



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

September 20, 2023

Doug Pehrson, Site Vice President
Entergy Operations, Inc.
N-TSB-58
1448 S.R. 333
Russellville, AR 72802-0967

**SUBJECT: ARKANSAS NUCLEAR ONE – BIENNIAL PROBLEM IDENTIFICATION AND
RESOLUTION INSPECTION REPORT 05000313/2023010 AND
05000368/2023010**

Dear Doug Pehrson:

On August 24, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed a problem identification and resolution inspection at Arkansas Nuclear One and discussed the results of this inspection with Brad Wertz, General Manager of Plant Operations, and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspection team reviewed the station's problem identification and resolution program and the station's implementation of the program to evaluate its effectiveness in identifying, prioritizing, evaluating, and correcting problems, and to confirm that the station was complying with NRC regulations and licensee standards for problem identification and resolution programs. Based on the samples reviewed, the team determined that your staff's performance in each of these areas adequately supported nuclear safety. However, the team identified three examples of inadequate evaluation and classification of condition reports. Specifically, the team found one example where the station failed to promptly evaluate, identify, and correct a condition adverse to quality following vendor failure analysis, and one example of failure to properly assess operability for a degraded non-conforming condition to establish the minimum amount of freon required for operability of a safety-related chiller. The team identified a third example where the station incorrectly classified a condition report, which resulted in a failure to prompt a failure analysis of the component and an extent of condition review to be performed. As a result, two Green non-cited violations and one observation are documented in the Inspection Results section of this inspection report.

The team also evaluated the station's processes for use of industry and NRC operating experience information and the effectiveness of the station's audits and self-assessments. Based on the samples reviewed, the team determined that your staff's performance in each of these areas adequately supported nuclear safety.

Finally, the team reviewed the station's programs to establish and maintain a safety-conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs. Based on the team's observations and the results of these interviews the team found

no evidence of challenges to your organization's safety-conscious work environment. Your employees appeared willing to raise nuclear safety concerns through at least one of the several means available.

Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations 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 IV; the Director, Office of Enforcement; and the NRC Resident Inspector at Arkansas Nuclear One.

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 IV; and the NRC Resident Inspector at Arkansas Nuclear One.

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,



Signed by Agrawal, Ami
on 09/20/23

Ami N. Agrawal, Team Leader
Inspection Programs & Assessment Team
Division of Operating Reactor Safety

Docket Nos. 05000313, 05000368
License Nos. DPR-51, NPF-6

Enclosure:
As stated

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ARKANSAS NUCLEAR ONE – BIENNIAL PROBLEM IDENTIFICATION AND RESOLUTION
 INSPECTION REPORT 05000313/2023010 AND 05000368/2023010- DATED
 SEPTEMBER 20, 2023

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 AND RESOLUTION INSPECTION REPORT 05000313/2023010 and 05000368/2023010
 ADAMS ACCESSION NUMBER: **ML23261A617**

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

Docket Numbers: 05000313 and 05000368

License Numbers: DPR-51 and NPF-6

Report Numbers: 05000313/2023010 and 05000368/2023010

Enterprise Identifier: I-2023-010-0004

Licensee: Entergy Operations, Inc.

Facility: Arkansas Nuclear One

Location: Russellville, AR

Inspection Dates: August 07, 2023 to August 24, 2023

Inspectors: N. Brown, Senior Resident Inspector
B. Correll, Reactor Inspector
C. Henderson, Senior Resident Inspector
F. Ramirez Munoz, Senior Reactor Inspector
W. Tejada, Physical Security Inspector

Approved By: Ami N. Agrawal, Team Leader
Inspection Programs & Assessment Team
Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting a biennial problem identification and resolution inspection at Arkansas Nuclear One, 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

Failure to Identify and Correct a Condition Adverse to Quality			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000313,05000368/2023010-01 Open/Closed	[H.13] - Consistent Process	71152B
The team identified a Green finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” for the licensee’s failure to promptly identify and correct plastic embrittlement, a condition adverse to quality, leading to brittle fractures in the rigid plastic arm of the safety-related General Electric SB-12 shunt trip attachment (STA) switches, which are part of the 4160 volt AC distribution system. This condition was identified in a vendor report received by the licensee in September 2020, but not correctly recognized and corrected until after a subsequent GE SB-12 STA switch failure on May 8, 2023.			

Failure to Adequately Assess Operability of Class 1E AC and DC Electrical Distribution Support System			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000313/2023010-02 Open/Closed	[H.6] - Design Margins	71152B
The team identified a Green finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” for the licensee’s failure to complete an adequate operability evaluation of the class 1E AC and DC distribution support system in accordance with procedure EN-OP-104, “Operability Determination Process,” revision 17. Specifically, the licensee failed to complete an adequate operability evaluation for the train A electrical equipment room emergency chiller (VCH-4A) freon leak to determine if interim corrective actions were required until the final repair was completed in September 2022.			

Additional Tracking Items

None.

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.

OTHER ACTIVITIES – BASELINE

71152B - Problem Identification and Resolution

Biennial Team Inspection (IP Section 03.04) (1 Sample)

- (1) The inspectors performed a biennial assessment of the effectiveness of the licensee's Problem Identification and Resolution program, use of operating experience, self-assessments and audits, and safety conscious work environment.
 - Problem Identification and Resolution Effectiveness: The inspectors assessed the effectiveness of the licensee's corrective action program in identifying, prioritizing, evaluating, and correcting problems. The inspectors sampled approximately 200 condition reports and their associated cause evaluations. The inspectors also conducted a five-year review of the 4160 Volt Alternating Current (AC) distribution system, which included review of failures, maintenance issues, surveillances, corrective and preventive maintenance, reliability, and maintenance rule performance. Additionally, inspectors reviewed findings and violations issued during the biennial assessment period.
 - Operating Experience, Self-Assessments and Audits: The inspectors assessed the effectiveness of the licensee's processes for use of operating experience, self-assessments and audits. The sample included industry operating experience communications like 10 CFR 50 Part 21 notifications and other vendor correspondence, NRC generic communications, publications from industry groups, and site evaluations. The sample also included reviews of licensee self-assessments and internal audits.
 - Safety Conscious Work Environment: The inspectors assessed the effectiveness of the station's programs to establish and maintain a safety-conscious work environment. The team interviewed 52 individuals, observed interactions between licensee employees and management during routine meetings, interviewed the employee concerns program manager and reviewed employee concerns files.

INSPECTION RESULTS

Assessment	71152B
Corrective Action Program Effectiveness	
<p>Based on the samples reviewed, the inspectors determined that the licensee's corrective action program was adequate and supported nuclear safety. However, the inspectors noted some areas for increased focus and attention, including two performance issues. Specifically, the inspectors noted current performance challenges in the areas of extent of condition reviews and classification of condition reports.</p>	
<u>Problem Identification</u>	
<p>The inspectors found that the licensee was identifying and documenting problems at an appropriately low threshold that supported nuclear safety. During the monitoring period being assessed, the licensee entered approximately 9000 condition reports each year into the corrective action program as conditions adverse to quality. The team determined that conditions that require generation of a condition report have been entered appropriately into the corrective action program.</p>	
<u>Problem Prioritization and Evaluation</u>	
<p>The inspectors found, in general, the licensee was adequately prioritizing and evaluating problems; however, the inspectors identified recent challenges associated with classification of condition reports with the correct significance category, or with not effectively evaluating additional information following failure analysis. Specifically, the team reviewed an example where the licensee failed to effectively evaluate data received from a high-pressure safety injection failure analysis for shunt trip attachment (STA) contact switch failure associated with age-related brittle fracture of plastic movable arm (CR-ANO-C-2023-03016). Another example of failure to fully evaluate a condition occurred when evaluating operating experience associated with under-voltage relay fuse sizing, where the licensee failed to fully evaluate the impact to the station (both units) for the potential for loss of safety-related buses due to meter faults, causing fuses to blow and deenergizing the safety-related buses. The licensee specifically failed to evaluate the 480-volt buses when evaluating this operating experience (CR-ANO-1-2023-01132 and CR-ANO-1-2023-01145). Lastly, the inspectors identified an example of failure to properly classify a condition report. Specifically, the licensee incorrectly classified a condition report associated with the failure of switchgear room cooler (2VUC-2D) timing relay as a Category C adverse condition, when the condition should have been classified as a Category B adverse condition, which requires a failure analysis and extent of condition to be performed (CR-ANO-C-2023-03073).</p>	
<p>Two Green non-cited violations and one observation will be documented in the Inspection Results section of this inspection report.</p>	
<u>Corrective Actions</u>	
<p>The inspectors concluded that, overall, the station generally developed effective corrective actions and timely implementing of those actions for the problems evaluated in the corrective action program, commensurate with their safety significance.</p>	

Assessment	71152B
<p>Operating Experience, Self-Assessments and Audits</p> <p><u>Operating Experience</u></p> <p>The team reviewed a variety of sources of operating experience including Part 21 notifications and other vendor correspondence, NRC generic communications, and publications from various industry groups including INPO and EPRI. The team determined that, overall, Arkansas Nuclear One is adequately screening and addressing issues identified through operational experience that apply to the station, and this information is being evaluated in a timely manner once it is received.</p> <p><u>Self-Assessments and Audits</u></p> <p>The inspectors reviewed a sample of Arkansas Nuclear One's self-assessments and audits to assess whether performance trends were regularly identified and effectively addressed. The inspectors also reviewed audit reports to assess the effectiveness of assessments in specific areas. Overall, the inspectors concluded that the licensee had an adequate departmental self-assessment and audit process.</p>	

Assessment	71152B
<p>Safety Conscious Work Environment</p> <p>The team conducted safety conscious work environment interviews with 52 employees from six different disciplines that included electrical maintenance, instrumentation and controls, operations, security, engineering, and information technology. The purpose of these interviews were (1) to evaluate the willingness of the licensee staff to raise nuclear safety issues, either by initiating a condition report or by another method, (2) to evaluate the perceived effectiveness of the corrective action program at resolving identified problems, and (3) to evaluate the licensee's safety conscious work environment (SCWE). The team also observed interactions between employees during routine daily operational focus plan-of-the-day meetings, and performance improvement review group meetings. The team interviewed the Employee Concerns Program Manager and reviewed a sample of case files that may relate to safety conscious work environment.</p> <p>The team found that the licensee had a safety conscious work environment where individuals felt free to raise concerns without fear of retaliation. Most expressed positive experiences after raising issues to their supervisors and after documenting issues in condition reports, and all individuals indicated that they would not hesitate to raise safety concerns, though at least one of the several means available at the station. Based on feedback from these interviews regarding anonymous concerns, the station should consider enhancing communications with plant personnel so that it is better understood what avenues are available for employees and how anonymous concerns are processed. It is also important for management in all departments to remain a strong and reliable avenue where employees feel free to bring up safety concerns. When these avenues start to erode, it could eventually impact your staff's willingness to bring up concerns using that management avenue.</p>	

Failure to Identify and Correct a Condition Adverse to Quality
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Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000313,05000368/2023010-01 Open/Closed	[H.13] - Consistent Process	71152B
<p>The team identified a Green finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify and correct plastic embrittlement, a condition adverse to quality, leading to brittle fractures in the rigid plastic arm of the safety-related General Electric SB-12 shunt trip attachment (STA) switches, which are part of the 4160-volt AC distribution system. This condition was identified in a vendor report received by the licensee in September 2020, but not correctly recognized and corrected until after a subsequent GE SB-12 STA switch failure on May 8, 2023.</p>			
<p><u>Description:</u> On October 23, 2018, the Unit 2 train A safety-related 4160 V switchgear 2A-303 breaker that provides power to the safety-related swing service water pump 2P-4B, failed to automatically close and start 2P-4B during surveillance testing. An interlock on the train A safety-related switchgear 2A-302 breaker that powers train A service water pump (2P-4A) prevented 2A-303 from automatically closing and starting pump 2P-4B. This interlock was designed to prevent both the 2P-4A and 2P-4B pumps from both automatically starting when aligned to emergency diesel generator A. The interlock comprised of a General Electric SB-12 shunt trip attachment (STA) switch in the 2A-302 breaker. Following this event in 2018 the licensee determined that an oxide layer on the contacts of the STA switch for the 2A-302 break was the cause of the failure of 2A-303 to automatically close and start pump 2P-4B. The licensee initiated condition report CR-ANO-2-2018-03454 and implemented the following corrective actions:</p> <ul style="list-style-type: none"> • Moved the interlock from the failed contact to a spare contact that the licensee verified to be in good condition to restore operability to 2P-4B. • Performed an extent of condition evaluation to identify other failed safety-related and important to safety breakers. This extent of condition focused on determining if another STA switch had an excessive oxide layer. • Established a periodical replacement of GE SB-12 switches used as STA devices on all Siemens vacuum circuit breaker applications on a preventative maintenance frequency of 12 years. However, the licensee failed to include Unit 1 safety-related 4160 V switchgear A-311, which contains the GE SB-12 switch block, for the safety-related motor driven emergency feedwater pump P-7B. • Initiate actions to remove and replace 2A-302 STA switch for vendor hardware failure analysis. On March 31, 2020, the licensee removed and replaced 2A-302 STA switch for vendor hardware failure analysis and closed condition report CR-ANO-2-2018-03454. The licensee initiated condition report CR-ANO-2-2020-01530 to track and evaluate the results of the hardware failure analysis. <p>In September 2020 the licensee received the vendor hardware failure analysis for the 2A-302 failed GE SB-12 switch block and documented their evaluation and corrective actions in CR-ANO-2-2020-01530. The vendor hardware failure analysis stated the following:</p> <ul style="list-style-type: none"> • During the failure analysis, the vendor identified the auxiliary switch had multiple damaged contact modules. Within the switch housing, the moving contacts are 			

actuated with a rigid plastic arm. One contact had the plastic arm fully broken in two and another contact has visible cracks at a similar location to the other's break.

- The vendor concluded the GE SB-12 switch's plastic became brittle, which led to the moving arm breaking from the physical force of actuation. Possible factors that can lead to plastic embrittlement included exposure to heat sources, ultraviolet radiation, oxygen, moisture, and time. Embrittlement, combined with the regular stress put on the contacts during actuation, can lead to brittle fractures in the plastic.

The licensee evaluation and corrective actions documented in CR-ANO-2-2020-01530 stated the following:

- The results for the failure analysis determined the failure of the GE SB-12 switch block was due to a broken cam follower/contact arm on the 11/12 contacts of the switch. The 11/12 contacts were the contacts found failed under the CR-ANO-2-2018-03454. The vendor could not determine a specific cause for the failure, but stated some contributing factors could be heat and stress on switch. The licensee closed CR-ANO-2-2018-03454 on November 26, 2020, with no additional corrective actions.

On May 8, 2023, the Unit 2 train A safety-related 4160 V switchgear 2A-306 breaker, which provides power to the safety-related high pressure safety injection pump 2P-89A, failed to close during surveillance testing. The licensee's troubleshooting determined that an interlock on the train B safety-related switchgear 2A-307 breaker that powers the safety-related swing high pressure 2P-89C prevented 2A-306 from automatically closing and starting pump 2P-89A. This interlock was designed to prevent both the 2P-89A and 2P-89C pumps from both automatically starting when aligned to emergency diesel generator A. The interlock is comprised of a General Electric SB-12 STA switch in the 2A-307 breaker. The normally closed contact 11/12 for 2A-307 failed to close when 2A-307 opened, which prevented the closure of 2A-306 and starting 2P-89A. The licensee initiated CR-ANO-2-2023-01365 and moved the interlock from the failed contact to a spare contact that they verified to be in good condition to restore operability to 2P-89A and performed a past operability review. The past operability review concluded the STA switch contacts failed to close was a known condition for Unit 2 GE SB-12 switches associated with Siemens breakers. The same condition was previously identified on the 2A-302 STA switch (CR-ANO-2-2018-03454 and CR-ANO-2-2020-01350). The licensee closed condition report CR-ANO-2-2023-01365 with no further actions.

The inspectors reviewed the above information and concluded that the licensee did not promptly identify and correct a condition adverse to quality. Specifically, the existence of multiple GE SB-12 STA switches failing due to plastic embrittlement, leading to brittle fractures in the rigid plastic arm constituted a condition adverse to quality because the condition could (and did) reduce the reliability of safety-related 4160 V breakers to close on demand. This condition was not identified as a condition adverse to quality between September 2020 and August 2023, and as result, the licensee failed to take action to identify the affected breaker population and corrected the condition.

Corrective Actions: The licensee will perform an extent of condition of the GE SB-12 STA switches installed in the plant to determine the most susceptible to plastic embrittlement leading to brittle fractures in the rigid plastic arm, as described in the September 2020 vendor hardware failure analysis.

Corrective Action References: Condition Report CR-ANO-C-2023-03016

Performance Assessment:

Performance Deficiency: The licensee's failure to promptly identify and correct a condition adverse to quality associated with General Electric SB-12 shunt trip attachment (STA) plastic embrittlement, leading to brittle fractures in the rigid plastic arm, was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance 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 plastic embrittlement, combined with regular stress during switch actuation leading to brittle fracture in the rigid plastic arm resulted in the failure of the train A high pressure safety injection pump to start during surveillance testing.

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 deficiency affecting design or qualification of a mitigating system, (2) does not represent a loss of the probability risk analysis (PRA) function of a single train technical specification system for greater than allowed outage time, (3) does not represent a loss of PRA function of one train of a multi-train technical specification system for greater than its allowed outage time, (4) does not represent a loss of the PRA function of two separate technical specification systems for greater than 24 hours, (5) does not represent a loss of PRA system and/or function as defined by the plant risk information e-book or the licensee's PRA for greater than 24 hours, and (6) does not result in the loss of a high safety-significant, non-technical specification train for greater than 3 days.

Cross-Cutting Aspect: H.13 - Consistent Process: Individuals use a consistent, systematic approach to make decisions. Risk insights are incorporated as appropriate. Specifically, the licensee failed to re-evaluate previous decisions associated with GE SB-12 STA failures and corrective actions when new facts associated with plastic embrittlement were identified by a vendor report in September 2020.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.

Contrary to the above, between September 2020 to August 2023, the licensee failed to promptly identify and correct plastic embrittlement condition of the rigid plastic arm, a condition adverse to quality, associated with safety-related General Electric SB-12 STA switches. This condition was identified in a vendor report received by the licensee in September 2020, but not correctly recognized and corrected until after subsequent GE SB-12 STA failure on May 8, 2023.

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

Failure to Adequately Assess Operability of Class 1E AC and DC Electrical Distribution Support System

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000313/2023010-02 Open/Closed	[H.6] - Design Margins	71152B

The team identified a Green finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to complete an adequate operability evaluation of the class 1E AC and DC distribution support system in accordance with procedure EN-OP-104, "Operability Determination Process," revision 17. Specifically, the licensee failed to complete an adequate operability evaluation for the train A electrical equipment room emergency chiller (VCH-4A) freon leak to determine if interim corrective actions were required until the final repair was completed in September 2022.

Description: The team performed a five-year review of the technical specification required class 1E AC distribution system and its required support systems that maintain operability of the system. During this review, the team identified five condition reports from March 2020 to August 2021 associated with a freon leak on the train A electrical equipment room chiller (VCH-4A). The team reviewed the five condition reports (CR-ANO-1-2021-02634, CR-ANO-1-2021-02466, CR-ANO-1-2021-01692, CR-ANO-1-2021-00080, and CR-ANO-1-2020-00512), the current licensing and design basis for VCH-4A, and EN-OP-104, "Operability Determination Process," revision 17 and identified the following:

EN-OP-104 states the following, in part,

- The operability determination process is used to assess operability of structures, systems, and components described in technical specification. The scope of the structures, systems, and components considered within the operability determination process is as follows:
 - Structures, systems, and components that are not explicitly required to be operable by technical specification, but that perform required support functions (as specified by the technical specification definition of operability) for structures, systems, and components that are required to be operable by technical specification.
 - Each technical specification structures, systems, and components has a set of structures, systems, and components that provide support functions required for the operability of the structures, systems, and components. This set of structures, systems, and components may or not be required to be operable by technical specification. Whenever a condition exists in one of these support structures, systems, and components that may affect the ability of the technical specification structures, systems, and components to perform its specified safety function, then an operability determination is performed for the technical specification structures, systems, and components.

- Step 8.10.9.2 Technical specification surveillances are performed periodically to validate system, structures, and components are operable. Satisfactory performance of a surveillance is usually considered sufficient to demonstrate operability. However, when conformance to criteria in the current licensing and design basis that are both necessary and sufficient to establish operability cannot be established with reasonable expectation, performance of the surveillance requirements cannot, by itself, be sufficient to demonstrate operability. Failure to conform to the current licensing and design basis criteria that are not needed to demonstrate operability are addressed by the corrective actions process.
- Step 8.10.4.2 During evaluation of impact of a degraded or nonconforming condition on plant operation and on operability of structures, systems, and components, as necessary, a compensatory measure is implemented as an interim step until the final corrective action is completed. Reliance on a compensatory measure for operability is an important consideration in establishing the schedule to resolve the degraded or nonconforming condition.

VCH-4A's safety-related support function for the technical specification required train A class 1E AC and DC distribution system was rejecting heat at 304,610 BTU per hour with a service water temperature of 121 degrees F at 40 gpm. This ensures class 1E AC and DC distribution system rooms do not exceed the maximum temperature of 120 degrees F and remain operable.

The failure mechanism that caused the VCH-4A freon leak was leakage through a dissimilar metal threaded connection on the discharge side of the condenser. VCH-4A was normally maintained in a standby condition and operated on a quarterly basis for surveillance testing. During surveillance testing, temperatures increase from ambient to 140 degrees F. Due to the different thermal expansion between the copper and carbon steel fittings, a leakage pathway developed. The corrective action to prevent this condition from reoccurring was to braze the threaded joint. This corrective action was completed in September 2022.

The operability evaluation documented in condition reports CR-ANO-1-2021-02634, CR-ANO-1-2021-02466, CR-ANO-1-2021-00080, and CR-ANO-1-2020-00512 stated VCH-4A was operable due to no issues noted by the operators during performance of the quarterly surveillance testing. However, the operability evaluation did not address the degraded nonconforming condition associated with the VCH-4A freon leak to determine if VCH-4A was able to perform its safety-related support function for the train A class 1E AC and DC distribution system and if interim corrective actions were required until the final corrective action was completed.

The inspectors reviewed the above information and concluded that the licensee did not appropriately assess operability for the VCH-4A degraded nonconforming condition associated with the freon leak from March 2020 to September 2022 in accordance with EN-OP-104. Specifically, the licensee failed to establish the minimum amount of freon required at design basis conditions for VCH-4A to perform its support function of maintaining the technical specification required class 1E AC and DC distribution system to appropriately assess operability and implement interim corrective actions until the final corrective actions of repairing the freon leak was completed in September 2022. The licensee needs to perform a calculation to determine the minimum freon loading in order to support the AC and DC

distribution system mission time during accident conditions when chiller loading is higher than during normal operation.

Corrective Actions: The establishment of the minimum freon level as design basis condition for VCH-4A to perform its support function of maintaining the technical specification required class 1E AC and DC distribution system operable and perform a past operability review of the freon leak.

Corrective Action References: Condition Report CR-ANO-1-2023-01135

Performance Assessment:

Performance Deficiency: The licensee's failure to appropriately assess operability for a degraded nonconforming condition to determine if interim corrective actions were required was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance 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 licensee's failure to appropriately assess operability of the VCH-4A to determine if interim corrective actions were required prior to the final corrective action to repair the freon leak in September 2022.

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 deficiency affecting design or qualification of a mitigating system, (2) does not represent a loss of the probability risk analysis (PRA) function of a single train technical specification system for greater than allowed outage time, (3) does not represent a loss of PRA function of one train of a multi-train technical specification system for greater than its allowed outage time, (4) does not represent a loss of the PRA function of two separate technical specification systems for greater than 24 hours, (5) does not represent a loss of PRA system and/or function as defined by the plant risk information e-book or the licensee's PRA for greater than 24 hours, and (6) does not result in the loss of a high safety-significant, nontechnical specification train for greater than 3 days.

Cross-Cutting Aspect: H.6 - Design Margins: The organization operates and maintains equipment within design margins. Margins are carefully guarded and changed only through a systematic and rigorous process. Special attention is placed on maintaining fission product barriers, defense-in-depth, and safety related equipment. Specifically, the licensee failed to establish the minimum amount of freon required for VCH-4A to perform its support function of maintaining the technical specification required class 1E AC and DC distribution system to appropriately assess operability and implement interim corrective actions until the final corrective actions of repairing the freon leak was completed in September 2022.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be described by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Procedure EN-OP-104, "Operability Determination Process," revision 17, a quality-related procedure,

provides instructions for performing immediate and prompt operability determinations when a current degraded or nonconforming condition is identified. Procedure EN-OP-104, requires, in part, to assess operability of SSCs described in technical specifications. The scope of SSCs considered within the operability determination process are SSCs that are not explicitly required to be operable by technical specifications, but that perform required support functions (as specified by the technical specification definition of operability) for SSCs that are required to be operable by technical specification.

Contrary to the above, from January 2020 to September 2022, the licensee failed to assess operability of SSCs described in technical specifications. Specifically, the licensee failed to complete an adequate operability evaluation for VCH-4A freon leak to determine if interim corrective actions were required until the final repair was completed in September 2022.

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

Observation: Switchgear Room Chiller (2VUC-2D) Timing Relay Failure	71152B
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On May 7, 2023, during performance testing of engineered safety features (ESF) time delay relays, the switchgear room unit cooler 2VUC-2D relay timer would not time out and actuate. This failure prevented the room cooler from starting during load sequencing of the emergency diesel generator. This relay was previously replaced in February 2022, approximately one year earlier. The licensee initiated a condition report and classified the condition as an adverse condition Category C (broke fix). The classification is incorrect and meets the requirements to be classified as a Category B adverse condition, as specified in EN-LI-102, "Corrective Action Program". Because of the incorrect classification, the licensee did not perform an equipment failure analysis to determine the reason the relay failed prematurely, and no extent of condition review was performed to determine if other relays from the same batch were currently installed in the units. The licensee plans to conduct an extent of condition review.

Condition Report: CR-ANO-C-2023-03073

EXIT MEETINGS AND DEBRIEFS

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

- On August 24, 2023, the inspectors presented the biennial problem identification and resolution inspection results to Brad Wertz, General Manager of Plant Operations, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152B	Corrective Action Documents	CR-ANO-	1-2008-00351, 1-2019-02659, 1-2021-00080, 1-2021-00457, 1-2021-02201, 1-2021-02405, 1-2021-02466, 1-2021-02478, 1-2021-02634, 1-2021-02754, 1-2021-02907, 1-2021-03066, 1-2021-03106, 1-2021-03125, 1-2021-03129, 1-2021-03141, 1-2022-00452, 1-2022-00481, 1-2022-00512, 1-2022-00513, 1-2022-00604, 1-2022-00750, 1-2022-00993, 1-2022-01298, 1-2022-01541, 1-2022-01980, 1-2022-02011, 1-2022-02267, 1-2022-02719, 1-2022-03199, 1-2023-00224, 1-2023-00250, 1-2023-00647, 1-2023-00877, 2-2015-03793, 2-2017-00272, 2-2017-01415, 2-2017-02018, 2-2017-05610, 2-2018-03112, 2-2018-03454, 2-2018-04209, 2-2020-01530, 2-2020-03652, 2-2021-00708, 2-2021-00769, 2-2021-01193, 2-2021-01507, 2-2021-01591, 2-2021-01918, 2-2021-02342, 2-2022-00543, 2-2022-00739, 2-2023-00108, 2-2023-00296, 2-2023-00521, 2-2023-00804, 2-2023-00899, 2-2023-01032, 2-2023-01104, 2-2023-01142, 2-2023-01296, 2-2023-01300, 2-2023-01357, 2-2023-01365, 2-2023-01371, 2-2023-01904, 2-2023-01998, 2-2023-02231, 2-2023-02276, C-2021-00765, C-2021-00843, C-2021-00844, C-2021-01170, C-2021-01253, C-2021-01429, C-2021-01430, C-2021-01807, C-2021-01831, C-2021-01855, C-2021-02202, C-2021-02552, C-2021-02590, C-2021-02595, C-2021-02603, C-2021-02630, C-2021-02655, C-2021-02724, C-2021-02775, C-2021-02876, C-2021-02955, C-2021-02968, C-2021-03271, C-2022-00068, C-2022-00149, C-2022-00210, C-2022-00243, C-2022-00329, C-2022-00330, C-2022-00331, C-2022-00332, C-2022-00368, C-2022-00387, C-2022-00595, C-2022-00637, C-2022-00647, C-2022-00802, C-2022-00860, C-2022-00898, C-2022-00970, C-2022-00979, C-2022-01016, C-2022-01028, C-2022-01060, C-2022-01119, C-2022-01181, C-2022-01185, C-2022-01200, C-2022-01236, C-2022-01328, C-2022-01403, C-2022-01418, C-2022-01554,	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			C-2022-01576, C-2022-01608, C-2022-01631, C-2022-01820, C-2022-01821, C-2022-02311, C-2022-02351, C-2022-02807, C-2022-03087, C-2023-00060, C-2023-00099, C-2023-00310, C-2023-00387, C-2023-00431, C-2023-00691, C-2023-00984, C-2023-01000, C-2023-01080, C-2023-01088, C-2023-01108, C-2023-01118, C-2023-01175, C-2023-01189, C-2023-01215, C-2023-01677, C-2023-02386, C-2023-02517, C-2023-02742, C-2023-03019, C-2023-03070, C-2023-03075, C-2023-03076	
71152B	Corrective Action Documents	CR-HQN-	2022-00120, 2022-01278, 2023-00459, 2023-00546	
71152B	Corrective Action Documents	WT-WTANO-	2021-00117, 2021-00253, 2023-00020, 2023-00086	
71152B	Corrective Action Documents Resulting from Inspection	CR-ANO-	1-2023-01132, 1-2023-01135, 1-2023-01145, C-2023-02967, C-2023-02968, C-2023-03016, C-2023-03042, C-2023-03073, C-2023-03106	
71152B	Corrective Action Documents Resulting from Inspection	CR-HQN-	2023-02788, 2023-02813	
71152B	Drawings	E-1, Sheet 1	Station Single Line Diagram	63
71152B	Drawings	E-2196, Sheet 1	Schematic Diagram High Pressure Safety Injection Pump 2P89A	20
71152B	Drawings	E-2197, Sheet 1	Schematic Diagram High Pressure Safety Injection Pump 2P89C	22
71152B	Drawings	E-34, Sheet 1	Schematic Meter and Relay Diagram 4160V System, Main Supply	13
71152B	Drawings	E-94, Sheet 1	Schematic Diagram Startup Transformer No 1 and No 2 Lockout Relays	22
71152B	Drawings	M-232, Sheet 1	Piping and Instrumentation Diagram Decay Heat Removal System	111
71152B	Engineering Changes	EC-95292	Replacement Relay for 2CR-54A4-1	0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152B	Engineering Changes	EC-95384	Failed Contact on 2A-307 STA, 152-307/B Contact 11-12 in Place of Failed One	0
71152B	Miscellaneous	INC 8242556	RADS PC IT Incident Ticket Number	02/16/2022
71152B	Miscellaneous	Notifications Drill - Everbridge	ERO Response Test	03/21/2023
71152B	Miscellaneous	Notifications Drill - Everbridge	ERO Response Test	06/25/2023
71152B	Miscellaneous	OE-NOE-2021-00078	NRC Part 21-2021-11-00 - 10 CFR Notification of Existence of a Defect-Siemens 5kV 1200 A Vacuum Breaker - 5-DPU-350-1200-78	0
71152B	Miscellaneous	OE-NOE-2022-00046	IRIS 414781 - 4.16kV Bus De-Energization	0
71152B	Miscellaneous	OE-NOE-2022-00190	NRC-21-2020-29-00 - Nutherm Part 21 Notification - Continuously Energized Eaton D26 Relays	0
71152B	Miscellaneous	OE-NOE-2023-0089-CA08	NRC-EA-22-121 - 05000483/2022010, Disputed Non-Cited Violation Upheld-Callaway Plant	0
71152B	Miscellaneous	PRG Meeting	PRG Meeting	8/9/2023
71152B	Miscellaneous	SEP-ANO-1-IST-1	ANO Unit 1 Inservice Testing Bases Document Site Engineering Programs	7
71152B	Miscellaneous	SEP-ANO-2-IST-1	ANO Unit 2 Inservice Testing Bases Document Site Engineering Programs	9
71152B	Miscellaneous	SIPD-10833	Switchgear PT Fuse Re-size	8/1/2023
71152B	Miscellaneous	TDP1550050	Pennwalt Corporation Operation and Maintenance Manual	3
71152B	Miscellaneous	ULD-1-SYS-16	Arkansas Nuclear One Upper Level Document ANO Unit 1 4.16 kV System	6
71152B	Procedures	EN-AD-103	Document Control and Records Management Programs	26
71152B	Procedures	EN-DC-117	Post Modification Testing and Special Instructions	16
71152B	Procedures	EN-DC-205	Maintenance Rule Monitoring	7, 9
71152B	Procedures	EN-EC-100	Employee Concerns Program	15
71152B	Procedures	EN-EP-306	Drills and Exercises	11
71152B	Procedures	EN-EP-610	Technical Support Center Operations	8
71152B	Procedures	EN-EP-801	Emergency Response Organization	18
71152B	Procedures	EN-EP-900 Attachment 9.2	Emergency Preparedness Forms	4

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152B	Procedures	EN-FAB-EP-005	Emergency Preparedness Performance Indicators	17
71152B	Procedures	EN-LI-102	Corrective Action Program	49
71152B	Procedures	EN-LI-114	Regulatory Performance Indicator Process	21
71152B	Procedures	EN-LI-118	Causal Analysis Process	37
71152B	Procedures	EN-MA-128	Refrigerant Management Program	9
71152B	Procedures	EN-MA-141	Limiter Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection	22, 23
71152B	Procedures	EN-NS-200	Security Reporting Requirements	15
71152B	Procedures	EN-OE-100	Operating Experience Program	36
71152B	Procedures	EN-OM-126	Management and Oversight of Supplemental Personnel	11
71152B	Procedures	EN-OP-104	Operability Determination Process	18, 17
71152B	Procedures	EN-OP-133	Operations Notifications	1
71152B	Procedures	EN-PL-187	Safety Conscious Work Environment Policy	3
71152B	Procedures	EN-QV-136	Nuclear Safety Culture Monitoring	25
71152B	Procedures	EN-WM-102	Work Implementation and Closeout	15
71152B	Procedures	OP-1104.004	Decay Removal Operating Procedure	139
71152B	Procedures	OP-1104.027	Battery and Switchgear Emergency Cooling System	53
71152B	Procedures	OP-1107.003	Inverter and 120V Vital AC Distribution	33
71152B	Procedures	OP-1416.001	Unit 1 A1 Bus Switchgear Inspection	22
71152B	Procedures	OP-1416.008	Unit 1 A3 Bus Switchgear Inspection	18
71152B	Procedures	OP-1903.062	Communications System Operating Procedure	38
71152B	Procedures	OP-2104.035	Ventilation System Operations	53
71152B	Procedures	OP-2303.012F	Annunciator 2K06 Corrective Actions	43
71152B	Self-Assessments	LO-ALO-2021-00057	50.59	
71152B	Self-Assessments	LO-ALO-2022-00038	Heat Exchanger/Sink Performance	
71152B	Self-Assessments	LO-ALO-2022-00055	PWR Emergency Onsite Power	
71152B	Self-Assessments	LO-ALO-2022-00076	Pre-NRC inspection Focused Self-Assessment for the Biennial PI&R - IP 71152	02/09/2023
71152B	Self-Assessments	LO-ALO-2022-00086	Security Self-Assessment for IP 71130.02, IP 71130.09, IP 71151	10/06/2022

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152B	Self-Assessments	LO-ALO-2023-00026	Snapshot Self-Assessment of Nuclear Safety Culture (NSC) at ANO	08/09/2023
71152B	Self-Assessments	QA-3-2023-ANO-1	Quality Assurance Audit Report "Corrective Action Program"	
71152B	Work Orders	00595204, 52910814, 52937733, 52919218, 510699, 52916856, 520265, 52984978, 573402, 520265		