UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

November 15, 2021

Mr. Joel P. Gebbie
Senior VP and Chief Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106

SUBJECT: DONALD C. COOK NUCLEAR PLANT – DESIGN BASIS ASSURANCE INSPECTION (PROGRAMS) INSPECTION REPORT 05000315/2021011 AND 05000316/2021011

Dear Mr. Gebbie:

On October 5, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Donald C. Cook Nuclear Plant and discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

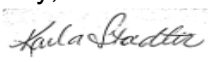
Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

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 III; the Director, Office of Enforcement; and the NRC Resident Inspector at Donald C. Cook Nuclear Plant.

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 Donald C. Cook Nuclear Plant.

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 Stoedter, Karla
on 11/15/21

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

Docket Nos. 05000315 and 05000316
License Nos. DPR-58 and DPR-74

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

Letter to Joel P. Gebbie from Karla K. Stoedter dated November 15, 2021.

SUBJECT: DONALD C. COOK NUCLEAR PLANT – DESIGN BASIS ASSURANCE INSPECTION (PROGRAMS) INSPECTION REPORT 05000315/2021011 AND 05000316/2021011

DISTRIBUTION:
Jessie Quichocho
Robert Williams
RidsNrrDorlLpl3
RidsNrrPMDCCook Resource
RidsNrrDroIrib Resource
John Giessner
Mohammed Shuaibi
Jamnes Cameron
Shelbie Lewman
Allan Barker
DRPIII
DRSIII

ADAMS ACCESSION NUMBER: ML21316A061

☒ SUNSI Review		☒ Non-Sensitive ☐ Sensitive		☒ Publicly Available ☐ Non-Publicly Available	
OFFICE	RIII	RIII			
NAME	JCorujo-Sandin:mb	KStoedter			
DATE	11/12/2021	11/15/2021			

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000315 and 05000316
License Numbers:	DPR-58 and DPR-74
Report Numbers:	05000315/2021011 and 05000316/2021011
Enterprise Identifier:	I-2021-011-0040
Licensee:	Indiana Michigan Power Company
Facility:	Donald C. Cook Nuclear Plant
Location:	Bridgman, MI
Inspection Dates:	August 09, 2021 to August 27, 2021
Inspectors:	J. Corujo-Sandin, Senior Reactor Inspector J. Park, Reactor Inspector T. Scarbrough, Senior Mechanical Engineer
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 (programs) inspection at Donald C. Cook Nuclear Plant, 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

Incorrect Valve Design and Bearing Material Assumed for Safety-Related Butterfly Valves 1-WMO-733/737 and 2-WMO-734/738			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000315,05000316/2021011-01 Open/Closed	None (NPP)	71111.21N.02
The inspectors identified a Green finding and associated Non-cited Violation (NCV) of Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," when the licensee failed to translate the correct valve design and bearing material for safety-related motor-operated butterfly valves 1-WMO-733, 1-WMO-737, 2-WMO-734, and 2-WMO-738 into their Motor-Operated Valve (MOV) program documents, testing plans/procedures and associated calculations, including the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) and Joint Owners Group (JOG) MOV Periodic Verification Program. Specifically, the licensee's documents assumed these valves were double offset valves with stainless steel bearings rather than the triple offset valves with ductile iron bearings which were actually installed in the plant.			

Maintaining Applicability of EPRI MOV PPM Predictions			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000315,05000316/2021011-02 Open/Closed	[P.1] - Identification	71111.21N.02
The inspectors identified a Green finding and associated Non-cited Violation (NCV) of 10 CFR 50.55a(b)(3)(ii) when the licensee failed to establish a program to ensure motor operated valves (MOVs) continue to be capable of performing their design basis safety functions. Specifically, the licensee failed to account and adhere to all the precautions, limitations and conditions when using the Electric Power Research Institute's MOV Performance Prediction Methodology model.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000315,05000316/ 2021011-03	Establishment of Non-Safety Related Nitrogen Supply as a Credited Motive Power Source to Mitigate a Steam Generator Tube Rupture Event	71111.21N.02	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 (COVID-19), inspectors were directed to begin telework. In addition, regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.21N.02 - Design-Basis Capability of Power-Operated Valves Under 10 CFR 50.55a Requirements

POV Review (IP Section 03) (9 Samples)

The inspectors:

a. Determined whether the sampled power operated valves (POVs) are being tested and maintained in accordance with NRC regulations along with the licensee's commitments and/or licensing bases.
b. Determined whether the sampled POVs are capable of performing their design-basis functions.
c. Determined whether testing of the sampled POVs is adequate to demonstrate the capability of the POVs to perform their safety functions under design-basis conditions.
d. Evaluated maintenance activities including a walkdown of the sampled POVs (if accessible).

(1) 1-ICM-250; Boron Injection Tank Train 'A' Outlet Containment Isolation Valve
(2) 1-IMO-262; Safety Injection Pumps Recirculation to Refueling Water Storage Tank TK-33 Train 'A' Shutoff
(3) 1-IMO-350; West Residual Heat Removal Heat Exchanger Outlet to Safety Injection Pump Suction Shutoff Valve
(4) 1-MRV-233; Steam Generator OME-3-3 Power Operated Relief Valve
(5) 1-NRV-151; Pressurizer Train 'B' Pressure Relief Valve
(6) 1-WMO-737; West Component Cooling Water Heat Exchanger Essential Service Water Outlet
(7) 2-ICM-129; Reactor Coolant Loop #2 Hot Leg to Residual Heat Removal Pumps Suction Containment
(8) 2-ICM-305; Recirculation Sump to East Residual Heat Removal/Containment Spray Pumps Suction Containment Isolation Valve

(9) 2-MRV-223; Steam Generator OME-3-2 Power Operated Relief Valve

INSPECTION RESULTS

<table>
<tr><td colspan="4">Incorrect Valve Design and Bearing Material Assumed for Safety-Related Butterfly Valves 1-WMO-733/737 and 2-WMO-734/738</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Mitigating Systems</td><td>Green
NCV 05000315,05000316/2021011-01
Open/Closed</td><td>None (NPP)</td><td>71111.21N.02</td></tr>
<tr><td colspan="4">The inspectors identified a Green finding and associated Non-cited Violation (NCV) of Title 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” when the licensee failed to translate the correct valve design and bearing material for safety-related motor-operated butterfly valves 1-WMO-733, 1-WMO-737, 2-WMO-734, and 2-WMO-738 into their Motor-Operated Valve (MOV) program documents, testing plans/procedures and associated calculations, including the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) and Joint Owners Group (JOG) MOV Periodic Verification Program. Specifically, the licensee's documents assumed these valves were double offset valves with stainless steel bearings rather than the triple offset valves with ductile iron bearings which were actually installed in the plant.</td></tr>
<tr><td colspan="4">Description:

While reviewing sampled valve 1-WMO-737, “West Component Cooling Water Heat Exchanger Essential Service Water Outlet Shutoff Valve,” inspectors found the D.C. Cook documentation referred to the design of 1-WMO-737 as a double offset butterfly valve in some documents and a triple offset butterfly valve in another document. In researching the inspectors' question regarding this discrepancy, licensee personnel determined the design and bearing material of 1-WMO-737 and its sister valves 1-WMO-733, 2-WMO-734, and 2-WMO-738 did not match the valve design and bearing material assumed in documentation used to demonstrate the functional capability and periodic verification of these four safety-related MOVs. In particular, the applicable licensee documents assumed these MOVs were double offset butterfly valves with stainless steel bearings. On August 17, 2021, inspectors were notified the valve manufacturer, Enertech, had concluded these MOVs were triple offset butterfly valves with ductile iron bearings.

Licensee personnel believe the incorrect valve design and bearing material assumptions were introduced when 1-WMO-737 and its sister valves were installed in the mid-1990s during plant modifications. These modifications were performed under Design Change 12-MM-454 which was approved on August 12, 1993. Over the years, several of these valves had also been refurbished. In February 2021, valve 1-WMO-737 experienced an overtorque event which the licensee evaluated under Condition Report (CR) 2021-1897. Despite these maintenance activities and the overtorque evaluation, the licensee had not identified the valves had a design and bearing material different from that assumed in the MOV calculations and periodic verification program until responding to inspector questions in August 2021.

In responding to questions from the inspectors, licensee personnel stated the differences in valve design and bearing material invalidated the applicability of these valves to the EPRI MOV PPM calculation method and the JOG MOV Periodic Verification Program used to</td></tr>
</table>

implement Generic Letter (GL) 96-05, “Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves.” Licensee procedure 12-EHP-5074-MOV-001, “Motor Operated Valve Program,” establishes the licensee's program to ensure that MOVs continue to be capable of performing their design bases functions. Attachment 3, “MOV Force Required to Operate,” Section 1.1, establishes the EPRI MOV PPM as the primary method used for evaluating valves (functional capability) in the D.C. Cook program in response to GL 89-10, “Safety-Related Motor-Operated Valve Testing and Surveillance.” Attachment 10, "Periodic Verification," Section 2.1, establishes the JOG Program will be used to the extent practical for periodic verification.

As part of their review, the inspectors identified a number of calculations and documents affected by the incorrect valve design assumptions:

- MD-01-ESW-084-N, Torque Setup Calculation for 1-WMO-733 and 1-WMO-737
- MD-02-ESW-031-N, Torque Setup Calculation for 2-WMO-734 and 2-WMO-738
- MD-02-ESW-049-N Torque Requirements for Unit 2 Enertech Butterfly Valves 2-WMO-734 and 2-WMO-738
- MD-12-ESW-009-N, Overview of the Basis for GL 89-10 MOV Torque/Thrust Requirements
- MPR-3362, Implementation of JOG MOV Periodic Verification Program at D.C. Cook Nuclear Power Plant
- VDS-1-WMO-733, Control Switch Setting for 1-WMO-733
- VDS-1-WMO-737, Control Switch Setting for 1-WMO-737
- VDS-2-WMO-734, Control Switch Setting for 2-WMO-734
- VDS-2-WMO-738, Control Switch Setting for 2-WMO-738

In addition to the calculations and documents listed above, the inspectors also discussed a number of additional MOV program requirements and/or considerations which were affected by the incorrect valve design assumption with the licensee's staff. The program documents impacted included:

- Ensuring 1-WMO-733/737 and 2-WMO-734/738 are capable of performing their safety function under all design bases conditions considering the actually installed valve design (current evaluation is only for operability purposes).
- Determining if the evaluation of the overtorque event for 1-WMO-737 in February 2021 was adequate in light of the incorrect valve design.
- Determining the need to update design-basis torque requirement calculations and weak link evaluations for the affected valves based on appropriate test-based information and verified assumptions.
- Determining if the current setup control for 1-WMO-733/737 and 2-WMO-734/738, (i.e., limit controlled) is still adequate in light of their triple offset butterfly valve design, which typically are torque controlled.
- Determining what periodic verification program is required for 1-WMO-733/737 and 2-WMO-734/738 based on the correct valve design.
- Determining whether the previous periodic verification testing and schedule for 1-WMO-733/737 and 2-WMO-734/738 provided reasonable assurance of the design-basis capability of these valves to perform their safety functions.

Corrective Actions: The licensee entered the concern into its corrective action program. Based on an initial review, the licensee identified the following high-risk valves have the incorrect assumptions for valve design and bearing material:

- 1-WMO-733, East Component Cooling Water Heat Exchanger HE-15E Essential Service Water Outlet Shutoff Valve
- 1-WMO-737, West Component Cooling Water Heat Exchanger Essential Service Water Outlet Shutoff Valve
- 2-WMO-734, East Component Cooling Water Heat Exchanger HE-15E Essential Service Water Outlet Shutoff Valve
- 2-WMO-738, West Component Cooling Water Heat Exchanger Essential Service Water Outlet Shutoff Valve

The licensee performed an immediate operability evaluation on the affected valves and contracted Kalsi Engineering to perform a detailed evaluation to help assess the concern and valve operability. The licensee's operability evaluation and information provided by Kalsi Engineering supported the continued operability of the affected valves. On August 18, 2021, the inspectors reviewed the operability evaluation for the four MOVs listed above and discussed the evaluation with licensee and Kalsi personnel. Based on this review and subsequent discussions, the inspectors concluded the licensee had lost design control for the affected butterfly valves. However, the inspectors did not identify any immediate safety concerns with the conclusions of the operability evaluation.

At the conclusion of the inspection, licensee personnel were preparing a detailed plan to address the incorrect assumptions for the valve design which included performing an extent of condition review. During discussions with the inspectors, licensee personnel indicated that several options were being considered to address the incorrect valve design and bearing material assumptions. For example, the currently installed triple offset valves were not allowed to be monitored, tested and evaluated using the JOG MOV Periodic Verification Program. Therefore, a separate periodic verification program (such as periodic dynamic testing) might be needed to ensure these valves remained able to perform their safety function(s). The licensee also indicated that one option being considered is to perform a plant modification to install valves that would allow the implementation of the JOG MOV Periodic Verification Program for 1-WMO-733/737 and 2-WMO-734/738.

Corrective Action References: CR 2021-7098, 1-WMO-737 Triple Offset Instead of Double Offset

Performance Assessment:

Performance Deficiency: The licensee's failure to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions as required by 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was a performance deficiency. Specifically, the licensee failed to correctly translate valve design and bearing material information for safety-related motor-operated butterfly valves 1-WMO-733, 1-WMO-737, 2-WMO-734, and 2-WMO-738 into MOV program documents, testing plans/procedures and associated calculations (e.g., EPRI MOV PPM and JOG Program).

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Design Control 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 incorrect valve design and bearing material assumptions used for valves 1-WMO-733, 1-WMO-737, 2-WMO-734, and 2-WMO-738 resulted in a loss of

design control which invalidated the applicability of these valves to the previously performed EPRI MOV PPM and the JOG MOV Periodic Verification Program evaluations. This impacted the design-basis torque requirement calculations, the established periodic verification program, and other activities, evaluations, calculations, etc. This determination is consistent with IMC 0612 Appendix E more than minor examples 1.c and 3.l.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Specifically, the finding screened to Green (very low safety significance) because it was a deficiency affecting the design of the component which did not result in the loss of operability or PRA functionality. The licensee's operability evaluation, including the Kalsi evaluation, concluded that the affected valves remained operable.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance. Specifically, the incorrect assumptions were introduced in the mid-1990s.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.

12-EHP-5074-MOV-001, "Motor Operated Valve Program," Revision 22, is the licensee procedure establishing a program to ensure MOVs continue to be capable of performing their design bases strategy function. Section 3.5.1 refers the user to Attachment 3 to determine the force required to operate the MOV. Section 3.16 refers the user to Attachment 10 for MOV periodic verification information.

12-EHP-5074-MOV-001, Attachment 3, "MOV Force Required to Operate," Section 1.1, establishes the EPRI MOV PPM as the primary method used for evaluating valves in the GL 89-10 program.

12-EHP-5074-MOV-001, Attachment 10, "Periodic Verification," Section 2.1, establishes the JOG Program will be used to the extent practical for periodic verification.

Contrary to the above, since August 12, 1993, the licensee failed to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions. Specifically, safety-related motor-operated butterfly valves 1-WMO-733, 1-WMO-737, 2-WMO-734, and 2-WMO-738 were incorrectly evaluated in the licensee's MOV program documents, testing plans/procedures and associated calculations (e.g., EPRI MOV PPM and JOG Program). The evaluated valves were incorrectly assumed to be of a design different than those actually installed in the field. The installed valves were triple offset butterfly valves instead of double offset butterfly valves and had ductile iron bearings instead of stainless steel bearings.

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

Maintaining Applicability of EPRI MOV PPM Predictions			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000315,05000316/2021011-02 Open/Closed	[P.1] - Identification	71111.21N.02

The inspectors identified a Green finding and associated Non-cited Violation (NCV) of 10 CFR 50.55a(b)(3)(ii) when the licensee failed to establish a program to ensure motor operated valves (MOVs) continue to be capable of performing their design basis safety functions. Specifically, the licensee failed to account and adhere to all the precautions, limitations and conditions when using the Electric Power Research Institute's MOV Performance Prediction Methodology model.

Description:

On November 11, 2020, prior to the beginning of this inspection, the licensee wrote Condition Report (CR) 2020-9425 which stated the following:

> "Internal valve maintenance and machining tolerance expectations for motor operated gate valves, as defined by EPRI's [Electric Power Research Institute's] Performance Prediction Methodology (PPM) Program and the NRC SE [Safety Evaluation], states that internal critical dimensions are to be obtained when valve maintenance is performed in order to validate that they are maintained within the tolerance limits analyzed in the previous PPM evaluations.
>
> As such, it is necessary to establish MOV program documentation for the critical dimensions of gate valves that utilize the PPM for establishing thrust requirements. Furthermore, the gate valve procedures need to be reviewed for applicability and revised to include guidance for obtaining critical dimensions.
>
> These dimensions need to be monitored to assess any changes in valve dimensions based on wear and/or internal maintenance activities.
>
> This is a tool for monitoring and maintaining the critical dimensions within the tolerance limits used in the PPM.
>
> Assignments need to be generated to identify applicable valves and dimensions to be incorporated into the appropriate procedures."

The inspectors reviewed the CR as part of this inspection and noted the licensee had not addressed valve internal maintenance mentioned in CR 2020-9425 to maintain the applicability of the EPRI MOV PPM to valves to which it is applied. In addition, the inspectors were concerned the CR was specific to gate valves (i.e., did not include globe and butterfly valves) and was designated as a "Non-CAP" document since this designation indicated the items discussed in the CR were enhancements rather than required to ensure the EPRI MOV PPM model and its results remained valid.

The inspectors reviewed the licensee's maintenance practices, NRC regulatory guidance and industry information and concluded the licensee's maintenance practices were not sufficient to provide reasonable assurance the MOVs in the site's MOV program will be capable of performing their design basis safety functions as required. Specifically, the inspectors

determined the licensee failed to establish an adequate internal valve preventive maintenance program to ensure the thrust or torque requirements predicted by the EPRI MOV PPM would remain valid. The inspectors based their conclusion on the following information:

The NRC regulations in 10 CFR 50.55a(b)(3)(ii) state, in part, the licensee must establish a program to ensure MOVs continue to be capable of performing their design basis safety functions. To comply with this requirement, the licensee developed and implemented procedure 12-EHP-5074-MOV-001, "Motor Operated Valve Program." In this procedure, the licensee selected the EPRI MOV PPM as the primary method for evaluating the gate, globe, and butterfly valves required to be in the MOV program (i.e., Generic Letter (GL) 89-10 and 96-05 programs). Additionally, this procedure established that when using the EPRI MOV PPM, the licensee would adhere to all the precautions, limitations, and conditions of the EPRI MOV PPM model and the associated NRC safety evaluation report (SER).

The EPRI MOV PPM was described in Topical Report TR-103237, "EPRI MOV Performance Prediction Program." Volume 1 of the topical report covers gate and globe valves, and Volume 2 covers butterfly valves. The NRC SER issued on March 15, 1996, (ML15142A761), determined TR-103237, with the conditions and limitations described in the SER, was considered as an acceptable methodology to predict the thrust or torque required to operate gate, globe, and butterfly valves.

Page 3-4 of EPRI Topical Report TR-103237 states that the use of the PPM requires specific information about the system and valve. Further, Page 5-17 of TR-103237 states the model is applicable to only valves which are properly fabricated and maintained.

EPRI Technical Report TR-103244-R2, "EPRI MOV Performance Prediction Program Implementation Guide Revision 2," states in Section 4, "Applicability Evaluation," on page 4-1 that "[i]n addition to meeting the specific applicability criteria described below, users must ensure that an adequate valve maintenance program is followed in order that the thrust/torque predictions made by the model remain valid over time."

The NRC SER on page 10 relied on EPRI statements that the user is responsible for accounting for any potential changes to the MOV which may occur and which may affect the disk-to-seat friction, and that the default friction coefficients within the computer model will bound the disk-to-seat friction at any time, provided the MOV is properly maintained. On page 13, the NRC SER indicates that EPRI has stated that the use of the computer model assumes that the valve is in good condition. The NRC SER also notes that model users will need to ensure that an adequate internal valve preventive maintenance program is established for the thrust or torque requirements predicted by the model to remain valid. On page 23, it acknowledges the butterfly model assumes that the seat material of the butterfly valve is in good condition. It also notes EPRI recognizes that seating material of butterfly valves may degrade (lose flexibility) and cause higher seating or unseating torque than the torque calculated by the model. Also, on page 23, the SER establishes the NRC staff considers that the information from the EPRI program emphasizes the need for a butterfly-valve preventive maintenance program that addresses potential seat material degradation.

Further, a supporting EPRI Topical Report TR-106563, "Application Guide for Motor-Operated Valves in Nuclear Power Plants," Volume 1, Revision 1: Gate and Globe Valves, states in Section 5.1 when discussing the NRC acceptance of the EPRI MOV PPM

that the long-term reliability of the PPM predictions depends on implementation of an appropriate preventive maintenance program for valves. EPRI Topical Report TR-106563, Volume 2, “Butterfly Valves,” references the EPRI MOV PPM and discusses potential degradation aspects in the sizing and setting of butterfly valves. NRC Inspection Procedure 71111.21N.02 indicates that EPRI provides guidance for MOV design calculations in TR-106563.

Licensee Response during the Inspection:

To address the inspectors’ concerns, the licensee developed inspection response CNP-POV-122. In its response, the licensee provided information on how D.C. Cook implements an internal valve preventive maintenance program to maintain applicability of the EPRI MOV PPM. In addition to on-going MOV surveillance testing, the licensee identified the following four elements to justify why an adequate valve maintenance program existed at DC Cook.

1. Static diagnostic testing, including analysis and trending of the diagnostic test data to evaluate and identify any potential valve degradation mechanisms. The static diagnostic testing is performed at intervals in accordance with the guidance of the Joint Owners Group (JOG) methodologies based on the valve degradation mechanisms of concern. EPRI TR-3002012918 provides guidance on what degradation mechanisms that can be seen through diagnostic testing.

2. Periodic external MOV inspections.

3. Leak testing where required (10 CFR Part 50, Appendix J local leakage rate testing (LLRT) testing, where applicable). This testing helps identify if any seat degradation or other internal degradation factors exist which can impact the valve closing/seating performance.

4. The corrective action process to resolve operational issues. This includes evaluating the extent of condition for any issues, which helps ensure any new found problems for other components are addressed. Maintenance procedures provide direction for internal inspections of the overall condition, if a valve is opened. If any abnormal or unexpected degradation is identified, the conditions are noted in the work packages and CR's are written. In addition, there is no need for the work packages to require any internal dimensions be taken, based on the conclusions from EPRI 3002012918.

NRC Inspection Team Response:

The inspectors worked with NRC personnel from the Office of Nuclear Reactor Regulation (NRR) to evaluate the licensee’s response provided in CNP-POV-122. The NRR personnel consulted by the inspectors during this inspection included one of the authors of the NRC SER which provided approval to use the EPRI MOV PPM methodology. Specific concerns with the licensee’s internal valve preventive maintenance program, and the ability of this program to ensure the thrust or torque requirements predicted by the EPRI MOV PPM would remain valid, are provided below.

1. Static diagnostic testing has not been demonstrated to identify valve internal degradation in a reliable manner. During static diagnostic testing, there is insufficient differential pressure force from fluid flow to provide an indication of the sliding performance of the

disk on the valve guides or the seat that might predict increased thrust and torque operating requirements for the valve. EPRI Report 3002012918 (August 2018), "Using MOV Static Diagnostic Testing to Diagnose Valve Degradation," has not been submitted to the NRC for detailed review and comment but does provide helpful guidance regarding MOV performance that can be monitored by static diagnostic testing. EPRI Report 3002012918 Table 4-1, "Degraded Conditions and Task Effectiveness - Gate Valves," and Table 4-2, "Degraded Conditions and Task Effectiveness - Globe Valves," indicate the effectiveness of static diagnostic testing to identify seating surface wear is low, while Table 4-3, "Degraded Conditions and Task Effectiveness - Butterfly Valves," indicates the effectiveness is medium. Static diagnostic testing alone is not sufficient to verify the internal condition of the valve supports the continued application of the EPRI MOV PPM over the service life of the valve.

2. Periodic external inspections do not provide information regarding the internal surfaces of the valve that relate to the continued applicability of the EPRI MOV PPM over the service life of the valve.

3. Leak testing can be used as one tool in helping to determine if the condition of the valve seat continues to support the applicability of the EPRI MOV PPM over the service life of the valve. However, a leak test does not provide information on whether the thrust and torque requirements will increase with seat or guide degradation beyond the EPRI MOV PPM predictions over the service life of the valve. Therefore, leak testing is not sufficient together with the other three elements specified by the licensee to support the continued applicability of the EPRI MOV PPM at D.C. Cook.

4. The corrective action process can address the evaluation of wear on valve surfaces if a performance issue is identified for a valve. However, it is not a proactive process that would provide verification that the valve internal condition supports the continued applicability of the EPRI MOV PPM for a valve over its service life. As noted above, EPRI Report 3002012918 does not support the use of static diagnostic testing to identify valve seat and guide degradation over the service life of the valve.

In addition to the points above, a recent on-site event supports the inspectors' concern. As documented in CR 2021-1897, the licensee determined the closing torque for butterfly valve 1-WMO-737, "West Component Cooling Water Heat Exchanger Essential Service Water Outlet Shutoff Valve," reached 2660 foot-pounds (ft-lbs) during an overtorque event in February 2021 because of internal valve degradation. However, calculation MD-12-ESW-070-N indicated the EPRI MOV PPM had predicted the closing torque would only reach 1679 ft-lbs for this valve. This valve and its sister valves have had a history of seat degradation issues in the past. [As a note, a review of this failure resulted in another violation documented in this report. As discussed in this report, it was determined that the licensee had assumed an incorrect butterfly valve design for the installed 1-WMO-737 and its sister valves. A new calculation performed by Kalsi Engineering for the correct butterfly valve design predicted a lower torque requirement than predicted by the EPRI MOV PPM. Therefore, the valve internal degradation caused a greater torque requirement to operate 1-WMO-737 than predicted by either the EPRI MOV PPM or the Kalsi Engineering calculation. This demonstrates that the EPRI MOV PPM (and Kalsi Engineering prediction) does not bound the operating requirements for valves with internal degradation.]

NRC Inspection Team Conclusion:

The inspectors concluded the information provided by the licensee in CNP-POV-122 does not describe sufficient activities to confirm the thrust and torque predictions provided by the EPRI PPM for MOVs at D.C. Cook will be sufficient to provide reasonable assurance that the MOVs will perform their design basis safety functions over their service life. The activities referenced by the licensee, such as static diagnostic testing, periodic external MOV inspections, leak testing, and the corrective process are helpful in evaluating certain aspects of the valve external and internal condition. However, these activities are not able to confirm that the valve internal condition supports the continued applicability of the thrust or torque predictions by the EPRI MOV PPM for the design-basis operating requirements over the service life of the valve.

Corrective Actions: A Condition Evaluation assignment was opened to determine the needed corrective actions.

Corrective Action References: AR 2021-8277, NRC POV MOV Violation - Internal Valve Maintenance
AR 2020-9425, Critical Dimensions for MOV gate valves that use the PPM (non-Cap)

Performance Assessment:

Performance Deficiency: The licensee failed to establish a program to ensure that MOVs continue to be capable of performing their design basis safety functions. Specifically, the licensee failed to account and adhere to all the precautions, limitations and conditions when using the EPRI MOV PPM model. This was contrary to the site's Motor Operated Valve Program (12-EHP-5074-MOV-001) and 10 CFR 50.55a(b)(3)(ii).

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, failure to ensure the valve's critical internal dimensions remain consistent with the assumption/inputs of the EPRI MOV PPM model can lead to required thrust and torque values which exceed the model's predictions. This could eventually lead to component deterioration and result in failures of MOV valves to perform their safety-related functions. This is consistent with more than minor examples 3.g and 13.a.

Significance: The inspectors assessed the significance of the finding using Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” Specifically, the inspectors determined this finding is of very low safety significance (Green) because the performance deficiency was not a design or qualification issue and did not represent a loss of the PRA system or function.

Cross-Cutting Aspect: P.1 - Identification: The organization implements a corrective action program with a low threshold for identifying issues. Individuals identify issues completely, accurately, and in a timely manner in accordance with the program. Specifically, as documented in CR 2020-9425, the licensee recognized the EPRI MOV PPM and the NRC SER stated that internal critical dimensions are to be obtained when valve maintenance is performed in order to validate that they are maintained within the tolerance limits analyzed in the previous PPM evaluations. However, by classifying it an enhancement the licensee failed to identify completely and accurately this was a site program requirement to ensure MOVs continue to be capable of performing their design basis safety functions.

Enforcement:

Violation: Title 10 CFR 50.55a(b)(3)(ii) states, in part, the licensee must establish a program to ensure that MOVs continue to be capable of performing their design basis safety functions.

Procedure 12-EHP-5074-MOV-001, "Motor Operated Valve Program," Revision 22, is the licensee procedure establishing a program to ensure MOVs continue to be capable of performing their design bases strategy function. Section 1.3 states that the "purpose of the CNP MOV Program is to ensure the operability of the MOVs within the GL 89-10 scope under all plant design basis operating and accident conditions." Section 3.5.1 refers the user to Attachment 3 to determine the force required to operate the MOV.

Procedure 12-EHP-5074-MOV-001, Attachment 3, "MOV Force Required to Operate," provides the following instructions:

Section 1.1 states the "EPRI PPM is used as the primary method for evaluating valves in the GL 89-10 program."

Section 1.1.1 states "[w]hen using the EPRI PPM, the complete model is used in accordance with all of the precautions and limitations."

Section 1.2 states "[e]ach EPRI PPM includes documentation of adherence to all of the conditions and limitations contained in the NRC Safety Evaluation Report (SER) including Supplement 1."

Section 1.2.1 states a "formal review of the NRC SER is performed in AEP Calculation MD-12-MSC-020-N, Guidance for Addressing the Conditions and Limitations of the EPRI MOV Performance Prediction Program, which develops a checklist to address each of the conditions and limitations of the NRC SER."

Formal Review MD-12-MSC-020-N, Revision 2, provides the guidance for evaluating the applicability criteria and the conditions and limitations of the EPRI MOV PPM for safety-related MOVs at D.C. Cook.

Section 1.1, "Assumptions," states, in part, it is assumed that the D.C. Cook Plant Maintenance Program maintains the GL 89-10 MOV program valves in adequate condition, for the results predicted by the EPRI PPM to remain valid.

Section 2.1.4, "Conditions and Limitations Pertaining to Valve Maintenance," states, in part, it is assumed that the D.C. Cook Plant Maintenance Program maintains the valves in adequate condition to ensure that the thrust or torque requirements predicted by the model remain valid for the life of the plant.

Page 3-4 of EPRI Topical Report TR-103237, "EPRI MOV Performance Prediction Program," states the use of the PPM requires specific information about the system and valve. Further, page 5-17 of TR-103237 states the model is applicable to only valves which are properly fabricated and maintained.

NRC SER dated March 15, 1996, determined the EPRI Topical Report TR-103237 (i.e., EPRI PPM), with the conditions and limitations described in the Safety Evaluation, was considered as an acceptable methodology to predict the thrust or torque required to operate gate, globe

and butterfly valves.

Section B, “Specific Comments on EPRI Computer Model,” specifically Section B.2.a, “Gate Valve Model - Model Description,” on page 10 establishes that EPRI states that the user is responsible for accounting for any potential changes to the MOV which may occur and which may affect the disk-to-seat friction. EPRI believes that the default friction coefficients within the computer model will bound the disk-to-seat friction at any time, provided the MOV is properly maintained.

Section B.2.b, “Gate Valve Model - Model Evaluation,” on page 13 established that EPRI has stated that the use of the computer model assumes that the valve is in good condition. Model users will need to ensure that an adequate internal valve preventive maintenance program is established for the thrust or torque requirements predicted by the model to remain valid. The user is also cautioned that aging conditions can influence valve performance.

Section B.3.b, “Globe Valve Model - Model Evaluation,” on page 20, states in part EPRI believes the thrust requirements for globe valves are not strongly influenced by friction forces between the seat and disk. Therefore, EPRI did not conduct preconditioning tests of its globe valves. The staff does not object to this practice by EPRI but notes that computer model users will need to establish appropriate preventive maintenance programs to address other aspects of valve aging.

Section B.4.b, “Butterfly Valve Model - Model Evaluation,” on page 23, states, in part, the butterfly valve model assumes the seat material of the butterfly valve is in good condition. EPRI recognizes seating material of butterfly valves may degrade (lose flexibility) and cause higher seating or unseating torque than the torque calculated by the model. [...] The staff considers the information from the EPRI program emphasizes the need for a butterfly-valve preventive maintenance program that addresses potential seat material degradation.

Contrary to the above, as of October 5, 2021, the licensee failed to establish a program to ensure that MOVs continue to be capable of performing their design basis safety functions. Specifically, when performing formal review MD-12-MSC-020-N, of the SER discussed in 12-EHP-5074-MOV-001, Attachment 3, Section 1.2.1, the licensee failed to account for and adhere to all the precautions, limitations, and conditions as required by 12-EHP-5074-MOV-001, Attachment 3, Section 1.1.1, Section 1.2. This is noted by the following examples:

1) Licensee failed to account for potential changes to the MOV which may occur and which may affect the disk-to-seat friction as discussed in SER Section B.2.a (e.g., critical valve internal dimensions needed to ensure the PPM model results remain valid).

2) Licensee failed to ensure an adequate internal valve preventive maintenance was established for the thrust or torque requirements predicted by the PPM model to remain valid as discussed in SER sections B.2.a; B.2.b; B.3.b; and B.4.b.

3) MD-12-MSC-020-N, Sections 1.1 and 2.1.4, assumed the licensee’s maintenance program maintains the valves in adequate condition to ensure that the thrust or torque requirements predicted by the PPM model remain valid for the life of the plant. However, the licensee failed to justify this assumption. Specifically, the licensee documentation and responses to the inspectors (e.g., CNP-POV-122) failed to provide sufficient activities to confirm that the thrust and torque predictions by the EPRI MOV PPM for MOVs at

D.C. Cook will be sufficient to provide reasonable assurance that the MOVs will perform their design basis safety functions over their service life.

4) CR 2021-1897 determined that the closing torque for 1-WMO-737 reached 2660 foot-pounds (ft-lbs) during an overtorque event in February 2021 because of internal valve degradation of the butterfly valve. However, MD-12-ESW-070-N indicated that the EPRI MOV PPM predicted that the closing torque would only reach 1679 ft-lbs for this butterfly valve. This revealed that the licensee had not established an adequate valve internal maintenance program contrary to Section 2.1.4 in MD-12-MSC-020-N. Updated Kalsi calculations underpredicted even further the torque requirement to operate this valve with internal degradation.

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)	Establishment of Non-Safety Related Nitrogen Supply as a Credited Motive Power Source to Mitigate a Steam Generator Tube Rupture Event URI 05000315,05000316/2021011-03	71111.21N.02

Description:

The inspectors identified an Unresolved Item (URI) involving the licensee's change to their facility which established the non-safety related Nitrogen system as a new credited source of motive power for the Steam Generator (SG) Power Operated Relief Valves (PORVs) in their mitigation strategy for the Steam Generator Tube Rupture (SGTR) accident. Specifically, the inspectors determined this change should have been considered adverse, prompting the licensee to perform a 50.59 Evaluation to determine whether prior NRC approval would have been required. This is a URI because the inspectors were not able to determine whether prior NRC approval should have been obtained, or the licensee would have been able to make changes without prior NRC approval.

During the 2012 NRC Component Design Basis Inspection (CBDI), Inspection Report 05000315/2012007; 05000316/2012007 (ML13011A401), and the subsequent Task Interface Agreement (TIA) with the Office of Nuclear Reactor Regulation (NRR) dated December 7, 2012, the NRC determined the licensing bases for the Donald C. Cook Nuclear Power Plant (CNP) requires an assumption of a SGTR concurrent with a station-wide (i.e., dual unit) Loss of Offsite Power (LOOP). This was contrary to the licensee's prior understanding of their licensing bases, which assumed a SGTR concurrent with a unit specific LOOP. As a result, Inspection Report 05000315/2013010; 05000316/2013010 (ML13189A243) was issued on July 8, 2013, to document a finding and two associated non-cited violations (NCVs) of NRC requirements. After the CDBI in 2012 but prior to the issuance of the NCVs on July 8, 2013, the licensee implemented a plant modification via Engineering Change (EC) 52530 to connect the existing non-safety related Nitrogen system to the compressed air system. This modification was implemented only as a "defense-in-depth" change at the time to align Nitrogen system as the back-up motive power for the SG PORVs.

Following the final NRC disposition of the licensing bases requiring the assumption of a SGTR concurrent with a station-wide LOOP, the licensee performed EC 54634 to formally establish the Nitrogen system in their design and licensing basis as the credited motive power for the SG PORVs for the SGTR mitigation strategy if the compressed air supply becomes

unavailable (i.e., Control Air Compressor (CAC) unavailable or CD Emergency Diesel Generator (EDG) unavailable). The licensee made changes via this EC to the licensing documents, including the UFSAR, the Technical Specification (TS) Bases, the Technical Requirements Manual (TRM), and applicable design basis analyses to establish the Nitrogen system as a new credited source of motive power for the SG PORVs.

The licensee performed 50.59 Screening 2017-0156 associated with EC 54634 and determined a 50.59 Evaluation was not required. Specifically, the 50.59 Screening stated the UFSAR function of interest was providing motive power to operate the SG PORVs as required to mitigate the consequences of a SGTR event. It further stated evaluating and crediting the available backup Nitrogen was not adverse to this function and concluded the change did not adversely affect any UFSAR design function. The licensee supplemented its position by stating, “the NRC documented understanding and acceptance of the crediting of non-safety grade equipment (e.g., Control Air system) for mitigating the SGTR event. The safety class and seismic class remain unchanged by this modification.” The licensee further asserted “the correspondence documenting the acceptance [by the NRC] of the non-safety related control air system did not explicitly include the Nitrogen back-up system. However, it is reasonable to apply the same requirements to the Nitrogen system.”

During this inspection, the inspectors challenged the conclusion of the 50.59 Screening and were specifically concerned with whether crediting the Nitrogen system as a backup source of motive power to the SG PORVs should have been considered an adverse change. The inspectors also challenged the acceptability of the licensee concluding it was reasonable to also consider the non-safety related Nitrogen system as acceptable to the NRC to mitigate a SGTR. In response, the licensee documented their understanding and position in a white paper provided to the inspectors on August 31, 2021.

With regards to whether the change should have been considered adverse, NEI 96-07, Revision 1, provides guidance on considerations to help determine if a change has adverse effects. One such consideration is a question provided in Section 4.2.1 of the NEI guidance, which asks, "Does the activity decrease the reliability of an SSC design function, including either functions whose failure would initiate a transient/accident or functions that are relied upon for mitigation?" The licensee's white paper stated the changes in EC-52530 and EC-54634 “actually increase the reliability that the function is performing by providing a continuously aligned source of motive force (that does not require electrical power to function) in the event the control air compressor is unavailable.” It further asserts their position by stating, “Since both the compressed air supply from the control air compressor and the backup nitrogen supply are non-safety related, seismic class III, there is no decrease in the quality of the components used to supply motive force to the SG PORVs.” It also states, “No new failure modes with different effects are introduced as loss of motive force to the SG PORVs was an existing failure mode.”

With regards to how it was reasonable to consider the Nitrogen system, also as a non-safety related system, acceptable by the NRC, the licensee stated:

> "The NRC acknowledged in the Safety Evaluation that the CNP [Cook Nuclear Plant] licensing basis SGTR analysis does credit limited use of non-safety grade equipment for mitigating the SGTR. From the CNP response to the request for additional information, this would include the SG PORVs as well as their electrical and control air appurtenances. CNP’s response did not specify the control air appurtenances required to provide motive power to the SG PORVs because that is below the level of detail contained in the

SGTR analysis. Crediting additional non-safety related control air appurtenances (the backup Nitrogen supply) to supply motive power to perform the non-safety related SG PORV function necessary to mitigate the SGTR is in alignment with the information previously submitted to the NRC in the Response to Request for Additional Information dated June 29, 2001 and acknowledged in the Safety Evaluation dated October 24, 2001."

The inspectors agreed with the licensee's statement that the key design function of interest, as described in the UFSAR, is to “provide motive power to operate the Steam Generator PORVs […] as required to mitigate the consequences of a Steam Generator Tube Rupture event.” However, the inspectors were concerned the addition of the existing Nitrogen system, not explicitly described in the UFSAR, into the SGTR mitigating strategy also had the potential to affect the SG PORV design functions. From the licensee’s 50.59 Screening and white paper alone, the inspectors were not able to determine whether the Nitrogen system, when called upon to function during unavailability of the compressed air system, would provide equivalent level of reliability as the compressed air system. In consideration of the equipment reliability, the inspectors noted the Nitrogen system, which consists of a bank of (6) Nitrogen tanks and their associated piping, valves, etc. is physically located outside and exposed to the elements. Unlike the majority of the compressed air system equipment, which is located inside major plant structures (e.g., Turbine Building), there are no structural barriers around the Nitrogen system that can provide equivalent level of protection against natural phenomena, severe weather and/or general exposure to the elements. Furthermore, the inspectors were unable to determine whether the licensee had considered any new potential degradation mechanism to the Nitrogen system itself as a result of the aforementioned changes (e.g., possible corrosion effects to the Nitrogen system now that it is permanently connected to the air system). In addition, contrary to the control air system dedicated compressors, the Nitrogen system is a shared system between both units.

Furthermore, the licensee's August 2021 white paper asserted that since the NRC's Safety Evaluation dated October 24, 2001, credited non-safety related "control air appurtenances" to mitigate the consequences of a SGTR, the crediting of the Nitrogen system, which was permanently connected to the control air system via piping and a check valve, was not an adverse change.

The inspectors reviewed the October 24, 2001, Safety Evaluation and found the NRC did acknowledge the use of certain non-safety grade equipment to mitigate the SGTR. However, the NRC specifically acknowledged only the *limited use (emphasis noted)* of non-safety grade equipment. At the time the NRC's Safety Evaluation was written, the CNP’s SGTR mitigation strategy did not include the Nitrogen system. Since CNP’s understanding of the licensing basis at that time was the SGTR concurrent with a single unit LOOP, the source of motive power was assumed to be available from the compressed air system, either from the control air system in the affected unit or from the Plant Air System in the unaffected unit. Furthermore, aligning the Nitrogen supply to the SG PORVs would have required additional operator actions, and it was demonstrated during the follow-up inspection related to the 2012 CDBI that the additional time needed to locally align the Nitrogen supply and operate the SG PORVs would have violated the response time assumed in the SGTR margin-to-overfill (MTO) analysis. Therefore, the inspectors determined it would have been highly unlikely the NRC would have considered the Nitrogen system as a viable source of SG PORV motive force when it acknowledged the limited use of non-safety related structures, systems, and components (SSCs) to mitigate the SGTR accident.

Furthermore, as part of researching this concern, the inspectors reviewed another white paper entitled, "Re: DC Cook CDBI Response to questions 2012-CDBI-298" (ML12320A544), developed by the licensee in 2012 and intended to address the concerns identified during the 2012 CDBI. In this document, the licensee explained their understanding and position regarding the site's licensing bases for a SGTR. Based on this white paper, it is clear the licensee did not consider the Nitrogen system as part of the non-safety related "control air appurtenances" relied upon to mitigate a SGTR. Appropriate sections of the white paper are included below. Note that Letter C0601-21, dated June 29, 2001, is a licensee-generated response to a Request for Additional Information (RAI) to the NRC supporting a license amendment request for changes to the SGTR analysis methodology. The NRC-prepared SER for license amendment No. 256 and amendment No. 239 (ML012690136) regarding this change were issued on October 24, 2001.

The 2012 white paper, Section 3, “Licensing Basis Discussion,” states, in part:

> "As called out in Letter C0601-21, “control air appurtenances” along with the SG PORVs are non-safety related and relied upon to mitigate a SGTR. Section 4 of this paper describes in further detail from the UFSAR all the components which make up the control air system, which includes the normal source of compressed air (the two Plant Air Compressors), the backup source of compressed air (the Control Air Compressor), as well as the associated piping, valves, etc. Note that the Nitrogen system is not included as part of the described control air system, it can be used to provide motive force to the SG PORVs but is only included as part of a defense in depth design. Since the normal and backup sources of compressed air are included as part of control air appurtenances these components are assumed to be available to mitigate a SGTR."

Similarly, the Nitrogen system is not included in the description of the “control air appurtenances” in Section 6, “Licensing Implications of the Postulated Scenario” and Section 7, “Conclusion.”

Based on the above, the inspectors determined the October 24, 2001, Safety Evaluation which supported the issuance of license amendments No. 256 and No. 239 did not consider the Nitrogen system as part of the "control air appurtenances." Therefore, the Nitrogen system cannot be considered to be part of the limited non-safety grade equipment the NRC approved to mitigate the SGTR accident. This understanding is consistent with the regulatory correspondence exchanged in 2001 (e.g., RAI response Letter C0601-21 and the subsequent SER), the licensee's own words from the 2012 white paper and the inspectors' understanding of the site's licensing bases.

Additionally, CNP's understanding of the SGTR licensing bases, during the 2001 license amendment process, was incorrect (e.g., availability to credit the Plant Air System). As a result, the bases used by the NRC to approve crediting of non-safety grade equipment might have been affected or undermined. There was no evidence the licensee had evaluated or considered this potential impact at the time Nitrogen was established as a credited power source (EC 54634).

In summary, for mitigating a SGTR using the SG PORVs, the licensee used the NRC's approval to credit non-safety grade equipment (control air) completed in October 2001 and incorrectly applied this approval to credit a previously unapproved non-safety grade system (Nitrogen). This effectively expanded the "limited use of the non-safety grade equipment" discussed in the NRC's 2001 SER.

In conclusion, the inspectors determined the change is considered adverse and a 50.59 Evaluation should have been performed to determine whether prior NRC approval would have been required. This is an URI because the inspectors were not able to determine whether prior NRC approval should have been obtained, or the licensee would have been able to make changes without prior NRC approval.

Planned Closure Actions: In accordance with NRC guidance, the inspectors need to wait for the licensee to complete a 50.59 evaluation and evaluate if the change required NRC approval. A review of the evaluation and/or additional corrective actions taken will help the inspectors determine the specific violation(s) to issue and assess the appropriate significance/severity level.

EXIT MEETINGS AND DEBRIEFS

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

On October 5, 2021, the inspectors presented the design basis assurance inspection (programs) inspection results to Joel P. Gebbie, Senior VP and Chief Nuclear Officer and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N.02	Calculations	1-E-N-ELCP-4KV-001	Unit 1 4kV/600 V Load Control Calculation	19
		DIT-B-00085-02	Generic Letter GL 89-10 DC Powered Motor Operated Valves (MOVs) Voltage Control Point for Electrical and Mechanical Calculation	02/01/2000
		DIT-B-00621-12	Unit 1 and 2, AC Powered Generic Letter (GL) 89-10 Motor Operated Valves (MOVs)	01/20/2012
		ES-ESFTRT-0001-QCN	ESF Time Response Basis Specification	7
		MD-01-ESW-084-N	Torque Setup Calculation for 1-WMO-733 and 1-WMO-737	1
		MD-01-RHR-019-N	Torque and Thrust Setup Calculation for 1-IMO-340 and 1-IMO-350	3
		MD-01-SI-007-N	Torque and Thrust Setup Calculation for 1-ICM-250 and 1-ICM-251	2
		MD-01-SI-011-N	Torque and Thrust Setup Calculation for 1-IMO-262/263	2
		MD-02-RH-119-N	Torque and Thrust Setup Calculation for 2-ICM-305 and 2-ICM-306	4
		MD-02-RH-195-N	Torque and Thrust Setup Calculation for 2-ICM-129 and 2-ICM-128	4
		MD-12-ESW-070-N	EPRI PPM Evaluation of 1-WMO-733, 1-WMO-737, 2-WMO-734, and 2-WMO-738	0
		MD-12-MS-013-N	Maximum Differential Pressure Calculation for Steam Generator Power Operated Relief Valves 1(2)-MRV-213, 223, 233 & 243	0
		MD-12-MS-016-N	Actuator Capability Calculation for Steam Generator Power Operated Relief Valves 1(2)-MRV-213, 1(2)-MRV-223, 1(2)-MRV-233, and 1(2)-MRV-243	2
		MD-12-MSC-039-N	MOV Parameter Calculation for Valves 1/2-IMO-202, 204, 212, 215, 225, 262, 263, IMO-270, 275, 315, 325, 330, 331, ICM-260, 265 & NMO-151, 152, 153	4
		MD-12-N2-001-N	Steam Generator PORV N2 Supply Requirements for	1

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Consumed Volume and Tank Pressure	
		MD-12-RCS-021-N	Maximum Differential Pressure Calculation for Pressurizer Power Operated Relief Valves 1(2)-NRV-151, 152 & 153	0
		MD-12-RCS-022-N	AOV Capability Calculation for 1(2)-NRV-151, 152, 153	3
		MD-12-RH-210-N	MOV Parameter Calculation for RHR Valves 1/2-IMO-128 & 1/2-ICM-129	2
		MD-12-RHR-004-N	EPRI PPM Evaluation of 1/2-ICM-129 and 1/2-IMO-128	1
		MD-12-RHR-105-N	EPRI PPM Evaluation of 1/2-ICM-305 and 1/2-ICM-306	0
		MD-12-SI-OO1-N	EPRI PPM Evaluation of 1/2-IMO-262 and 1/2-IMO-263	2
	Corrective Action Documents	2013-3692-1	Adjust Benchset on Pressurizer PORVs	04/30/2013
		AR 01156041	Operating Experience Provided to D.C. Cook to Evaluate Updated Guidance for Thrust Requirements with Stainless Steel Guides	06/05/2001
		AR 2020-9425	Critical Dimensions for MOV Gate Valves that Use the PPM	11/11/2020
		AR 2021-1897	1-WMO-737 Overtorque Closed	02/25/2021
		AR 2021-1897	1-WMO-737 Overtorque Closed	02/26/2021
		AR 2021-2501-2	Review Auto MOV Voltage Margin in Calculations	03/22/2021
		GT 00057969-02-12	Tracking AR for Revision of GL 89-10 MOV Valve Data Sheets	02/06/2002
		GT 2019-1560-14	Revise MPR-3362 to Remove Margin Statements	09/17/2020
		GT-2014-0057-17	Revise MD-01-SI-007-N	06/18/2014
	Corrective Action Documents Resulting from Inspection	AR 2021-6906	PMI-5074 References Outdated Version of Code	08/09/2021
		AR 2021-6931	Fix Editorial Error in ES-VALVE-1432-QCN Rev 2	08/10/2021
		AR 2021-6958	1-ICM-250 Actuator Has Drop of Oil	08/11/2021
		AR 2021-6959	1-WMO-737 Actuator Has Drop of Oil	08/11/2021
		AR 2021-6960	2-CMO-414 Actuator Has Drop of Oil	08/11/2021
		AR 2021-6971	Administrative Error in MD-01-SI-007-N	08/11/2021
		AR 2021-6987	2-ICM-129 Has a Drop of Oil	08/12/2021
		AR 2021-6992	2-NFP-231 Active Boric Acid Leak	08/12/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		AR 2021-6993	2-ICM-129 Inactive Packing Leak	08/12/2021
		AR 2021-7008	Insulation in Containment	08/12/2021
		AR 2021-7012	Fire Alarm in OBA Not Heard in NRC Residents' Office	08/12/2021
		AR 2021-7080	Superseded DIT in MOV Procedure	08/16/2021
		AR 2021-7080	Superseded DIT in MOV Procedure	08/16/2021
		AR 2021-7086	KVAP 4.0 Validation Not Documented Correctly	08/17/2021
		AR 2021-7098	1-WMO-737 Triple Offset Instead of Double Offset	08/17/2021
		AR 2021-7098-1	ODS to Support Operability with Different Valve Type	08/17/2021
		AR 2021-7209	Administrative Error in MOV Documentation	08/20/2021
		AR 2021-8277	NRC POV MOV Violation - Internal Valve Maintenance	10/04/2021
		KEI-4044	Kalsi Engineering Report KEI-4044, "Evaluation of 1-WMO-733/737 and 2-WMO-734/738"	1
	Drawings	1-2-FISC-GE08078	667 80 Actuator Diaphragm Actuator Unit 1 and 2	0
		1-AEP-FISC-30A0649	Fisher Controls 6” SCH 80 BWE Air Operated Globe Valve	1
		DC-10976	6” Vessel Modular Assembly 24” O.D. Vessels 306 CU. FT. – 2450 PSI DP	10/19/2001
		DC-15008	1-WMO-737 , "Outline Drawing 16" Class 150 MAK Permaseat Assembly"	2
		DC-15689	Control Valve 2” Model 38-20771 ANSI Class 1500 3” SCH 160 Butt Weld Ends, No. 18 Reverse Actuator	2
	Engineering Changes	1-MOD-45692	Replace the Air Operators for Steam Generator PORV’s 1-MRV-213, 223, 233 and 243	0
		52530	Steam Generator PORV EPT 20# N2 Supply	0
		54634	Qualification of Nitrogen Backup to Steam Generator PORVs and Backup Air Bottles for Pressurizer PORVs	0
	Engineering Evaluations	12-EHP-9010-PRA-001	Probabilistic Risk Assessment	8
		DIT-S-06396-00	Anchor Darling Part 21 Pin Results Using the Boiling Water Reactor Owner's Group (BWROG) Methodology	06/07/2021
		MD-12-MSC-009-N	Overview of the Basis for GL 89-10 MOV Torque/Thrust Requirements	3
		MD-12-MSC-020-	Guidance for Addressing the Conditions and Limitations	2

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		N	of the EPRI MOV Performance Prediction Program	
		MD-12-RHR-110-N	EPRI PPM Evaluation of 1/2-IMO-340 and 1/2-IMO-350	1
		MPR-3362	Implementation of JOG MOV Periodic Verification Program at D.C. Cook Nuclear Power Plant	0
		MPR-3362, Addendum 1	Upgrade for JOG Class D MOVs at D.C. Cook Nuclear Power Plant	09/07/2012
		SD-000212-001	Thrust Rating Increase of Limitorque Actuators	0
		SD-000212-001	Thrust Rating Increase of Limitorque Actuators	0
		SD-000317-001	Thrust Rating Increase of Limitorque SB-00 through SB-2 Spring Compensator Assemblies and SB-00 through SB-1 Operators (Kalsi Engineering Report KEI-1799C)	1
		Software Action Request 1003225	For Acceptance of KVAP 4.0 Software Used to Perform Calculations for AOV and MOV Programs	07/12/2016
	Miscellaneous	50.59 Screening No. 2013-0013-00	Provide 20# Nitrogen Supply to SG PORVs in the Event of Loss of All Air	0
		50.59 Screening No. 2017-0156-00	Qualification of Nitrogen Backup to Steam Generator PORVs and Backup Air Bottles for Pressurizer PORVs	0
		C0601-21	Donald C. Cook Nuclear Plant Units 1 and 2 Response to Nuclear Regulatory Commission Request for Additional Information Regarding License Amendment for “Changes in Steam Generator Tube Rupture Analysis Methodology” (TAC NOS. MB0739 and MB0740)	06/29/2001
		CUSTOMER P.O.: 01581629	Inspection & Refurbishment Report, REV. 0 for 16" Class 150 Type Mak Permaseat Valve Assembly P/N: PD96503, S/N: 11475	03/09/2018
		CUSTOMER P.O.: 01595982	Inspection & Refurbishment Report, REV. 0 for 16" Class 150 Type Mak Permaseat Valve Assembly P/N: PD96503, S/N: 12201	03/31/2020
		DB-12-ECCS	Design Bases Document for the Emergency Core Cooling System	11
		DCCPM702QCN	Control Valve Specification	3
		ES-VALVE-1432-QCN	Gate and Globe Valves, Sizes 2 ½” and Larger	4

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		IST Program Plan	Donald C. Cook IST Program Plan – 5th Interval	3
		ML012690136	Issuance of Amendments (TAC Nos MB0739 and MB0740) Related to SGTR Event Analysis	10/24/2001
		NB-22618	Form U-1A Manufacturers' Data Report for Pressure Vessels for Nitrogen	06/24/1971
		PMI-5073	Air Operated Valve Program	10
		VDS-1-NRV-151	Valve Data Sheet for 1-NRV-151	4
		VDS-2-ICM-129	Control Switch Settings	03/31/2000
	Procedures	1-OHL-5030-SOM-032	Unit 1 Daily Outside Tours	39
		1-OHP-4023-E-3	Steam Generator Tube Rupture	25
		12-EHP-5043-OAR-001	Engineering Work Product Acceptance Review	20
		12-EHP-5073-AOV-003	Air Operated Valve Categorization	10
		12-EHP-5073-AOV-004	Air and Hydraulic Operated Valve Design Basis Reviews	0
		12-EHP-5074-MOV-001	Motor Operated Valve Program	22
		12-OHP-4021-030-001	Operation of the Reactor Nitrogen System	23
		EVAL-2-E-600AC-MOV-001	Methodology for Calculating AC MOV Actuator Output Capability for Reliance 550 VAC and 575 VAC Motors Using the KCI/ComEd Method	0
		PMI-5074	Motor Operated Valve Program	4
		PMP-2350-SAR-001	UFSAR Update Process	20
		PMP-5046-SCP-001	Software Control	11
		PS-MOV-001D	Motor Performance Curves and Empirical Relationship for Output Torque Calculation	1
		PS-MOV-001E	Methodology to Calculate Terminal Voltage for AC MOV Motors Using Breakdown Current	1
	Work Orders	55225070-01	Perform Diagnostic Testing	04/20/2010

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		55232723-01	1-ICM-250-ACT, Boron Injection Tank Train 'A' Outlet Contamination Isolation Valve ICM-250 Motor Actuator	03/31/2016
		55263396	Refurbish MOV Actuator for 2-ICM-305	04/18/2012
		55266989-04	1-IMO-262 Refurbish MOV Actuator	11/19/2015
		55266989-07	Perform As-Found / As-Left Diagnostic	08/22/2015
		55470945-01	As-Found / As-Left Diagnostic Testing	04/19/2016
		55484723-01	NQQS, Inspect Reactor Plant Nitrogen Bulk Storage Tanks	06/05/2017
		55495837-03	Hot Shutdown Panel Operability for Steam Generator PORV	06/25/2018
		55503249-01	MTMV, 2-MRV-223 Perform AF/AL Diagnostic Testing	06/26/2019
		55508187-01	MTI: 1-NRV-151, PM to Perform AOV Diagnostics	03/28/2019
		55508855-02	MTI, 1-MRV-233, A-F & A-L Diag, Replace Hoses, Regulator	06/05/2019
		55517188	2-ICM-305-ACT PM for Diagnostic Testing	10/07/2019
		55527054	Perform As-Found / As-Left Diagnostics for 2-ICM-305	12/01/2020
		55530574-02	Perform As-Found / As-Left Diagnostic Test	01/16/2020
		55532617-01	1-NRV-151, Perform Diagnostic Testing	10/05/2020
		55536648	Hot Shutdown Panel Operability for Steam Generator PORV	08/20/2020
		55551226-01	Perform an As-Found / As-Left Diagnostic	12/02/2020