



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

February 23, 2021

Mr. David Rhoades
Senior VP, Exelon Generation Co., LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – DESIGN BASIS
ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT
05000237/2021010 AND 05000249/2021010**

Dear Mr. Rhoades:

On January 29, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Dresden Nuclear Power Station, Units 2 and 3 and discussed the results of this inspection with Mr. P. Karaba, Site Vice President 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 III; the Director, Office of Enforcement; and the NRC Resident Inspector at Dresden Nuclear Power Station, Units 2 and 3.

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 III; and the NRC Resident Inspector at Dresden Nuclear Power Station, Units 2 and 3.

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,

/RA/

Karla K. Stoedter, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 05000237 and 05000249
License Nos. DPR-19 and DPR-25

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

Letter to David Rhoades from Karla K. Stoedter dated February 23, 2021.

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – DESIGN BASIS
 ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT
 05000237/2021010 AND 05000249/2021010

DISTRIBUTION:

Jessie Quichocho
 Mark Haire
 RidsNrrDorLpl3
 RidsNrrPMDresden Resource
 RidsNrrDrolrib Resource
 John Giessner
 Kenneth O'Brien
 Jamnes Cameron
 Allan Barker
 DRPIII
 DRSIII
ROPreports.Resource@nrc.gov

ADAMS ACCESSION NUMBER: ML21054A248

<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	RIII	RIII			
NAME	JCorujo-Sandin:mb via e-mail	KStoedter via e-mail			
DATE	02/23/2021	02/23/2021			

OFFICIAL RECORD COPY

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

Docket Numbers: 05000237 and 05000249

License Numbers: DPR-19 and DPR-25

Report Numbers: 05000237/2021010 and 05000249/2021010

Enterprise Identifier: I-2021-010-0018

Licensee: Exelon Generation Company, LLC

Facility: Dresden Nuclear Power Station, Units 2 and 3

Location: Morris, IL

Inspection Dates: January 11, 2021 to January 29, 2021

Inspectors: K. Barclay, Reactor Inspector
J. Benjamin, Senior Reactor Inspector
J. Corujo-Sandin, Senior Reactor Inspector
B. Daley, Senior Reactor Inspector
M. Holmberg, Senior Reactor Inspector
J. Park, Reactor Inspector

Approved By: Karla K. Stoedter, Chief
Engineering Branch 2
Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting a design basis assurance inspection (teams) inspection at Dresden Nuclear Power Station, Units 2 and 3, 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

Missing or Inadequate Battery Surveillance Acceptance Criteria			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000237,05000249/2021010-01 Open/Closed	[P.2] - Evaluation	71111.21M
The inspectors identified a Green finding and associated Non-Cited Violation (NCV) of 10 CFR 50, Appendix B, Criterion XI, “Test Control,” when the licensee failed to establish acceptance criteria or account for instrument uncertainty in surveillance procedures for battery electrolyte temperature.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000237,05000249/ 2021010-02	Potential Non-Conservative DC Short-Circuit Current Values	71111.21M	Open

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 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. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the Coronavirus Disease (COVID-19), regional inspectors were directed to begin telework. During this time regional baseline inspections were evaluated to determine if all or portions of the objectives and requirements stated in the IP could be performed remotely. In some cases, portions of an IP were completed remotely and on-site. The inspection documented below was determined that the objectives and requirements stated in the IP could be completed remotely.

REACTOR SAFETY

71111.21M - Design Bases Assurance Inspection (Teams)

The inspectors evaluated the following components and listed applicable attributes, permanent modifications, and operating experience:

Design Review - Risk-Significant/Low Design Margin Components (IP Section 02.02) (4 Samples)

For each component sample, the inspectors reviewed the licensing bases including: (1) the Updated Final Safety Analysis Report (UFSAR); (2) the Technical Specification (TS); and (3) the Technical Requirements Manual (TRM). The inspectors reviewed a sample of operating procedures (including normal, abnormal and accident procedures) as well as the overall system/component health (including condition reports and operability evaluations, if any). The inspectors performed visual inspections of the accessible components to identify potential hazards and/or signs of degradation. Additional component specific attributes inspected are listed below.

(1) Unit 3: 125VDC Battery (3-83125-3AH4-F1 & 3-83125-3AH4-F2)

1. Maintenance effectiveness
2. Modifications
3. Translation of vendor specifications
4. Environmental qualification
5. Mechanical design:
 - a. Flood protection
 - b. Seismic
 - c. High energy line break
 - d. Room heat up
 - e. Room ventilation

6. Test/inspection procedures, acceptance criteria, and recent results:
 - a. Performance testing
 - b. TS surveillance
 - c. Discharge testing
 - d. Terminal corrosion resistance
7. Electrical design:
 - a. Battery sizing
 - b. Duty cycle
 - c. Float and equalizing voltages
 - d. Battery loading
 - e. Short circuit calculation
 - f. Breakers
 - g. Maximum allowed room temperature during normal and accident operations
 - h. Voltage drop calculation
 - i. Minimum voltage
 - j. Hydrogen concentration calculation
 - k. Battery life
 - l. Battery charger sizing
 - m. Cable ampacity
 - n. Ground protection
 - o. Protective relays/breakers

(2) Unit 3: 125VDC Distribution Panel (3A-1)

1. Mechanical design:
 - a. Flood protection
 - b. Seismic
 - c. Room heat up
 - d. Room ventilation
2. Electrical design:
 - a. Short circuit calculation
 - b. Breaker ratings
 - c. Minimum voltage at downstream panels
 - d. Voltage drop calculation
 - e. Coordination calculations
3. Ground detection
4. Surveillance procedures

(3) Unit 2: Isolation Condenser Outboard Condensate Return Valve (MOV 2-1301-3)

1. Environmental qualification
2. Protection against seismic events
3. Mechanical design:
 - a. Weak link analysis
 - b. Required thrust and torque
 - c. Pressure locking and/or thermal binding
 - d. Maximum allowed leakage
 - e. Maximum differential pressure
4. Test/ inspection procedures, acceptance criteria, and recent results:
 - a. Leakage

- b. In service testing
 - c. TS required surveillance
 - d. Leak rate testing
 - e. Actuation test
 - 5. Motor:
 - a. Voltage drop
 - b. Control logic
 - c. Thermal overload
- (4) Unit 2: Turbine Building Closed Cooling Water Heat Exchanger (2A)
- 1. Maintenance effectiveness (e.g., maintenance rule and procedures)
 - 2. Design calculations and considerations:
 - a. Tube plugging limit
 - b. Heat transfer capacity
 - 3. Test/inspection procedures, acceptance criteria, and recent results:
 - a. Flowrates
 - b. Inspection or thermal performance test

Design Review - Large Early Release Frequency (LERFs) (IP Section 02.02) (1 Sample)

- (1) Unit 2: Isolation Condenser (2-1302)
- 1. As built heat exchanger for conformance with design specifications and construction code requirements
 - 2. Modifications
 - 3. Protection against seismic events
 - 4. Design calculations and considerations:
 - a. Shell make-up capability
 - b. Heat transfer capacity
 - 5. Test/inspection procedures, acceptance criteria, and recent results:
 - a. Inspection and thermal performance tests
 - b. Eddy current examination of internal tube bundles
 - 6. Impacts of thermal transients (peak stress and fatigue) during shell refill on heat exchanger tube bundles
 - 7. Chemistry samples - for leak detection

Modification Review - Permanent Mods (IP Section 02.03) (5 Samples)

- (1) Engineering Change (EC) 20170124: Replace Speed Board and Install Magnetic Pickup Sensor for Emergency Diesel Generator (EDG) Unit 2
- (2) EC 405079: EPN 2/3-5203, EDG Fuel Oil Transfer Pump Motor - Determine Impact of Replacement Motor on Protective Devices/Calculations/UFSAR
- (3) EC 405449: Reconfigure the 2/3 EDG Heating, Ventilation and Air Conditioning Dampers and Related Items to Fail Open on a Loss of Instrument Air
- (4) EC 628890: Installation of Reactor Feed Pump Suction Strainers
- (5) EC 399980: Replace/Modify Angled Main Steam Isolation Valve Disc with Spherical Edges to Reduce Seat Leakage

Review of Operating Experience Issues (IP Section 02.06) (2 Samples)

- (1) Bulletin 1976-01: Boiling Water Reactor Isolation Condenser Tube Failure
- (2) Information Notice 2017-06: Battery and Battery Charger Short-Circuit Current Contributions to a Fault on the Direct Current Distribution System

INSPECTION RESULTS

Missing or Inadequate Battery Surveillance Acceptance Criteria			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000237,05000249/2021010-01 Open/Closed	[P.2] - Evaluation	71111.21M
<p>The inspectors identified a Green finding and associated Non-Cited Violation (NCV) of 10 CFR 50, Appendix B, Criterion XI, "Test Control," when the licensee failed to establish acceptance criteria or account for instrument uncertainty in surveillance procedures for battery electrolyte temperature.</p> <p><u>Description:</u></p> <p>The inspectors identified deficiencies with the testing procedures for the safety-related 125 VDC and 250 VDC station batteries. Specifically, the inspectors found examples where the licensee failed to: (1) establish acceptance criteria; (2) account for instrument uncertainties; and/or (3) account for errors when using indirect measurement methodologies in the procedures used to measure battery electrolyte temperature.</p> <p>In accordance with Title 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," tests performed on safety-related components must incorporate the requirements and acceptance limits contained in applicable design documents. For the 125 VDC batteries, the applicable design document was calculation DRE18-0009, "Dresden Units 2 and 3, 125 VDC System Analysis." This calculation establishes that 65 degrees Fahrenheit (degrees F) was used as the minimum electrolyte temperature when developing the battery sizing calculation. Additionally, UFSAR Section 8.3.2.1.1 for the 250 VDC system and Section 8.3.2.2.1 for the 125 VDC system describe the minimum electrolyte temperature used for battery sizing as 65 degrees F.</p> <p>To ensure continued compliance with design documents and regulatory requirements, the licensee periodically measured the battery electrolyte temperature using direct or indirect methods. When using an instrument to directly or indirectly measure a value, the measured value will always have an amount of uncertainty. These uncertainties need to be accounted for in an analysis or within the acceptance criteria to ensure the associated structure, system or component (SSC) remains within licensing and design bases values (i.e. greater than or equal to 65 degrees F). The licensee measured distinct battery parameters, including electrolyte temperatures, for the 125 VDC and 250 VDC station batteries on a monthly, quarterly and annual periodicity. For each of these frequencies the licensee developed and implemented specific surveillance procedures.</p> <p>Monthly (every 31 days): Technical Specifications Surveillance Requirement (TSSR) 3.8.6.4 required the licensee to verify each battery pilot cell temperature is greater than or equal to minimum established design limits. The TS bases for TSSR 3.8.6.4 prescribes the minimum established design limit as 65 degrees F.</p> <p>The licensee implemented procedure DOS 8300-16, "U2 (3) Monthly Station Battery Inspection," to satisfy the monthly surveillance requirement. The inspectors found that instead of measuring battery electrolyte temperature directly to meet TSSR 3.8.6.4, the licensee measured battery room ambient temperature and verified the room temperature was</p>			

greater than or equal to 65 degrees F. The licensee had not accounted for any potential instrument uncertainty or indirect measurement effects when establishing the acceptance criteria. The inspectors reviewed a sampling of quarterly and annual battery inspection procedures which required both battery electrolyte and room temperatures to be measured and found instances where the average temperature of the battery was below the measured room temperature. In one instance, the average battery temperature was 1.3 degrees F below the room temperature with one of the individual battery cells being 2.9 degrees F below the room temperature. Additionally, the inspectors reviewed the measuring and test equipment (M&TE) calibration certificate for the instrument used to measure room temperature and found the acceptance tolerance was +/- 0.54 degrees F.

Quarterly (every 92 days): Technical Requirements Manual, Section 3.8.b, "Battery Monitoring and Maintenance," specifically Surveillance Requirement TSR 3.8.b.3, directs the licensee to verify the average electrolyte temperature of representative cells is greater than 65 degrees F.

The licensee used procedure DOS 8300-17, "U2 (3) Quarterly Station Battery Inspection," to meet this requirement. When successfully completed, this procedure was also credited as satisfying the monthly test required by TSSR 3.8.6.4. The inspectors found the licensee measured the electrolyte temperature directly for the pilot cell and six other representative battery cells during the performance of DOS 8300-17. However, this procedure failed to have explicit acceptance criteria to confirm the battery temperature remained within design limits.

Annually: IEEE Standard 450-1995, Section 4.3.3, "Yearly," directs the licensee check the specific gravity of each cell.

The licensee utilized procedure DES 8300-49, "Yearly Unit 2 (3) Safety Related 125V and 250V Station Battery Inspection," to meet the IEEE Standard. When successfully completed, the results from this procedure were also used to satisfy the quarterly (TSR 3.8.b.3) and monthly (TSSR 3.8.6.4) surveillance requirements. The inspectors reviewed procedure DES 8300-49 and found the licensee had failed to establish acceptance criteria to confirm acceptable results for the specific pilot cell electrolyte temperature (TSSR 3.8.6.4) and account for instrument uncertainty in the acceptance criteria for verifying the average electrolyte temperature of representative cells (TSR 3.8.b.3). The inspectors reviewed the M&TE calibration certificate for the instrument that measured battery electrolyte temperature and found that the acceptance tolerance was +/- 0.9 degrees F.

Since the available acceptance criteria in procedure DOS 8300-16 was equal to the design acceptance limits, the inspectors concluded the instrument uncertainties were not accounted for in the surveillance procedures. No evidence was provided to the inspectors to demonstrate these uncertainties had been accounted for elsewhere. The licensee was also unable to provide information explaining why procedures DOS 8300-17 and DES 8300-49 failed to contain acceptance criteria. As a result, the inspectors were concerned the lack of acceptance criteria and the failure to account for uncertainties could result in a situation where a surveillance test was declared satisfactory when in reality the battery electrolyte temperature was below the minimum established design limit of 65 degree F assumed in the UFSAR, design calculations, TS Bases and the TRM. Battery temperatures below the minimum design limit would result in a failed TS surveillance, require the licensee to enter the associated LCO action statement, and the need to restore battery pilot cell temperature to greater than or equal to the minimum established design limit within 12 hours. If battery temperature is not able to be restored within 12 hours, the licensee must declare the battery

inoperable. The inspectors reviewed past surveillance test results and did not identify any instances where the battery should have been declared inoperable.

Corrective Actions: The licensee verified that previous surveillance test results were acceptable and the batteries remained operable. The licensee also created an assignment to evaluate the implementing procedures for TSSR 3.8.6.4 and TSR 3.8.b to ensure uncertainty from instruments and indirect measurements are considered when establishing acceptance criteria.

Corrective Action References:

AR 4398651: 2021 NRC DBAI Questions for DOS 8300-16

AR 4398689: NRC DBAI 2021 - Inadequate 50.59 for DOS 8300-16 Rev 16

Performance Assessment:

Performance Deficiency: The licensee's monthly, quarterly, and annual battery surveillance procedures had missing or inadequate acceptance criteria for the performance of TSSR 3.8.6.4 and TSR 3.8.b.3. Specifically, the acceptance criteria were either missing or failed to account for instrument uncertainty and/or indirect measurement effects. This was contrary to Title 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," and was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, failing to have acceptance criteria or implementing acceptance criteria without accounting for instrument uncertainty and indirect measurement effects would have the potential to result in a satisfactory test result, when in actuality the SSCs had failed the surveillance test. Since the acceptance criteria values used in one of the procedures were the same as those used in Technical Specifications, the Technical Requirements Manual, and the associated analysis used to establish the minimum design limit, this could have resulted in: (1) the licensee failing to enter the required TS Limiting Condition of Operation (LCO) action; (2) failing to declare the associated equipment inoperable; (3) failing to enter the TRM action; and/or (3) potentially place the plant in an unanalyzed configuration. This issue is similar to the guidance provided in IMC 0612, Appendix E, Example 3.g.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The inspectors screened the issue against the Mitigating Systems Cornerstone questions and determined that the finding was of very low safety significance (Green) because it was not a design or qualification issue, did not represent a loss of probabilistic risk assessment function, and was not associated with an SSC specifically designed to mitigate an external event. The inspectors did not identify an example where the deficient procedures resulted in an actual failed surveillance test.

Cross-Cutting Aspect: P.2 - Evaluation: The organization thoroughly evaluates issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, the NRC identified a similar NCV in the first quarter of 2020, and the licensee's extent of condition failed to identify these additional battery surveillance examples. The previous NCV also involved instrument uncertainty and was documented in NRC Inspection Report 05000237/2020001 (ADAMS Accession Number ML20133J811).

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," requires, in part, that a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.

Calculation DR18-0009, revision 0, "Dresden Units 2 and 3, 125 VDC System Analysis," serves as the applicable design document and establishes that 65 degrees F was the minimum temperature assumed in the battery sizing calculation.

For the safety-related 125 VDC and 250 VDC station batteries: Procedure DOS 8300-16, "U2 (3) Monthly Station Battery Inspection," revision 22, is the implementing procedure to comply with applicable design documents and TSSR 3.8.6.4. Data Sheet 1, "Monthly Battery Surveillance Data Sheet," contains acceptance criteria that ambient room temperature must be greater than or equal to 65 degrees F when battery charging current is less than or equal to 2 amperes when on a float charge. The licensee credits complying with the ambient room temperature acceptance criteria for verifying that each battery pilot cell electrolyte temperature is greater than or equal to minimum established design limits (i.e. 65 degrees F).

Procedure DOS 8300-17, "U2 (3) Quarterly Station Battery Inspection," revision 22, is the implementing procedure to comply with applicable design documents, TSSR 3.8.6.4. and TSR 3.8.b.3. Section A, "Purpose", states in part, "this procedure contains actions to satisfy weekly AND monthly surveillance criteria." Data Sheet 2, "U2(3) 125 VDC Battery Cell Voltage, Level, and Specific Gravity Datasheet," measures the electrolyte temperature for the pilot cell and six other representative battery cells. Data Sheet 3, "U2(3) 125 VDC Battery Average Determination Datasheet," calculates the average electrolyte temperature of the pilot and representative cells.

Procedure DES 8300-49, "Yearly Unit 2 (3) Safety Related 125V and 250V Station Battery Inspection," revision 12, is the implementing procedure to comply with applicable design documents, TSSR 3.8.6.4. and TSR 3.8.b.3. Section A, "Purpose," states in part, "this procedure contains actions to satisfy weekly, monthly and quarterly surveillance criteria." Data Sheet 1, "U2(3) 125 VDC Battery Yearly Surveillance," records all battery cell temperatures and calculates the average electrolyte temperature. Additionally, Step I.25 (e) states, "(AC) Verify Average Cell Temp is greater than 65 degrees F (TSR 3.8.b.3)."

Contrary to the above, as of January 29, 2021, the licensee failed to assure that the testing required to demonstrate that the 125 VDC and 250 VDC batteries would perform satisfactorily in service was identified and performed in accordance with written test procedures which incorporated the requirements and acceptance limits contained in applicable design documents, as evidenced by the following examples:

- 1) Specifically, for procedure DOS 8300-16, revision 22, the licensee failed to account for instrument uncertainties and the effects of indirect measurements (i.e. room temperature instead of the pilot cell temperature) when establishing the acceptance criteria to ensure successful completion of these tests would ensure the associated batteries would remain operable and within the acceptance limits as determined by applicable design documents and TSSR 3.8.6.4.

2) Specifically, for procedure DOS 8300-17, revision 22, the licensee failed to establish testing acceptance criteria to ensure the batteries would remain operable and within the acceptable limits contained in applicable design documents, TSSR 3.8.6.4. and TSR 3.8.b.3.

3) Specifically, for procedure DES 8300-49, revision 12, the licensee failed to establish acceptance criteria to confirm acceptable results for the specific pilot cell electrolyte temperature, as required by TSSR 3.8.6.4; and failed to account for instrument uncertainties when verifying the average electrolyte temperature of representative cells was greater than 65 degrees F, as directed by TSR 3.8.b.3.

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

Unresolved Item (Open)	Potential Non-Conservative DC Short-Circuit Current Values URI 05000237,05000249/2021010-02	71111.21M
------------------------	--	-----------

Description:

During the inspectors' review of calculation DRE18-0009, "Dresden Units 2 and 3, 125 VDC System Analysis," the inspectors noticed the licensee used 125 percent of the full load rating for the battery charger current contribution to the short circuit calculations. The inspectors were concerned that using 125 percent of the battery charger full load rating may be non-conservative based on NRC Information Notice (IN) 2017-06, "Battery and Battery Charger Short-Circuit Current Contributions to a Fault on the Direct Current Distribution System." Specifically, the Dresden 125 VDC battery chargers were silicon-controlled rectifier (SCR) type battery chargers and the testing described in the IN demonstrated SCR-type battery chargers produced significantly higher currents than expected. NRC IN 2017-06, stated, "The testing validated that the initial fault current contribution to a downstream fault from a battery charger (specifically the SCR-type chargers vs. the CF-type) is much higher—in the range of 7 to 10 times the battery charger full load ampere rating—during the first 100 milliseconds than what is currently stated as 150 percent of battery charger full load rating in IEEE Standard 946-2004. The test results indicated that the initial short circuit contribution from the charger is not limited when connected in parallel with the battery."

The inspectors reviewed the licensee's evaluation of NRC IN 2017-06 (OPXR ATI Assignment #: 4067133-02) and found the licensee did not discuss the vulnerability of SCR-type battery chargers producing higher currents or justify why the Dresden battery chargers were not susceptible to the higher current condition. The inspectors determined, based on a battery charger full load rating of 200 amperes, that the additional current contribution from a single battery charger could potentially range from 1150 to 1750 amperes. Additionally, because the licensee parallels two battery chargers together when switching between battery chargers, the licensee models two battery chargers contributing to the total short circuit current, which could double the additional current contribution. The inspectors found that in one portion of the licensee's 125 VDC distribution system the margin to exceeding the 10,000-ampere limiting fault rating of a circuit breaker may be as low as 298 amperes before any additional currents are considered. The inspectors also recognized that increasing the short-circuit current can affect the circuit breaker coordination studies and potentially change the conclusions of the licensee's fire safe shutdown analyses.

Planned Closure Actions: The inspectors plan to review the licensee's updated evaluation of NRC IN 2017-06, which is being tracked by AR 4398306, and determine if any performance

deficiencies exist, whether the performance deficiencies are more than minor, and if a violation of NRC requirements occurred.

Licensee Actions: Based on inspectors' concerns the licensee entered the issue into their corrective action program to reopen the evaluation of NRC IN 2017-06. An action was assigned to the Engineering department to account for the potentially high fault current contribution to a downstream fault from a battery charger that is much higher-in the range of 7 to 10 times the charger full load ampere rating-during the first 100 milliseconds than what is currently stated as 150 percent in IEEE Std 946-2004. The Operations department evaluated the available information and determined the potentially affected batteries remain operable.

Corrective Action References:

AR 4398306: 2021 DBAI: OPEX IN 17-06 Evaluation Incomplete

AR 4056647: OPEX Review: IN 2017-06: Battery / Charger Short Circuits (Corporate AR)

AR 4399797: AR Generated to Determine Course of Action for 2021 DBAI: OPEX IN 17-06 Evaluation (Corporate AR)

EXIT MEETINGS AND DEBRIEFS

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

- On January 29, 2021, the inspectors presented the design basis assurance inspection (teams) inspection results to Mr. P. Karaba, Site Vice President and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21M	Calculations	004-E-032	Dresden Units 2 and 3 Thermal Overload Review	2
		0101-0072-01	Dresden Isolation Condenser Heat Transfer Calculation	3
		0591-156-SED-002	ISCO Shell Side Pressure	0
		092-016-DRN	Evaluation of Stroke Time and Actuator Capacity for DC Motor-Operated Valves at Dresden Nuclear Station	0
		1303-M-205/206, Hanger No. M-1163D-254	Pipe Support Qualification	5
		5569-39-19-1	125 VDC Fault Currents	4
		7294-TB-05	125 VDC Battery Replacement, Trolley Beam & Rack Design	3
		7329-TB-05	125 VDC Battery Rack Details, U-3	2
		8188-109B-D2	Flued Head Anchor X-109B	3
		8900-15-EO-S	Re-evaluate Anchorage Assemblies for the Isolation Condenser	6
		9389-68-19-1	Calculation for Voltage Adequacy of Swing Diesel Circuit Breaker Closing Coils	1
		9389-68-19-2	Calculation for Voltage Adequacy of Swing Diesel Circuit Breaker Closing Coils	0
		9389-68-19-3	Calculation for Control Voltage Adequacy of Unit 3 Diesel Generator Circuit Breaker Closing Coils	0
		9389-68-19-6	Calculation for Control Voltage of Unit 2 Diesel Generator Circuit Breaker Closing Coils	0
		9630-13-19-1	Voltage Adequacy at the Closing Coils of Ten Selected Circuit Breakers	0
		BSA-D-99-04	Reconstitution of Isolation Condenser Design Basis with Respect to Decay Heat Loads and Long Term Make-up Requirements	1b
CE-DR-003	Calculation for Allowable Limits for Stems and Discs for Valves with Tag Nos. 2(3)-1301-3	1		
D2-ISCO-01C	Reanalysis Per NRC Bulletin 79-14	5		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		D3-ISP-07	Isolation Condenser Steam Side Setpoint Flow Rates	0
		DRE-2-1301-3	MIDACALC Results, DC Motor Operated GL96-05 Gate Valve	7
		DRE01-0045	Isolation Condenser Vent Piping Flow Capability	0
		DRE02-0020	Isolation Condenser Heat Removal Capacity Test Validation	7
		DRE03-0011	Isolation Condenser System Combined DBD and DP Calculation	0 and 0A
		DRE03-0025	Baseline Calculation for 125 VDC ELMS-DC Conversion to DCSDM	2B, 3D and 4D
		DRE05-0011	Hydraulic Model of Condensate, Condensate Booster, and Feedwater Systems to Evaluate Impact of Increased Condensate Filtration Flow	4
		DRE18-0009	Dresden Units 2 and 3, 125 VDC System Analysis	0
		DRE97-0005	Isolation Condenser Return Valve 2/3-1301-3 Cool Down Rate	0
		DRE99-0011	Isolation Condenser Make-up Pumps Hydraulic Performance	1
		EMD-067683	Calculation for Isolation Condenser Vent Piping	0
		KPA-SWC-67-131	Stress Report Dresden Unit 2 and 3 Isolation Condenser	0
		NED-M-MSD-72	The Seismic Thrust Limits of the Dresden Non-Mark I MOVs	9
		SL-4500-3	Overcurrent Protective Device Overcurrent Study, 125 VDC Systems	03/24/1989
		VE-4	Dresden Unit 3 Battery Room Ventilation	07/08/1985
		XCE091.0208	MOV Structural Integrity Calculation, Non-Mark I MOVs, Dresden Units 2 & 3	4
		Calibration Records	0011216087	Anton Paar DMA 35 Density Meter
0011267136	Anton Paar DMA 35 Density Meter		09/17/2020	
0011284855	Fluke 54 II B Digital Thermometer		12/18/2020	
Corrective Action Documents	00693719	U2 IC West End Pass Plate is Bowed, with Sheared Bolts	11/02/2007	
	00798153	MOV 2-1301-3 Thermal Binding Review	07/18/2008	
	01337933	NRC Concern: 3B Standby Liquid Control Squib Valve Temperature	03/07/2012	
	01685226-02	Evaluation to Determine the Tube Plugging Limit for TBCCW Heat Exchangers	04/07/2017	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		02498753	U3 125 VDC Level III Ground	05/11/2015
		04056647	OPEX Review: IN 2017-06: Battery / Charger Short Circuits	09/28/2017
		04069471	MOV 2-1301-3 Stroke Length Found Shorter than Acceptable	11/01/2017
		04107306	Discrepancy Found in HPCI AOP Critical Parameters	02/23/2018
		04141412	MOV 2-1301-3 As-Found Stroke Length High	05/25/2018
		04144225	Isolation Condenser 2-1301-3 Valve Troubleshooting	06/04/2018
		04292887	D2R26 - Results of ISCO Shell Internals Inspection Results	10/30/2019
		04297715	U2 Isolation Condenser Tritium is Above Goal	11/15/2019
		04310460	2B TBCCW HX Has Reached Tube Plugging Limit	01/15/2020
		04354304	U2 ISO Condenser West End Bell Leak	07/02/2020
		04357922	U2 ISO Cond Press Reading High on PI 2-1340-3	07/20/2020
	Corrective Action Documents Resulting from Inspection	04396236	2021 DBAI - NRC Identified Discrepancy in Calc on ISCO	01/15/2021
		04396770	2021 DBAI - Incorrect Code Reference in Piping Analysis	01/19/2021
		04397127	2021 DBAI - Inapplicable Information in EQ Binder EQ-74D	01/21/2021
		04397286	2021 DBAI Non Conservative Calculation Fault 125 VDC system	01/21/2021
		04398108	IST 10-Year Plan Valve Test Table Not Updated	01/26/2021
		04398306	2021 DBAI: OPEX IN 17-06 Evaluation Incomplete	01/27/2021
		04398651	2021 NRC DBAI Questions for DOS 8300-16	01/28/2021
		04398660	2021 DBAI: UFSAR Section 8.3.2.2.1 Update	01/28/2021
		04398682	2021 DBAI: Calculation 004-E-032 Justification Needed	01/28/2021
		04398689	NRC DBAI 2021 - Inadequate 50.59 for DOS 8300-16 Rev 16	01/28/2021
		04399797	OPEX IN 17-06 Evaluation Review	02/02/2021
	Drawings	12E-2507	Schematic Diagram Primary CNMT Isolation System Isolation Condenser VLV - Outboard MOV 1301-3 Control	AP
		12E-3303	Key Diagram 4169 Switchgears 31, 32, 33, 34	S
		12E-3322A	Key Diagram Turbine Building 125 VDC Main Bus Distribution Panels	Z
		12E-3685C	Schematic Diagram Turbine Building 125 VDC Main Bus 3 & 3A	S
		12E-3685D	Wiring Diagram Turbine Building 125V VDC Main Bus	M

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Distribution Panel	
		66-2-5636C1	Isolation Condenser	6
		66-2-5636D1	Isolation Condenser - Shell Details	2
		66-2-5637D1	Isolation Condenser - Tube Bundle Assembly	0
		D-14297	Tee Strainer Assembly	2
		ISI-201	Inservice Inspection Class II Isolation Condenser Piping	H
		ISI-307	Inservice Inspection Class III Isolation Condenser and Vent Piping	C
		M-16	Diagram of Condensate Booster Piping	AQ
		M-609C	Piping Plan Reactor Feed Pump Suction Line Condensate Booster Piping	A
	Engineering Changes	0000358092	Unit 2 Isolation Condenser East End Tube Bundle Heat Shield Installation - Gap Dimension	0
		0000368127	U2 Isolation Condenser Water Box Repairs	2
		0000399980	Replace/Modify Angled MSIV Disc with Spherical Edges to Reduce Seat Leakage	0
		0000405079	EPN 2/3 5203, EDG Fuel Oil Transfer Pump Motor. Determine Impact of Replacement Motor on Protective Devices/Calculations/UFSAR	0
		0000405887	Replace Speed Board and Install Magnetic Pickup Sensor for Emergency Diesel Generator (EDG) Unit 2	0, 1 and 2
		0000620232	Load Profile for the Unit 3 125 VDC Main Battery Modified Performance Test (DES 8300-19) Supersedes EC 401226	0
		0000628890	Installation of a Reactor Feed Pump (RFP) Suction Strainer 2-3404-A, 2-3404-B, 2-3404-C	1
	Engineering Evaluations	0000363440	Isolation Condenser Tube Plugging Criteria	0
		0000372073	Unit 2 Isolation Condenser Valve 2-1301-3 Opening Setting Adjustment	3
		0000372144	Preliminary Results of U2 ISCO Heat Capacity Test	09/13/2008
		0000382128	Isolation Condenser Eddy Current Testing Tube Plugging Criteria	0
		0000399268	Preliminary Results of U2 ISCO Heat Capacity Test	09/13/2014
		0000405702	Isolation Condenser Make-up Pump DOS 1300-05 Evaluation	0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date	
		0000617372	LLRT Scope Reduction	0	
		0000624559	MOV Program Risk Ranking and Scoping Document (2018 PRA)	0	
		0000628678	Isolation Condenser Make-up Pump DOS 1300-05 Evaluation Dresden	1	
		0001493789	00001376-01, COM D2 3RFL, COM MOV Electrical Insp & Diagnostic Test 2-1301-3, E: 2-1301-3, MOVA, L05	11/27/2017	
		EE-017002-15	GNB Battery Short Circuit Ratings: Justification for Short Circuit Ratings	0	
		Generic Letter 95-07	Pressure Locking and Thermal Binding Susceptibility Evaluation for Dresden Station	0	
	Miscellaneous			50.59 Applicability Review and Coversheet for DTP 47, Rev. 20	10/27/2017
				Inservice Testing (IST) Program Plan	5
				Isolation Condenser System Health Report	
				U2 Daily Operator Surveillance Log	01/25/2021
				Report - Master Lee, Eddy Current Examination Final Report - ISO Condenser EPN: 2-1302-West	11/2017
				Report - Master Lee, Eddy Current Examination Final Report - ISO Condenser EPN: 2-1302-East	11/2015
				Form N-1 Manufacturers' Data Report for Nuclear Vessels, Heat Exchanger 66-2-5637	12/31/1967
				Letter from Commonwealth Edison to USNRC, Dresden Station Units 1, 2, and 3 Response to IE Bulletin No. 76-01	03/17/1976
				Letter from Commonwealth Edison to USNRC, Dresden Station Units 1, 2, and 3 Emergency/Isolation Condenser Information (Record of Phone Call)	03/03/1976
				Letter from Exelon to USNRC, Dresden Nuclear Power Station Unit 2 Completion of Isolation Condenser Tube Bundle Integrity Testing; Response to NRC IE Bulletin 76-01	03/05/1998
				TBCCW System Health Report	
				AC/DC Distribution - Engage Health System Health Report	11/2020
				Engage Health System Health Reports (DIS - AC/DC	NA

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Distribution)	
		04067133-02	Level 3 OPEX Evaluation: IN 2017-06	01/31/2018
		2019-009-002	10 CFR 50.59 Evaluation - Installation of a Reactor Feed Pump Suction Strainer 2-3404-A, 2-3404-B, 2-3404-C	0
		2019-129	10 CFR 50.59 Screening-Installation of a Reactor Feed Pump Suction Strainer 2-3404-A, 2-3404-B, 2-3404-C	0
		205-92017	GE Specification - Instruction Book for Isolation Condenser for Dresden	02/26/1968
		2A TBCCW/EPN 2-3802-A	Eddy Current Examination Final Report	05/07/2017
		2B TBCCW/EPN 2-3802-B	Eddy Current Examination Final Report	01/15/2020
		CHRON# 188292	Test Report: GNB NCX-21 Series Cell Short Circuit Tests	05/06/1992
		D03-8303A1-2-P06	Screening Evaluation Work Sheet (SEWS) for 125 VDC / TB Main Bus #3A-1	0 and 1
		DR-MISC-14	Motor-Operated Valve Program Risk Ranking Input – PRA Model Revision DR217B	2
		DR-PSA-005.05	Electric Power (EP) System Notebook	7
		DR-PSA-005.09	Instrument/Service and Pumpback Air (IA/SA/PBA) System Notebook	7
		DR-PSA-005.10	Isolation Condenser (IC) System Notebook	7
		DR-PSA-005.20	Probabilistic Risk Assessment – Turbine Building Closed Cooling Water (TBCCW) System Notebook	3
		DRE-19-002	Surveillance Test Interval (STI) Evaluation Form - DOS 1300-01 Isolation Condenser Five Year Heat Removal Capability Test	10/31/2019
		DRE-2-1301-3 (DRE-2)	MIDACALC Results for 2-1301-3 DC Motor Operated GL96-05 Gate Valve	7
		EQ Binder No. EQ-74D	Limatorque SMB Valve Actuators Located Outside Drywell	5
		PNL-10719	Report - Pre-Phase 1 Aging Assessment of the BWR Isolation Condenser System	08/1995
		RRP 3-14-023	ASME Section XI Repair/Replacement Plan for WO 1617486-23	03/06/2014

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		RRP 3-16-024	ASME Section XI Repair/Replacement Plan for WO 1617486-28	05/02/2016
		Section 35.40	Specifications Nuclear Class 1E Flooded Batteries NCN* - Lead Calcium	03/2010
		Section 93.10	GNB Flooded Classic Installation and Operation Manual Section 4	08/2014
	NDE Reports		Hydrostatic Test Certificate, ISLIP Flow Controls Inc, Drawing D-14297	10/22/2019
	Procedures	04932057	D3 QTR TSNC 125 VDC Sta Batt Surv	09/12/2019
		CY-DR-120-160	Isolation Condenser	4
		DAN 902(3) B-4	Isolation Condenser Valves Off Normal	15
		DAN 902(3) H-2	Isolation Condenser Line Break (Group 5 Isolation)	21
		DAN 902(3)-3 B-3	Isolation Condenser Vent Radiation High	13
		DAN 902(3)-3 C-4	Isolation Condenser Temperature High	15
		DAN 902(3)-3 D-4	Isolation Condenser Level Hi-Lo	13
		DAN 902(3)-4 A-15	Isolation Condenser Channel A-B Initiation	18
		DAN 902(3)-8 C-9	U2 125 VDC Battery Ground U3 125 VDC Battery Ground	10
		DAN 902(3)-8 D-10	125 VDC Power Failure	6
		DAN 923-1	U2 or U3 TBCCW Temp High	11
		DAN 923-1 D-2	U2 or U3 TBCCW Press Low	15
		DGA-12	Loss of Offsite Power	80
		DGA-13	Loss of 125 VDC Battery Chargers with Simultaneous Loss of Auxiliary Electrical Power	21
		DOA 0010-01	Dresden Lock and Dam Failure	38
		DOA 1300-01	Isolation Condenser Tube Leak	18
		DOA 3800-01	Loss of Turbine Building Closed Cooling Water	6
		DOA 6900-03	Failure of Unit 3 125 VDC Power Supply	22
		DOA 6900-03	Failure of Unit 3 125 VDC Power Supply	22

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		DOA 6900-T1	Unit 2 and Unit 3 125 VDC Battery System Detailed Load List	27
		DOA 6900-T2	Unit 2 and Unit 3 125 VDC Battery System	14
		DOP 1300-01	Standby Operation of the Isolation Condenser System	55
		DOP 1300-02	Automatic Operation of the Isolation Condenser	27
		DOP 1300-03	Manual Operation of the Isolation Condenser	38
		DOP 6900-02	125 VDC Electrical System	35
		DOP 6900-07	125 VDC Ground Detection - Unit 3	40
		DOP 8300-06	Unit 2 (3) Supplemental Battery Information	7
		DOS 1300-01	Isolation Condenser Heat Removal Capacity Test	52
		DOS 1300-05	Isolation Condenser Make-Up Pump Capacity Test	10
		DOS 8300-16	Unit 2 (3) Monthly Station Battery Inspection	22
		DOS 8300-17	Unit 2 (3) Quarterly Station Battery Inspection	22
		DTP 09	Leak Detection and Reduction Program	17
		ML-NDE-017	Eddy Current Examination of Non-Ferromagnetic Heat Exchanger Tubing	2
		OP-AA-102-106	Operator Response Time Program	6
		OP-DR-102-106	Operator Response Time Program at Dresden	11
		PI-AA-115	Operating Experience Program	5
		PI-AA-115-1003	Processing of Level 3 OPEX Evaluations	5
	Self-Assessments	4385641	FASA: NRC DBAI Preparation	12/17/2020
		SRPT 04323578-01	Self-Assessment Report	
	Work Orders	00884517	D2 5RFL COM Isolation CDSR Insp/Eddy Current East	11/12/2015
		01096660-24	D2 5RFL Com Isolation CDSR Insp/Eddy Current West	10/19/2017
		01650222	D3 5Y TSNC 125 VDC STA Batt Modified Performance Test	04/28/2018
		01703750-01	Isolation Condenser Heat Removal Test	09/13/2014
		01705165-01	B Iso Condenser Make-Up Pump Capacity Test	04/07/2016
		01712364-01	A Iso Condenser Make-up Pump Capacity Test	05/31/2016
		01939575	Replace EDG Speed Board & Install Magnetic Pickup Sensor U2	12/13/2016
		04700713-01	D2 PRE/RFL Reg Iso Cond Leak Det & Reduction Program	10/28/2019
		04716683-01	D2 QTR/CSD TS (IST) Cold Shutdown Valve Testing	11/12/2019

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Surveillance	
		04718571-01	D2 24M TS Isolation Condenser Auto-Actuation	11/13/2019
		04753909-01	D2 QTR TS Valve Timing (IST)	05/25/2018
		04787291	D3 AN TSNC 125 VDC Main Station Batt Surv	03/14/2019
		04899165	D3 QTR TSNC 125 VDC Sta Batt Surv	06/13/2019
		04900547	D3 AN TSNC 125 VDC Main Station Batt Surv	03/05/2020
		04945098-07	Installation of 2A Reactor Feed Pump (RFP) Suction Strainer	11/06/2019
		04945098-08	Installation of 2A Reactor Feed Pump (RFP) Suction Strainer	11/03/2019
		04945098-11	Installation of 2A Reactor Feed Pump (RFP) Suction Strainer	11/16/2019
		04945098-15	Installation of 2A Reactor Feed Pump (RFP) Suction Strainer	11/07/2019
		04945098-23	Installation of 2A Reactor Feed Pump (RFP) Suction Strainer	11/05/2019
		05023261-01	Fatigue and Transient Monitoring Program	08/13/2020
		05108899	D3 1M TSNC 125 VDC Station Battery Insp	01/20/2021
		05113940	D3 WK TSNC 125 VDC Battery Surv	01/13/2021