



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
475 ALLENDALE RD, STE 102
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

November 10, 2022

John J. Grabnar
Site Vice President
Energy Harbor Nuclear Corporation
Beaver Valley Power Station
P.O. Box 4, Route 168
Shippingport, PA 15077

**SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2 – INTEGRATED
INSPECTION REPORT 05000334/2022003 AND 05000412/2022003 AND
INDEPENDENT SPENT FUEL STORAGE INSTALLATION INSPECTION
REPORT 07201043/2022001**

Dear John Grabnar:

On September 30, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Beaver Valley Power Station, Units 1 and 2. On October 6, 2022, the NRC inspectors discussed the results of this inspection with Bob Kristophel, Plant Manager, and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Beaver Valley Power Station, Units 1 and 2.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspector at Beaver Valley Power Station, Units 1 and 2.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Matt R. Young, Chief
Projects Branch 2
Division of Operating Reactor Safety

Docket Nos. 05000334, 05000412, and
07201043
License Nos. DPR-66 and NPF-73

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2 – INTEGRATED INSPECTION REPORT 05000334/2022003 AND 05000412/2022003 AND INDEPENDENT SPENT FUEL STORAGE INSTALLATION INSPECTION REPORT 07201043/2022001 DATED NOVEMBER 10, 2022

DISTRIBUTION:

- MYoung, DORS
- SElkhiamy, DORS
- JDeBoer, DORS
- EBrady, DORS
- GEatmon, DORS, SRI
- RRolph, DORS, RI
- CFragman, DORS, AA
- LMcKown, RI OEDO
- RidsNrrPMBeaverValley Resource
- RidsNrrDorlLp1 Resource

DOCUMENT NAME: <https://usnrc.sharepoint.com/teams/Region-I-Branch-2/Shared Documents/Inspection Reports/Beaver Valley/2022/BV IR 2022-003.docx>

ADAMS ACCESSION NUMBER: ML22314A063

<input checked="" type="checkbox"/> SUNSI Review		<input checked="" type="checkbox"/> Non-Sensitive <input type="checkbox"/> Sensitive		<input checked="" type="checkbox"/> Publicly Available <input type="checkbox"/> Non-Publicly Available	
OFFICE	RI/DORS	RI/DORS	RI/DORS	RI/DORS	
NAME	GEatmon	SElkhiamy	DWerkheiser	MYoung	
DATE	11/10/22	11/8/22	11/8/22	11/8/22	

OFFICIAL RECORD COPY

**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 05000334, 05000412, and 07201043

License Numbers: DPR-66 and NPF-73

Report Numbers: 05000334/2022003, 05000412/2022003, and 07201043/2022001

Enterprise Identifier: I-2022-003-0031

Licensee: Energy Harbor Nuclear Corporation

Facility: Beaver Valley Power Station, Units 1 and 2

Location: Shippingport, PA 15077

Inspection Dates: July 1, 2022 to September 30, 2022

Inspectors: E. Allen, Resident Inspector
E. Andrews, Technical Assistant
B. DeBoer, Senior Health Physicist
J. DeBoer, Senior Project Engineer
J. Demarshall, Senior Operations Engineer
G. Eatmon, Senior Resident Inspector
N. Eckhoff, Health Physicist
B. Edwards, Health Physicist
E. Eve, Senior Reactor Inspector
T. Fish, Senior Operations Engineer
J. Kulp, Senior Reactor Inspector
N. Mentzer, Reactor Inspector
R. Rolph, Resident Inspector
J. Schoppy, Senior Reactor Inspector
D. Werkheiser, Senior Reactor Analyst

Approved By: Matt R. Young, Chief
Projects Branch 2
Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated inspection at Beaver Valley Power Station, Units 1 and 2, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC’s program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

Emergency Diesel Generator Lube Oil Degraded Due to Inadequate Procedures			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000412/2022003-01 Open/Closed	[H.1] - Resources	71111.15
<p>A finding of very low safety significance (Green) and associated non-cited violation of Technical Specification 5.4.1.a, for the licensee’s failure to properly preplan and perform maintenance that can affect the performance of safety-related equipment. Specifically, the licensee failed to maintain adequate procedural guidance associated with filling and venting the 2-2 emergency diesel generator (EDG) fuel oil system following planned maintenance. This condition resulted in the 2-2 EDG gravity drain line becoming air-bound that caused fuel oil to contaminate and degrade the lube oil viscosity to less than allowed to support EDG operability.</p>			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000412/2022-001-00	LER 2022-001-00 for Beaver Valley Power Station, Unit 2, Operation or Condition Prohibited by Technical Specification and Loss of Safety Function due to Emergency Diesel Generator Fuel Oil Intrusion into Lube Oil	71153	Closed
LER	05000412/2021-005-00	LER 2021-005-00 for Beaver Valley Power Station, Unit 2, Manual Reactor Trip and Auxiliary Feedwater Actuation due to Trip of a Main Feedwater Pump	71153	Closed

PLANT STATUS

Unit 1 began the inspection period at 48 percent rated thermal power after the unit was manually shutdown on June 23, 2022. Unit 1 returned to rated thermal power on July 2, 2022. Unit 1 operated at or near rated thermal power for the remainder of the inspection period.

Unit 2 operated at or near rated thermal power for the entire inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed activities described in IMC 2515, Appendix D, "Plant Status," observed risk significant activities, and completed on-site portions of IPs. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 2, primary component cooling water from 'B' train pump to supply header and the service water to and from the primary component cooling heat exchanger, August 4, 2022
- (2) Unit 1, chemical and volume control system alignment for boron injection when letdown and normal charging were isolated, August 10, 2022
- (3) Unit 1, 'B' auxiliary feedwater system while 'A' auxiliary feedwater system was being tested, September 6, 2022
- (4) Unit 2, 'A' train auxiliary feedwater system while 'B' train auxiliary feedwater system was being tested, September 22, 2022

Complete Walkdown Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated system configurations during a complete walkdown of the Unit 2, 'D' recirculation spray to high head safety injection performed July 20–25, 2022.

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (7 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Units 1 and 2, control room and fan room, fire compartments 3-CR-1, 2-CB-4 and 2-CB-5, July 20, 2022
- (2) Unit 2, 718' and 737' safeguards, fire compartments 2-SG-12 and 2-SG-1N, July 21, 2022
- (3) Unit 2, decontamination building 735'-766', fire compartment 2-FB-1, July 28, 2022
- (4) Unit 1, safeguard building elevation 722', 735', 751' and pipe tunnel, fire area 1-PT-1, August 4, 2022
- (5) Unit 2, control building, fire compartment 2-CB-1, while automatic CO2 suppression non-functional and under continuous fire watch, August 24, 2022
- (6) Unit 1, cooling tower pump house, fire area 1-CTP-1, September 8, 2022
- (7) Unit 2, instrumentation room (2PFP-CNTB-707) and west communication room (2PFP-CNTB-707-West), fire areas 2-CB-1 and 2-CB-6, September 8, 2022

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the fire brigade performance during an unannounced fire drill on September 14, 2022.

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Unit 2, cable vault and auxiliary building 718'6" elevation, September 1, 2022

71111.11A - Licensed Operator Requalification Program and Licensed Operator Performance

Requalification Examination Results (IP Section 03.03) (2 Samples)

- (1) The inspectors reviewed and evaluated the Unit 1 licensed operator examination failure rates for the requalification annual operating exam administered July - August 2022.
- (2) The inspectors reviewed and evaluated the Unit 2 licensed operator annual requalification results for the annual operating exam administered April - July 2022.

71111.11B - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Requalification Program (IP Section 03.04) (1 Sample)

(1) Biennial Requalification Written Examinations

The inspectors evaluated the quality of the Unit 1 licensed operator biennial requalification written examination administered March - April 2022.

Annual Requalification Operating Tests

The inspectors evaluated the adequacy of the Unit 1 annual requalification operating test.

Administration of an Annual Requalification Operating Test

The inspectors evaluated the effectiveness of the facility licensee in administering requalification operating tests required by Title 10 of the *Code of Federal Regulations* (10 CFR) 55.59(a)(2) and that the facility licensee is effectively evaluating their licensed operators for mastery of training objectives.

Requalification Examination Security

The inspectors evaluated the ability of the facility licensee to safeguard examination material, such that the examination is not compromised.

Remedial Training and Re-examinations

The inspectors evaluated the effectiveness of remedial training conducted by the licensee, and reviewed the adequacy of re-examinations for licensed operators who did not pass a required requalification examination.

Operator License Conditions

The inspectors evaluated the licensee's program for ensuring that licensed operators meet the conditions of their licenses.

Control Room Simulator

The inspectors evaluated the adequacy of the facility licensee's control room simulator in modeling the actual plant, and for meeting the requirements contained in 10 CFR 55.46.

Problem Identification and Resolution

The inspectors evaluated the licensee's ability to identify and resolve problems associated with licensed operator performance.

71111.11Q - Licensed Operator Regualification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

- (1) The inspectors observed licensed operator performance in the control room during:
 - Unit 2, solid state protection system, 'B' train surveillance, September 15, 2022
 - Unit 1, partial rod movement test, September 22, 2022

Licensed Operator Regualification Training/Examinations (IP Section 03.02) (1 Sample)

- (1) The inspectors observed a Unit 1 simulator training evaluation that included two scenarios for cold weather preparations on September 26, 2022.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (3 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

- (1) Unit 2, multiple unexpected alarms for digital rod indication of control rod F04 in the 'B' control bank for the 'B' digital rod indication train, August 3, 2022
- (2) Unit 2, maintenance preventable functional failure evaluation of the 2 EDG air intake and recirculation damper to fail in full recirculation positions due to a power supply failure, August 9, 2022
- (3) Units 1 and 2, cable trays in electrical manhole 8B, September 2, 2022

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Unit 2, elevated risk during the scheduled dry cask campaign that included irradiated fuel movement and NUREG-1022 heavy load lifts, week of June 13 to week of August 1, 2022
- (2) Unit 2, emergent maintenance on the 2-2 EDG from July 13 to July 16, 2022
- (3) Unit 1, elevated risk due to single point vulnerability of bus duct cooling fan, 1GL-F-1B, after 1GL-F-1A tripped, that would require down power commence within 14 minutes of identification of the 'B' bus duct cooling fan tripped, while FCV-1CH-122, was unavailable, identified on August 8, 2022
- (4) Unit 1, elevated risk during emergent work to repair and repack charging flow control valve, FCV-1CH-122, that affected the ability to manage reactivity in the core, July 29 to August 12, 2022
- (5) Units 1 and 2, emergent work on the diesel engine driven fire pump during September 12–14, 2022

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (7 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) Unit 2, service water pump cubicle 'C' and 'D' crosstie flood door functional assessment performed after floor door seal unable to maintain pressure, April 1, 2022
- (2) Unit 1, EDG fuel oil tank calculation revision for minimum fuel oil volume storage requirements reflected in the calculated tank level requirements, and alarm setpoints, for the storage tanks, day tank, and engine mounted tank due to previously unaccounted, unusable tank volume, July 11, 2022
- (3) Unit 2, 2 EDG operability evaluation due to low lube oil viscosity after fuel oil was identified in lube oil, July 15, 2022
- (4) Unit 1, 1 EDG fire extinguisher at station 243, 150 pound dry chemical wheel unit, identified with an unsatisfactory low pressure and compensatory measure applied per Technical Requirements 9, July 27, 2022
- (5) Unit 1, recalculation of U1C28 end of life moderator temperature coefficient due to not meeting surveillance acceptance criteria, July 29, 2022
- (6) Unit 2, 2-1 EDG jack water heat exchanger low flow condition during planned system flush after chemically treating service water for asiatic clams and zebra mussels, August 4, 2022
- (7) Unit 1, 'A' and 'C' recirculation spray heat exchanger low flow condition that failed to meet the acceptance criteria during 'A' train reactor plant river water full flow test using the 'C' reactor plant river water pump, August 30, 2022

71111.17T - Evaluations of Changes, Tests, and Experiments

Sample Selection (IP Section 02.01) (27 Samples)

The inspectors reviewed the following evaluations, screenings, and/or applicability determinations for 10 CFR 50.59 from July 18–21, 2022.

- (1) Evaluation 19-01142, Steam Generator Examination Program, dated 1/22/2020
- (2) Evaluation 19-01882, Safety Analysis of the Radiological Consequences of a Waste Gas System Rupture Design Basis Accident at Beaver Valley Power Station Unit 1, Control Room, Exclusion Area Boundary, and Low Population Zone Doses, dated 1/22/2020
- (3) Evaluation 20-00440, Licensing Requirements Surveillance 3.3.9.6 Inspection of Beaver Valley Power Station-2 Main Turbine Throttle and Governor Valves on 40-month Interval, dated 4/1/20
- (4) Evaluation 20-00442, Remove the 2R21 (April 2020) Calibration Requirement for the Unit 2 Seismic Instruments from the Licensing Requirements Manual, dated 4/1/20
- (5) Evaluation 20-01033, Downgrade and isolate Beaver Valley Power Station-2 Hydrogen Analyzer Remote Control Panels BV-2HCS.PNL100A and BV-2HCSPNL1008, dated 8/18/2020
- (6) Evaluation 20-01128, Revision to Reactor Vessel System Model and Related Analyses, dated 8/20/2020

- (7) Evaluation 20-01484, Extend the Frequency as Listed in Licensing Requirement Manual Table 3.3.6-2 for the Calibration Interval for the Specified Seismic Monitoring Instrumentation, dated 3/9/2021
- (8) Evaluation 21-00869, Remove Licensing Requirements Surveillance 3.3.9.6 Requirements For Beaver Valley Power Station-2 Reheat Stop and Intercept Valve Inspections and Update Beaver Valley Power Station-2 Updated Final Safety Analysis Report, Section 3.5.1.3.4 (CN 21-053 and 21-059), dated 12/3/21
- (9) Evaluation 22-01042, Evaluate the PIPESTRESS Software for use at Beaver Valley Power Station-1, dated 3/2/22
- (10) 14-04037, Update to Leak-Before-Break Analysis BV 2 of Reactor Coolant System Branch Lines, dated 3/2/22
- (11) 19-00980, Change the Normal System Arrangement of Various BV 1 BV-2 Components, dated 1/6/20
- (12) 19-01061, Station Battery Charger Shutdown & Startup, dated 10/9/2019
- (13) 19-01317, Changes to the Licensing Requirements Manual/Core Operating Limit Report and Updated Final Safety Analysis Report text due to the Unit 1 Cycle BV 1 27 core design, dated 8/7/2019
- (14) 19-01367, Unit 2 Emergency Diesel Generator Wet Layup, dated 8/13/2019
- (15) 19-01392, Diesel Generator Fuel Oil Day Tanks BV 1 [1EE-TK-2A, 2B], dated 8/20/2019
- (16) 19-01426, Temporary Repair for Screen Spray Header, dated 8/27/2019
- (17) 19-01591, Updated Final Safety Analysis Report and Licensing Requirements Manual/Core Operating Limit Report Changes Due to a Revised Unit 1 Locked Rotor Accident Analysis, dated 10/19/19
- (18) 19-01745, Unit 1 Vertical Tornado Missile Protection, dated 11/19/2019
- (19) 19-01949, Reactor Coolant Pump Startup, dated 10/30/2019
- (20) 20-00446, Handling of NUREG BV 1 0612 Heavy Loads, dated 3/27/2020
- (21) 20-00685, Temporary Modification – Defeating an Encoder Card Input Train for an Individual Rod Digital Rod Position Indication (DRPI), dated 5/06/2020
- (22) 20-01618, Performance of Control Room River Water Cooling Coils with 90°F River Water, dated 12/17/2020
- (23) 21-00432, Elimination of Rod Worth BV 2 Measurement Testing, dated 3/23/21
- (24) 21-01097, BV 1 Technical Specification Bases, dated 7/21/21
- (25) 21-01698, OPPS Change and Document Updates for 54 "EFPY", dated 11/11/2021
- (26) 22-00141, BV 1 Diesel Generator No. 1 Monthly Test, dated 2/15/22
- (27) 22-00458, Auxiliary Feedwater Pump Startup, dated 4/12/2022

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the following post-maintenance testing activities to verify system operability and/or functionality:

- (1) Unit 2, 2-2 EDG after lube oil change, fuel injector replacements, two injector pump replacements, and fuel oil drain line venting during the week of July 13–16, 2022
- (2) Unit 1, reactor plant component cooling water pump (1CC-P-1C) operational testing after maintenance, July 28, 2022
- (3) Unit 1, delta T AVE protection instrument channel 1 calibration after TI-1RC-412C failed low, August 30, 2022

- (4) Unit 1, complete corrective actions for 'B' supplemental leak collection and release system exhaust fan, 1VS-F-4B, failure to start and restore, September 2, 2022
- (5) Unit 2, 'B' charging pump test, post preventative maintenance and oil change, September 16, 2022

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance testing activities to verify system operability and/or functionality:

Surveillance Tests (other) (IP Section 03.01) (8 Samples)

- (1) Unit 2, inspect and static test MOV operator, 2CCP-MOV177-2, "Primary Component Cooling Return Isolation Valve," July 26, 2022
- (2) Unit 1, 1OST-15.2, "Reactor Plant Component Cooling Water Pump," July 28, 2022
- (3) Unit 1, 1-CHS-SAM-3.25, "Reactor Coolant Sampling While Purging to the Primary Plant Sample Sink," August 1 and 3, 2022
- (4) Unit 2, 2MSP-21.19-1, "2MSS-P474 Loop A Steamline Pressure Protection Channel II Calibration," August 16, 2022
- (5) Unit 1, 1OST-36.2, "Diesel Generator No. 2 Monthly Test," August 17, 2022
- (6) Unit 1, 1OST-30.12A, "Train 'A' Reactor Plant River Water System Full Flow Test," August 30, 2022
- (7) Unit 1, 1OST-47.1, "Containment Air Lock Door(s) Type B Leak Test," test after containment entries, September 27, 2022
- (8) Unit 2, 2OST-1.11B, "Operating Surveillance Test Safeguards Protection System Train A SIS Go Test," train A, September 28, 2022

FLEX Testing (IP Section 03.02) (1 Sample)

- (1) Units 1 and 2, FLEX turbine marine generator quarterly surveillance test, August 8, 2022

71114.06 - Drill Evaluation

Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

The inspectors evaluated:

- (1) The conduct of a routine Beaver Valley Unit 2 emergency plan drill on August 11, 2022. The drill included failing the main service water, a leak in the emergency service water piping, followed by an anticipated transient without scram, a large break loss of coolant accident with loss of the fuel clad barrier, then a breach of containment, and radioactive release to the environment.

RADIATION SAFETY

71124.07 - Radiological Environmental Monitoring Program

Environmental Monitoring Equipment and Sampling (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated environmental monitoring equipment and observed collection of environmental samples.

Radiological Environmental Monitoring Program (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the implementation of the licensee's radiological environmental monitoring program.

GPI Implementation (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the licensee's implementation of the groundwater protection initiative program to identify incomplete or discontinued program elements.

71124.08 - Radioactive Solid Waste Processing & Radioactive Material Handling, Storage, & Transportation

Radioactive Material Storage (IP Section 03.01) (2 Samples)

The inspectors evaluated the licensee's performance in controlling, labeling and securing the following radioactive materials:

- (1) Dry drum storage area for Units 1 and 2
- (2) West Yard Seavan Container Storage Area

Radioactive Waste System Walkdown (IP Section 03.02) (2 Samples)

The inspectors walked down the following accessible portions of the solid radioactive waste systems and evaluated system configuration and functionality:

- (1) High Intensity Container processing and storage areas
- (2) Unit 1 radioactive liquid waste storage tanks

Waste Characterization and Classification (IP Section 03.03) (2 Samples)

The inspectors evaluated the following characterization and classification of radioactive waste:

- (1) Classification of container 120L-20012 as type B waste
- (2) Reviewed 10 CFR 61 analysis and how it is used in several shipments

Shipment Preparation (IP Section 03.04) (1 Sample)

- (1) Observed preparation of UN2910 contaminated laundry shipment number B-5285

Shipping Records (IP Section 03.05) (4 Samples)

The inspectors evaluated the following non-excepted radioactive material shipments through a record review:

- (1) Radioactive Waste Shipment Number B-5261, UN2916 Type B(U) package; metal oxide in High Intensity Container
- (2) Radioactive Waste Shipment Number B-5227; UN2913 Limited Quantity, Iron; Surface Contaminated Objects (SCO-II)
- (3) Radioactive Waste Shipment Number B-5262, UN3321 Radioactive Material 7, Low Specific Activity (LSA-II)
- (4) Radioactive Waste Shipment Number B-5263, UN3321 Radioactive Material 7, Low Specific Activity (LSA-II)

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS08: Heat Removal Systems (IP Section 02.07) (2 Samples)

- (1) Unit 1, July 1, 2021 through June 30, 2022
- (2) Unit 2, July 1, 2021 through June 30, 2022

MS09: Residual Heat Removal Systems (IP Section 02.08) (2 Samples)

- (1) Unit 1, July 1, 2021 through June 30, 2022
- (2) Unit 2, July 1, 2021 through June 30, 2022

MS10: Cooling Water Support Systems (IP Section 02.09) (2 Samples)

- (1) Unit 1, July 1, 2021 through June 30, 2022
- (2) Unit 2, July 1, 2021 through June 30, 2022

71152A - Annual Follow-Up Problem Identification and Resolution

Annual Follow-up of Selected Issues (Section 03.03) (2 Samples)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

- (1) Units 1 and 2, reactor pressure vessel O-ring seal non-conformance report for installed O-rings evaluation, September 7, 2022
- (2) Units 1 and 2, river water, service water and auxiliary feedwater piping material condition, September 19–22, 2022

71153 – Follow-Up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (2 Samples)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 05000412/2021-005-00, Unit 2, Manual Reactor Trip and Auxiliary Feedwater Actuation Due to Trip of a Main Feedwater Pump (ADAMS Accession No. ML22017A001). The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER, therefore, no performance deficiency was identified. The inspectors did not identify a violation of NRC requirements.
- (2) LER 05000412/2022-001-00, Unit 2, Operation or Condition Prohibited by Technical Specifications and Loss of a Safety Function Due to Emergency Diesel Generator Fuel Oil Intrusion into Lube Oil (ADAMS Accession No. ML22251A354). The inspection conclusions associated with this LER are documented in this report under Inspection Results Section 71111.15.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

60856 - Review of 10 CFR 72.212(b) Evaluations

Review of 10 CFR 72.212(b) Evaluations (1 Sample)

- (1) The inspectors reviewed Engineering Change Package 18-0193, which replaced the original Beaver Valley Unit 2 125 ton capacity crane with an upgraded 130 ton capacity single failure proof crane. This new crane supports the movement of spent fuel from the spent fuel pool to the Beaver Valley Independent Spent Fuel Storage Installation. The inspectors verified that dry cask storage system lifts were performed under the Beaver Valley Power Station’s control of heavy loads program, 1/2-ADM-0819, “Handling of NUREG 0612 Heavy Loads.” The crane was designed in accordance with Crane Manufacturers Association of America, Specification 70, “Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes,” and is capable of lifting the heaviest loads expected for dry cask storage system operations. The crane was tested in accordance with the requirements of the American Society of Mechanical Engineers, B30.2, “Overhead and Gantry Cranes Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist.” The inspectors verified that the crane completed testing with loads of 100 percent and 125 percent of the rated crane capacity. Additionally, the inspectors performed walkdowns of the crane and fuel and decontamination buildings during the week of March 14, 2022.

INSPECTION RESULTS

Emergency Diesel Generator Lube Oil Degraded Due to Inadequate Procedures			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000412/2022003-01 Open/Closed	[H.1] - Resources	71111.15
A finding of very low safety significance (Green) and associated non-cited violation of Technical Specification 5.4.1.a, for the licensee’s failure to properly preplan and perform			

maintenance that can affect the performance of safety-related equipment. Specifically, the licensee failed to maintain adequate procedural guidance associated with filling and venting the 2-2 emergency diesel generator (EDG) fuel oil system following planned maintenance. This condition resulted in the 2-2 EDG gravity drain line becoming air-bound that caused fuel oil to contaminate and degrade the lube oil viscosity to less than allowed to support EDG operability.

Description: On July 13, 2022, elevated fuel oil was identified in the lube oil for Unit 2 2-2 EDG through oil analysis results. The 2-2 EDG was declared inoperable due to lube oil dilution caused by fuel oil leakage into the lube oil reservoir. Fuel oil was bypassing the scraper rings, an internal component in the fuel injection pump drive, and entered the camshaft area that holds lube oil from the main reservoir. Excess fuel from the injection pumps did not drain to the underground fuel oil tank via the gravity drain line as designed because that path was blocked since it was air-bound. Instead, fuel oil bypassed the scraper rings and leaked into the camshaft area that resulted in dilution of the lube oil. The gravity drain line became air-bound during required maintenance for the EDG main fuel storage tanks, that requires the underground tanks to be drained, cleaned, inspected, and subsequently refilled with fuel oil on a 10-year frequency IAW License Requirement Surveillance 3.8.3.1.

Nine months prior, during this surveillance in refueling outage 2R22, an air-bound condition was introduced into the fuel oil gravity drain piping of both trains of the EDGs (Unit 2, 2-1 and 2-2 EDGs) because each fuel oil storage tank was completely drained below the gravity drain line outlet inside the tank, allowing an air bubble to form in the line when the fuel oil tank was refilled without venting.

During post-maintenance testing in 2R22, the air-bound condition was discovered and corrected on the 2-1 EDG, when fuel oil sputtering from a fuel injector pump was identified and replaced. During this maintenance, the air-bound fuel drain line was identified, and gravity vent valve for 2-1 EDG was opened, allowing excess fuel flow from the injection pumps to drain to the underground fuel oil tank. The 2-2 EDG did not experience any fuel oil sputtering from the fuel injector pumps so the gravity vent valve was not opened.

When the 2-2 EDG gravity drain line was air-bound, fuel oil was introduced into the lube oil during operation of the EDG, causing contamination of the lube oil that led to viscosity degradation. With the viscosity of the lube oil degraded, the oil film strength is reduced and potentially increases wear rates of engine components. Using the existing fuel oil leak rate combined with continued 2-2 EDG operation, the licensee determined 2-2 EDG would not meet its current licensing basis requirement of a 30-day mission time. The licensee further concluded that the 2-2 EDG would support probability risk analysis mission time, or probability risk analysis function, based on extrapolating minimum lube oil viscosity. Concurrently, the 2-1 EDG maintained a monthly surveillance schedule, meaning the 2-1 EDG was inoperable for less than the technical specification completion time and when performing a surveillance, the 2-1 EDG supported the probability risk analysis function.

Corrective Actions: The licensee concluded that procedures associated with adding fuel to the fuel oil storage tanks did not recognize the need to open the gravity drain vent valve every time fuel is added to the storage tanks, including after cleaning. The specific procedures are 1/2-PMP-M-36-001, "Diesel Generator Fuel Oil Holding or Storage Tank Cleaning," dated January 24, 2019; and 2OM-36.4.U, "Filling an Emergency Diesel Generator Fuel Oil Storage Tank," Revision 14. Furthermore, the licensee determined promptly sampling oil after post-

maintenance testing and evaluating the results is prudent, in addition to establishing a scraper ring preventative maintenance strategy.

Corrective Action References: CR2022-05516

Performance Assessment:

Performance Deficiency: The failure to provide adequate procedures for maintenance on safety-related equipment was a performance deficiency. Specifically, the licensee's failure to provide and maintain adequate procedural guidance and instructions in 1/2-PMP-M-36-001 or 2OM-36.4.U, associated with filling and venting the 2-2 EDG fuel oil system gravity drain from the fuel injection pumps to the underground storage tank, were properly vented after the underground storage tank was inspected per License Requirement Surveillance 3.8.3.1, led to the gravity drain line becoming air-bound. The air-bound drain line resulted in the fuel oil bypassing the scraper rings and diluted the lube oil to an unacceptable viscosity and the 2-2 EDG was declared inoperable.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Procedure Quality attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to provide an adequate surveillance and maintenance procedure to restore (fill and vent) the 2-2 EDG fuel oil system after a required underground fuel oil tank inspection required, that included steps to vent the air-bound gravity drain line of the 2-2 EDG fuel oil system.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding was determined to be of very low safety significance (Green) because it (1) was not a design or qualification deficiency impacting operability or probability risk analysis functionality, (2) did not represent a loss of system and/or function, (3) did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time, (4) did not represent a loss of the probability risk analysis function of two separate technical specification systems for greater than 24 hours, (5) did not represent a loss of probability risk analysis system and/or function for greater than 24 hours, and (6) did not result in the loss of a high safety-significant, non-technical specification train.

Cross-Cutting Aspect: H.1 - Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Procedures to support License Requirement Surveillance, 3.8.3.1, "Main Fuel Oil Storage Tank Maintenance Requirement," were not available and adequate to support nuclear safety.

Enforcement:

Violation: Technical Specification 5.4.1.a requires, in part, that written procedures shall be established, implemented, and maintained covering activities referenced in Regulatory Guide 1.33, Appendix A, Revision 2, Section 9, "Procedures for Performing Maintenance," requires, in part, that maintenance should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. The licensee established Procedure 1/2-PMP-M-36-001, Issue 4, Revision 7, to clean diesel generator fuel oil holding or storage tanks and 2OM-36.4.U, to fill an EDG fuel oil storage tank.

Contrary to the above, the licensee failed to maintain written procedures, documented instructions, or drawings appropriate to the circumstances to filling and venting the EDG fuel oil system. Specifically, the licensee failed to identify inadequate procedural guidance associated with refilling and venting the EDG fuel oil tank after License Requirement Surveillance 3.8.3.1, in accordance with Procedure 1/2-PMP-M-36-001 or 2OM-36.4.U. This condition resulted in the 2-2 EDG gravity drain line becoming air-bound, caused fuel oil to contaminate and degrade lube oil viscosity, and resulted in 2-2 EDG not able to meet a licensing basis mission time.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Observation: Unit 1 and 2, River Water, Service Water and Auxiliary Feedwater Piping Material Condition	71152A
---	--------

The inspectors performed an in-depth review of Beaver Valley Power Station's corrective actions to address piping degradation in the service water, river water, and auxiliary feedwater systems identified either through planned examinations or reactive corrective actions resulting from identified leaks during the operating cycle. The inspectors reviewed the last 3 years of corrective action program documentation for the identified systems, performed walkdowns of the systems and conducted interviews with the responsible system and program engineers.

Beaver Valley identified localized wall thinning near an orifice in an auxiliary feedwater pump recirculation line during examinations performed as part of a Beaver Valley inspection program developed in response to industry operating experience in piping degradation in similarly designed auxiliary feedwater piping systems. The licensee performed an engineering analysis to ensure the structural integrity of the thinned area and scheduled the replacement of the affected section of piping with erosion resistant material in the next outage.

Beaver Valley monitors the Unit 1 river water and Unit 2 service water systems under the maintenance rule and under the open cycle cooling water system program aging management plan. Corrective actions are tracked in the Beaver Valley corrective action program and evaluated and repaired using American Society of Mechanical Engineers Code Case N-513 when appropriate. Beaver Valley implemented continuous biocide injection in 2014 in the service and river water systems, replacing a periodic batch add process. The continuous chlorination process appears to have been more effective against the microbiological induced corrosion which is common in the raw water systems at Beaver Valley. Recently, the number of through wall raw leaks attributed to microbiological induced corrosion has increased and corresponds to the unavailability of the continuous chlorination system which has piping leaks and causes Beaver Valley Power Station to the use of the batch add method of chlorination to combat microbiological induced corrosion. Beaver Valley is in the process of repairing the piping for the continuous chlorination system.

The inspectors did not identify any findings or violations.

EXIT MEETINGS AND DEBRIEFS

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

- On October 6, 2022, the inspectors presented the integrated inspection results to Bob Kristophel, Plant Manager, and other members of the licensee staff.
- On July 14, 2022, the inspectors presented the radiological environmental monitoring program inspection results to Greg Laird, P.I. Director, and other members of the licensee staff.
- On July 21, 2022, the inspectors presented the triennial evaluation of changes, tests, and experiments inspection results to Will Cothen, Director, Site Engineering, and other members of the licensee staff.
- On September 22, 2022, the inspectors presented the radioactive waste inspection results to Steve Sawtschenko, Station Manager for Regulatory Affairs and Emergency Preparedness, and other members of the licensee staff.

THIRD PARTY REVIEWS

Inspectors reviewed Institute on Nuclear Power Operations reports that were issued during the inspection period.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date		
71111.04	Drawings	RM-0407-001	Chemical and Volume Control System	Revision 40		
		RM-0407-003	Chemical and Volume Control System	Revision 27		
		RM-0407-004	Chemical and Volume Control System	Revision 31		
		RM-0415-001	Primary Component Cooling Water	Revision 20		
		RM-0424-002	Valve Operator No Diagram Feedwater System	Revision 20		
		RM-0424-003	Valve Oper No Diagram Auxiliary Feedwater	Revision 21		
		RM-0430-001	Service Water Supply and Distribution	Revision 38		
		RM-0430-003	Service Water Primary Cooling	Revision 29		
	Procedures	1/2-ADM-2098	System Walkdowns	Revision 3		
		1OST-11.3	Boron Injection FLOW Path Valve Position Verification	Revision 19		
		RM-0413-001	Recirculation Spray System	Revision 12		
		RM-407-001A	Chemical and Volume Control	Revision 27		
		RM-411-001	Low/High Head Safety Injection	Revision 22		
		71111.05	Corrective Action Documents	CR-2022-06381		
			Fire Plans	1PFP-CTPH	Cooling Tower Pump House	Revision 1
1PFP-SFGB-711	Safeguards Area, Fire Compartment 1-PT-1			Revision 2		
1PFP-SFGB-751	West Safeguards, Fire Compartment 1-PT-1			Revision 2		
1PFP-SRVB-735-CONTRM	Control Room and Computer Room			Revision 2		
2PFP-CBLT-712	Cable Tunnel Fire Compartment 2-CB-1			Revision 6		
2PFP-CNTB-707	Instrumentation and Relay Area Fire Compartment 2-CB-1			Revision 7		
2PFP-CNTB-707	Instrumentation and Relay Area			Revision 7		
2PFP-CNTB-707-West	West Communication Room			Revision 4		
2PFP-CNTB-725	Cable Spreading Area Fire Compartment 2-CB-1			Revision 6		
2PFP-CNTB-735	Control Room and Computer Room			Revision 5		
2PFP-CNTB-735-FAN	Fan Room			Revision 3		
2PFP-DCNB-735-766	Decon Building Fire Compartment 2-FB-1			Revision 2		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		2PFP-MSCV-755-ROD	Rod Control Area Fire Compartment 2-CV-3	Revision 5
		2PFP-SFGS-718	Safeguards	Revision 3
		2PFP-SFGS-737	Safeguards	Revision 4
	Procedures	2MSCV-12	Fire Drill Scenario	09/13/2022
71111.06	Procedures	10080-DMC-0058	Flooding Analysis of Cable Vault and Auxiliary Building, 718'6" Elevation	Revision 0
71111.11Q	Miscellaneous		Simulator Instructor Guidelines for Cycle 5 Cold Weather Preparations	
	Procedures	1OST-1.1	Control Rod Assembly Partial Movement Test	Revision 26
		2MSP-1.05-1	Reactor Protection System Train B Test	02/25/2022
71111.12	Corrective Action Documents	CR-2008-46961		
		CR-2009-60316		
		CR-2022-06115		
		CR-2022-06763	(NRC id)	
	Procedures	1/2MI-75-Manhole-1E	Unit 1/2 Inspection of Manholes for Water Induced Damage	
		NOBP-ER-3399	Circuit Card and Power Supply Burn-In Guide	03/08/2021
		NOBP-ER-3900	Equipment Reliability and Common Definitions and Structures	03/18/2022
71111.13	Corrective Action Documents	CR-2022-04712		
		CR-2022-05783		
		CR-2022-06053		
	Procedures	1/2-ADM-0804	On-Line Risk Assessment and Management	Revision 15
		1/2-ADM-0819	Handling of NUREG 0612 Heavy Loads	Revision 21
		1OM-35.4.ABS	Unit 1, Main Leads Cooling Fan Auto Stop	Revision 1
		2OST-36.2	Emergency Diesel Generator [2EGS*EG2-2] Monthly Test	Revision 82
		NOP-OP-1007	Risk Management	Revision 37
		NOP-OP-1007	Risk Management	Revision 37
		PRA-BV2-21-002-R00	BVPS-2 Configuration Risk Determination for Both Normal Fire Pumps OOS	Revision 0
	Work Orders	200821527		
200851939				

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.15	Calculations	8700-DMC-3443	BVPS Intake Structure Cubicles Internal Flood Analysis	08/17/2001
	Corrective Action Documents	CR-2022-02894		
		CR-2022-03979		
		CR-2022-05450		
		CR-2022-05516	Oil Analysis Indicates Elevated Presence in 2-2 Diesel Engine Oil	07/13/2022
		CR-2022-05848		
		CR-2022-05889		
		CR-2022-06027		
	CR-2022-06167			
	Procedures	1/2-PMP-M-36-001	Diesel Generator Fuel Oil Holding or Storage Tank Cleaning	01/24/2019
		1RST-2.5	Moderator Temperature Coefficient Determination, Issue 1	Revision 15
		2OM-30.4.M	Asiatic Clam and Zebra Mussel Chemical Treatment Program, Train A Service Water System	Revision 51
2OM-36.4.U		Filling an Emergency Diesel Generator Fuel Oil Storage Tank	Revision 14	
71111.17T	Calculations	DMC-2362	Performance of Control Room River Water Cooling Coils with 90F River Water	12/17/2021
	Corrective Action Documents Resulting from Inspection	CR-2022-05384		
		CR-2022-05405		
		CR-2022-05684		
		CR-2022-05689		
	Procedures	1/2-ADM-0819	Handling of NUREG 0612 Heavy Loads	Revision 21
		1OM-6.4A	Reactor Coolant Pump Startup	Revision 36
71111.19	Corrective Action Documents	CR-2022-06600		
		CR-2022-06679		
	Procedures	1OST-15.3	[1CC-P-1C] Quarterly Test	Revision 52
		2OM-7.4.A1	Returning A Charging/HHSI Pump to Service Following Mechanical Maintenance	Revision 10
		2OST-36.2	Emergency Diesel Generator [2EGS*EG2-2] Monthly Test	Revision 83
		2OST-7.5	Centrifugal Charging Pump [2CHS*P@!B]	Revision 42
	Work Orders	200888843		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		200888844		
		200891455		
71111.22	Corrective Action Documents	CR-2022-06667		
		CR-2022-06668		
		CR-2022-06673		
	Drawings	RM-0053A	Flow Diagram Emergency Diesel Generator Fuel and Air System	Revision 37
		RM-0415-005	Primary Component Cooling Water (G-5)	Revision 11
		RM-0421-001	Unit 2 Main Steam System	Revision 18
	Miscellaneous		Beaver Valley PM Service Report, Turbine Marine Inc	08/08/2022
	Procedures	1-CHM-SAM-3.15	Charging Pump Discharge [1CH-P-1A, 1B, 1C]	Revision 8
		1-CHM-SAM-3.25	Reactor Coolant	Revision LUC Tracking No. PAF-22-01084
		1-CHM-SAM-3.26	RCS-Demineralizer Inlet and Outlet Header	Revision13
		1/2-CMP-75-QUARTER TURN-iE	Testing of Motor Operated Butterfly Valves	Revision 17
		1/2-PMP-E-75-020	Limitorque MOV Inspection and Test	Revision 20
		1OST-47.1	Containment Air Lock Door(s) Type B Leak Test	Revision 15
		2MSP-21.19-1	Unit 2, 2MSS-P474 Loop A Steamline Pressure Protection Channel II Calibration Issue 4	
		2OST-1.11B	Operating Surveillance Test Safeguards Protection System Train A SIS Go Test	Revision 51
		IOST-36.2	Diesel Generator No. 2 Monthly Test	Revision 87
	Work Orders	200812336	Inspect and Static Test MOV Operator	
71114.06	Miscellaneous		2022 Blue Team Integrated Drill Scenario	08/11/2022
71152A	Corrective Action Documents	CR-2021-06193		
		CR-2022-02903		
		CR-2022-03048		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		CR-2022-06667		
		CR-2022-06846		
71153	Corrective Action Documents	CR-2021-08803		