UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 31, 2013

Mr. Michael J. Pacilio
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 - SAFETY EVALUATION IN SUPPORT OF REQUEST FOR RELIEFS ASSOCIATED WITH THE FIFTH 10-YEAR INTERVAL INSERVICE TESTING PROGRAM (TAC NOS. ME9865, ME9866, ME9869, ME9870, ME9871, AND ME9872)

Dear Mr. Pacilio:

By letter dated October 30, 2012 (Agencywide Documents Access and Management System (ADAMS) and supplemented by letters dated April 1, 2013, June 13, 2013, and August 29, 2013, Exelon Generation Company, LLC (the licensee) submitted relief requests (RRs) RV-01, RV-02C, and RV-23H to the U.S. Nuclear Regulatory Commission (NRC). The licensee requested relief from, and proposed alternatives to, certain inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for the IST program at the Dresden Nuclear Power Stations (DNPS), Units 2 and 3, for the fifth 10-year IST program interval.

The NRC staff has determined that for RRs RV-01, RV-02C, and RV-23H, the proposed alternatives provide reasonable assurance that the components are operationally ready. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii) for requests RV-01, RV-02C, and RV-23H, and is in compliance with the ASME OM Code requirements. All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests remain applicable. Therefore, the NRC staff authorizes use of the alternative in RRs RV-01, RV-02C, and RV-23H, at DNPS, Units 2 and 3, for the fifth 10-year IST program interval, which begins on November 1, 2013, and is scheduled to conclude on October 31, 2023.

All requirements for which relief was not specifically requested and approved in the subject requests remain applicable.

If you have any questions on this action, please contact the NRC Project Manager, Brenda Mozafari, at (301) 415-2020.

Sincerely,

Travis L. Tate, Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST NOS. RV-01, RV-02C, and RV-23H

RELATED TO THE INSERVICE TESTING PROGRAM

FOR THE FIFTH 10-YEAR INTERVAL

EXELON GENERATION COMPANY, LLC.

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

By letter dated October 30, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12305A532) and supplemented by letters dated April 1, 2013 (ADAMS Accession No. ML13093A177), June 13, 2013 (ADAMS Accession No. ML13165A205), and August 29, 2013 (ADAMS Accession No. ML13241A419), Exelon Generation Company, LLC (EGC, the licensee) submitted alternative relief requests (RRs) for RV-01, RV-02C, and RV-23H, to the U.S. Nuclear Regulatory Commission (NRC). The licensee requested relief from and proposed alternatives to certain inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for the IST program at the Dresden Nuclear Power Stations (DNPS), Units 2 and 3, for the fifth 10-year IST program interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii), the licensee requested to use the proposed alternatives in RV-01, RV-02C, and RV-23H, on the basis that compliance with certain ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

Section 50.55a(f) of 10 CFR, "Inservice Testing Requirements," requires, in part, that an IST of certain ASME Code Class 1, 2, and 3, components must meet the requirements of the ASME OM Code and applicable addenda.

Section 50.55a(a)(3) of 10 CFR states, in part, that alternatives to the requirements of paragraph (f) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (i) the proposed alternative provides an acceptable level of quality and safety, or (ii)

compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The DNPS, Units 2 and 3, fifth 10-year IST interval begins on November 1, 2013, and is currently scheduled to end on October 31, 2023. The DNPS, Units 2 and 3, fifth 10-year IST program complies with the ASME OMb Code, 2004 Edition with Addenda through OMb-2006 Addenda.

Based on the above, and subject to the NRC's findings with respect to authorizing the proposed alternatives to the ASME OM Code given below, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to authorize the alternatives requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Relief Request RV-01

The licensee stated in its relief request that this request applies to all pumps and valves contained within the DNPS, Units 2 and 3, IST program scope. This request applies to the various frequency specifications of the ASME OM Code as shown below. These frequencies for tests given in the ASME OM Code do not include a tolerance band.

OM Code Section	Description
ISTA-3120(a)-	"The frequency for inservice testing shall be in accordance with the requirements of Section IST."
ISTB-3400-	Frequency of Inservice Tests; "An inservice test shall be run on each pump as specified in Table ISTB-3400-1." Table ISTB-3400-1 lists two frequencies - quarterly and biennially.
ISTC-3510-	Exercising Test Frequency; "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, ..."
ISTC-3540-	Manual Valves
I STC-3630(a)-	Frequency; "Tests shall be conducted at least once every 2 years."
ISTC-3700-	Position Verification Testing; "Valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated . . ."

OM Code Section	Description
ISTC-5221(c)(3)-	"At least one valve from each group shall be disassembled and examined at each refueling outage; all valves in a group shall be disassembled and examined at least once every 8 years."
Appendix I, I-1320(a)-	"5 - Year Test Interval. Class 1 pressure relief valves shall be tested at least once every 5 years, . . ."
Appendix I, I-1330-	Test Frequency, Class 1 Non-reclosing Pressure Relief Devices; "Class 1 non-reclosing pressure relief devices shall be replaced every 5 years . . ."
Appendix I, I-1340-	Test Frequency, Class 1 Pressure Relief Valves that are used for Thermal Relief Application; Refers to I-1320 for test frequency.
Appendix I, I-1350-	Test Frequency, Classes 2 and 3 Pressure Relief Valves; "Classes 2 and 3 pressure relief valves, with the exception of PWR main steam safety valves, shall be tested every 10 years, . . ."
Appendix I, I-1360-	Test Frequency, Classes 2 and 3 Non-reclosing Pressure Relief Devices; "Classes 2 and 3 non-reclosing pressure relief devices shall be replaced every 5 years, . . ."
Appendix I, I-1370-	Test Frequency, Classes 2 and 3 Primary Containment Vacuum Relief Valves; "Tests shall be performed on all Classes 2 and 3 containment vacuum relief valves at each refueling outage or every 2 years, . . ."
Appendix I, I-1380-	Test Frequency, Classes 2 and 3 Vacuum Relief Valves Except for Primary Containment Vacuum Relief Valves; "All Classes 2 and 3 vacuum relief valves shall be tested every 2 years, . . ."
Appendix I, I-1390-	Test Frequency, Classes 2 and 3 Pressure Relief Devices that are used for Thermal Relief Application; "Tests shall be performed on all Classes 2 and 3 relief devices used in thermal relief application every 10 years, . . ."
Appendix II, II-4000(a)(1)(e)-	Performance Improvement Activities; "Identify the interval of each activity."
Appendix II, II-4000(b)(1)(e)-	Optimization of Condition-Monitoring Activities; "Identify the interval of each activity . . ."

3.1.1 Reason for Relief Request RV-01

As stated by the licensee:

The ASME OM Code Section IST establishes the frequency for all components within the scope of the Code. The frequencies (e.g., quarterly) have always been interpreted as "nominal" frequencies generally as defined in the Table 3.2 of NUREG-1482, Revision 1, and Owners routinely applied the surveillance extension time period (i.e., grace period) contained in the plant technical specification (TS) surveillance requirements (SRs). The TSs typically allow for a less than or equal to 25 percent extension of the surveillance test interval to accommodate plant conditions that may not be suitable for conducting the surveillance. However, regulatory issues have been raised concerning the applicability of the TS "Grace Period" to ASME OM Code-required IST frequencies irrespective of allowances provided under TS Administrative Controls (i.e., TS 5.5.6, "Inservice Testing Program," invokes SR 3.0.2 for various OM Code frequencies).

The lack of a tolerance band on the ASME OM Code IST frequencies restricts operational flexibility. There may be a conflict where a surveillance test could be required (i.e., its frequency could expire), but where it is not possible or not desired for it be performed until sometime after a plant condition or associated limiting condition for operation is within its applicability. Therefore, to avoid this conflict, the surveillance should be performed when it can be and should be performed.

The NRC recognized this potential issue in the TS by allowing a frequency tolerance as described in the TS SR 3.0.2. The lack of a similar tolerance applied to the ASME OM Code testing places a hardship on the plant to adequately schedule work tasks without operational flexibility. Thus, just as with TS-required surveillance testing, some tolerance is needed to allow adjusting ASME OM Code testing intervals to suit the plant conditions and other maintenance and testing activities. This assures operational flexibility when scheduling surveillance tests that minimize the conflicts between the need to complete the surveillance and plant conditions.

As currently written, ASME OM Code requirements do not allow testing period extensions that provide an allowance for operational flexibility for the performance of ASME OM Code testing. As a result, this places a hardship on DNPS's ability to schedule and perform ASME OM Code testing without a compensating increase in the level of quality and safety.

3.1.2 Licensee's Proposed Alternative for Relief Request RV-01

The licensee proposed to adopt wording equivalent to the ASME Board of Nuclear Codes and Standards (BNCS)-Approved OM Code Case OMN-20, repeated below, for determining acceptable tolerances for pump and valve test frequencies. This Code Case was approved by the ASME OM Code Standards Committee in February 2012. The proposed alternative will be utilized for the entire fifth 10-year interval and will apply to the various frequency specifications of the ASME OM Code for all pumps and valves contained within the DNPS IST program scope.

BNCS-Approved OMN-20

The IST and earlier editions and addenda of ASME OM Code specify component test frequencies based either on elapsed time periods (e.g., quarterly, two years, etc.) or based on the occurrence of plant conditions or events (e.g., cold shutdown, refueling outage, upon detection of a sample failure, following maintenance, etc.).

(a) Components whose test frequencies are based on elapsed time periods shall be tested at the frequencies specified in section IST with a specified time period between tests as shown in the table below. The specified time period between tests may be reduced or extended as follows:

(1) For periods specified as less than two years, the period may be extended by up to 25 percent for any given test.

(2) For periods specified as greater than or equal to two years, the period may be extended by up to six months for any given test.

(3) All periods specified may be reduced at the discretion of the Owner (i.e., there is no minimum period requirement).

Period extension is to facilitate test scheduling and considers plant operating conditions that may not be suitable for performance of the required testing (e.g., performance of the test would cause an unacceptable increase in the plant risk profile due to transient conditions or other ongoing surveillance, test or maintenance activities). Period extensions are not intended to be used repeatedly merely as an operational convenience to extend test intervals beyond those specified.

Period extensions may also be applied to accelerated test frequencies (e.g., pumps in Alert Range), and other less than 2-year test frequencies not specified in the table below.

Period extensions may not be applied to the test frequency requirements specified in Subsection ISTD, *Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-water Reactor Nuclear Power Plants*, as Subsection ISTD contains its own rules for period extensions.

Frequency	Specified Time Period Between Tests
Quarterly (or every 3 months)	92 days
Semiannually (or every 6 months)	184 days
Annually (or every year)	366 days
x Years	x calendar years where 'x' is a whole number of years ≥ 2

(b) Components whose test frequencies are based on the occurrence of plant conditions or events may not have their period between tests extended except as allowed by ASME OM Code 2004 Edition through OMb-2006 Addenda and earlier and addenda of ASME OM Code.

3.1.3 NRC Staff Evaluation Regarding Relief Request RV-01

Historically, licensees have applied and the NRC staff has accepted the standard TS definitions for IST intervals (including allowable interval extensions) to ASME OM Code required testing (Reference NUREG-1482 Revision 1, Section 3.1.3). Recently, the NRC staff reconsidered the allowance of the TS testing intervals and interval extensions for IST not associated with TS SRs. As noted in Regulatory Issue Summary (RIS) 2012-10, *"NRC Staff Position on Applying Surveillance Requirements 3.0.2 and 3.0.3 to Administrative Controls Program Tests,"* the NRC determined that programmatic test frequencies can't be extended in accordance with the TS SR 3.0.2. This includes all ISTs described in the ASME OM Code but not specifically required by the TS SRs.

Following this development, the NRC staff sponsored and co-authored an ASME OM Code inquiry and Code Case to modify the ASME OM Code to include TS-like test interval definitions and interval extension criteria. The resultant BNCS-Approved Code Case OMN-20, as shown above, was approved by the ASME Operation and Maintenance Standards Committee on February 15, 2012, with the NRC representative voting in the affirmative on this proposed Code Case. The licensee proposes to adopt language equivalent to the BNCS-Approved Code Case OMN-20.

The NRC staff determined that requiring the licensee to meet the ASME OM Code requirements, without an allowance for defined frequency and frequency extensions for IST of pumps and valves, results in a hardship without a compensating increase in the level of quality and safety. Based on the prior acceptance by the NRC staff of the similar TS test interval definitions and interval extension criteria, the staff finds that implementation of the test interval definitions and interval extension criteria contained in the ASME BNCS-Approved OM Code Case OMN-20 is acceptable. Allowing usage of Code Case OMN-20 provides reasonable assurance of operational readiness of pumps and valves subject to the ASME OM Code IST.

3.2 Licensee's Alternative for Relief Request RV-02C

This request applies to the DNPS, Units 2 and 3, and main steam safety valves (MSSV) as provided by the licensee in the list given in attachment 3 of the licensee's relief request.

In ASME OM Code Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," Section I-1320, "Test Frequencies, Class 1 Pressure Relief Valves," paragraph (a), "5-Year Test Interval" states these valves shall be tested as least once every five years. This section also states that a minimum of 20 percent of the pressure relief valves are to be tested within any 24-month interval. The required test ensures that the MSSVs, which are located on each of the main steam lines between the reactor vessel and the first isolation valve within the drywell, will open at the pressures assumed in the safety analysis.

The licensee proposes to extend the test interval for these valves from five years to six years (with a 6-month grace period) while still maintaining the required 24-month/20 percent sampling requirement. This will allow the MSSV testing to more closely coincide with the DNPS refueling outage interval.

3.2.1 Licensee's Reason for Relief Request

In accordance with 10 CFR 50.55a(a)(3)(ii), the licensee's relief request seeks approval of an alternative to the 5-year test interval requirements of ASME OM Code, Appendix I, Section I-1320(a), for the Dresser Model 3777Q MSSVs (provided in the table in section 3.5) at DNPS, Units 2 and 3. EGC requests that the test interval be increased from 5 years to 6.5 years. All other requirements of the applicable ASME OM Code would be met. Compliance with the applicable requirements of the ASME OM Code for these MSSVs results in hardship due to unnecessary personnel radiation exposure without a compensating increase in the level of quality or safety.

Given the current 24-month operating cycle for each DNPS unit, EGC is required to remove and test 50 percent (four of eight) of the MSSVs every refueling outage, so that all valves are removed and tested every two refueling outages. This ensures compliance with the ASME OM Code requirements for testing Class 1 pressure relief valves within a 5-year interval. Extending the overall test interval to 6.5 years would reduce the minimum number of MSSVs tested at DNPS to the code required 20 percent per 24 months and over three refueling outages (i.e., 24-month cycles at DNPS) would reduce radiation exposure associated with testing four extra MSSVs per unit.

Without Code relief, the incremental outage work due to the inclusion of the four additional MSSVs would be contrary to the principles of as low as reasonably achievable), in that, the removal and replacement of the four extra MSSVs over three refueling outages per unit will result in approximately eight additional person-rem of cumulative radiation exposure. This additional cumulative radiation exposure represents a hardship for DNPS without a compensating increase in the level of quality or safety.

The MSSVs are located on the second elevation of the drywell. The major contributor to radiation exposure on the first and second elevations of the drywell is the Reactor Recirculation system, for which permanent shielding has been installed. However, other systems on the second elevation of the drywell also contribute to radiation exposure. These systems include Reactor Water Cleanup, Shutdown Cooling, and the Isolation Condenser.

Removal of an installed MSSV and installation of a replacement MSSV requires removal of insulation and appurtenances on the MSSV and unbolting the MSSV. Once unbolted, the MSSV is maneuvered from its location and lowered to the first elevation. Due to the highly congested configuration of the General Electric Mark I containment at DNPS, this evolution requires construction and demobilization of additional rigging. Based upon the size of the valves, a crew of five to seven personnel is necessary to safely move each valve.

Historical cumulative radiation exposure at DNPS for removal and replacement of safety and relief valves from 11 recent DNPS refueling outages is described in the table below.

Outage	Number of Valves Replaced	Cumulative Radiation Exposure (rem)
D3R17	7	5.0
D3R18	7	10.4
D3R19	7	23.2
D3R20	6	4.5
D3R21	5	4.5
D2R17	7	10.6
D2R18	7	16.0
D2R19	7	12.6
D2R20	7	6.7
D2R21	6	8
D2R22	5	4.6

This data indicates that the cumulative radiation exposure to replace an MSSV could range from approximately one rem to three rem per valve. The outage-specific variability of cumulative radiation exposure is attributed to the location of a particular valve relative to radiation hot spots, the physical configuration of surrounding equipment for a particular valve, and the impact of outage-specific plant configurations. Due to the dynamic nature of refueling outages, the combinations of these factors for refueling outages vary significantly. The licensee estimates that the cumulative radiation exposure to remove and replace a single MSSV is approximately two person-rem. Therefore, absent the requested relief, replacement of four extra MSSVs would result in approximately eight additional person-rem over three refueling outages per unit, without a compensating increase in the level of quality or safety.

3.2.2 Licensee's Proposed Alternative for Relief Request RV-02C

The licensee states that since DNPS operates on a 24-month refueling outage cycle, EGC proposes that the DNPS MSSVs be tested at least once every 6.5 years (i.e., every six years with a grace period of six months) in accordance with ASME OM Code Case OMN-17, "Alternative Rules for Testing ASME Class 1 Pressure Relief/SafetyValves." A minimum of 20 percent of the pressure relief valves will be tested within any 24-month interval and this 20 percent will consist of valves that have not been tested during the current 6.5 year interval, if they exist. The test interval for any individual valve shall not exceed 6.5 years. This alternative test frequency is consistent with the alternative test frequency provided in ASME Code Case OMN-17.

The licensee also proposed to comply with all other OMN-17 requirements for the MSSVs including requirements for replacement with pretested valves, requirements for testing additional valves, maintenance requirements, and requirements for disassembly and inspection. The IST history for the Dresser Model 3777Q MSSVs at DNPS from May 1997, to the present, indicates that all tested MSSVs (i.e., 58 MSSV tests) that have been installed in either DNPS, Unit 2 or Unit 3, for two operating cycles have successfully passed the ASME OM Code and TS as-found lift setpoint acceptance criteria within plus or minus 3 percent.

This historical DNPS test data is also consistent with the reliable and consistent performance of the same Dresser Model 3777Q MSSVs at Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2, which are tested and refurbished at the same facility, using the same techniques and processes. Since 1997, EGC has collected and documented 128 as-found Model 3777Q test results from both DNPS and QCNPS. This test data indicates that all MSSV test results (i.e., Dresser Model 3777Q valves) are within the ASME acceptance criteria of plus or minus 3 percent. MSSV performance data prior to 1997 is not indicative of current MSSV performance; therefore, it was not considered. The licensee states that this is due to the fact that changes in refurbishment methods, testing methods, and improvements in main steam system vibration reduction have since improved MSSV performance.

In addition to the historical test results, the licensee states the current DNPS reload ASME overpressure analyses for both units assume that only eight of nine MSSVs are operable, and all of the operable MSSVs open to relieve pressure at the upper ASME limit of plus 3 percent of the MSSV set-point. These conservative assumptions provide additional assurance that the requested relief from the ASME OM Code requirement would not result in a decrease in the level of quality or safety.

Additionally, an EGC-approved and qualified procedure is used for disassembly and inspection of the MSSVs. This procedure requires that each MSSV be disassembled and inspected upon removal from service, regardless of the as-found test results. The procedure identifies the critical components that are required to be inspected for wear and defects, and the critical dimensions that are required to be measured during the inspection. If components are found worn or outside of the specified tolerance(s), the components are either reworked to within the specified tolerances, or are replaced. All parts that are defective, outside-of-tolerance, and all reworked/replaced components are identified, and EGC is notified of these components by the off-site vendor. The MSSVs are then re-assembled, an as-left test is performed, and the MSSVs are returned to DNPS.

Based upon the estimated cumulative radiation exposure to comply with the ASME OM Code, coupled with historical MSSV test results for Dresser Model 3777Q MSSVs at DNPS and QCNPS, EGC has concluded that compliance with the ASME OM Code would result in a hardship, without a compensating increase in the level of quality or safety.

3.2.3 NRC Staff Evaluation for Relief Request RV-02C

The ASME OM Code, Mandatory Appendix I, requires that Class 1 safety relief valves (SRVs) be tested at least once every five years. However, Mandatory Appendix I does not require that SRVs be disassembled and inspected prior to the start of the 5-year test interval. In lieu of the 5-year test interval, the licensee proposed to implement ASME OM Code Case OMN-17, which allows a test interval of six years plus a 6-month grace period. The ASME Committee on OM developed Code Case OMN-17 and published it in the 2009 Edition of OM Code. ASME OM Code Case OMN-17 imposes a special maintenance requirement to disassemble and inspect each SRV to verify that parts are free from defects resulting from time-related degradation or maintenance-induced wear prior to the start of the extended test interval. The purpose of this maintenance requirement is to reduce the potential for SRV set-point drift.

The ASME Code Case OMN-17 has not been added to Regulatory Guide 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code," or included in 10 CFR 50.55a by reference. However, the NRC has allowed licensees to use ASME Code Case OMN-17,

provided all requirements in the Code Case are met. Consistent with the special maintenance requirement in ASME Code Case OMN-17, each MSSV will be refurbished to a like-new condition prior to the start of each 6.5 year test interval. Critical components are required to be inspected for wear and defects, and the critical dimensions will be measured during the inspection.

MSSV components are required to be reworked to within the specified tolerance or replaced if found to be worn or outside of specified tolerances. Furthermore, the NRC staff determined that ASME Code Case OMN-17 is performance-based, in that, it requires SRVs to be tested more frequently if test failures occur. For example, ASME Code Case OMN-17 requires that two additional valves be tested when a valve in the initial test group exceeds the set pressure acceptance criteria. All remaining valves in the group are required to be tested if one of the additional valves tested exceeds its set pressure acceptance criteria. Therefore, the SRV test frequency would be equivalent to the current test frequency, if test failures occur.

The licensee has provided test data to show that the subject valves have historically exhibited very limited susceptibility to time-related degradation or set-point drift. The licensee has also committed to implement a disassembly and inspection program in conjunction with the extended test interval, as required by ASME OM Code Case OMN-17.

Based on the historical performance of the set-point testing of DNPS, Units 2 and 3, MSSVs and the licensee's commitments to disassemble and inspect the MSSVs prior to use, the NRC staff finds that implementation of the ASME OM Code Case, OMN-17, for the testing of the designated MSSVs, in lieu of the requirements of ASME OM Code 2004 Edition through OMb-2006, Mandatory Appendix I, Section 1320, of the OM Code, is acceptable. In addition, on the basis of the estimated radioactive dose for the MSSV replacement, favorable historical performance of the MSSVs, and the licensee's commitment to disassemble and inspect the MSSVs, the NRC staff concludes that compliance with the ASME OM code would result in a hardship or unusual difficulty without a compensating increase in the level of quality as safety.

3.3 Licensee's Relief Request RV-23H (as provided by the licensee:)

This request applies to the DNPS high-pressure coolant injection (HPCI) system solenoid valves 2-2301-032-SO and 3-2301-032-SO. This request applies to the following Subsection ISTC and paragraphs of the ASME OM Code.

ISTC-3300 Reference Values: "Reference values shall be determined from the results of preservice testing or from the results of inservice testing."

ISTC-331 0 Effects of Valve Repair, Replacement, or Maintenance on Reference Values: "When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect the valve's performance, a new reference value shall be determined or the previous value reconfirmed ..."

ISTC-3500, "Valve Testing Requirements," states, "Active and passive valves in the categories defined in ISTC-1300 shall be tested in accordance with the paragraphs specified in Table ISTC-3500-1 and the applicable requirements of ISTC-5100 and ISTC-5200."

ISTC-3510, "Exercising Test Frequency," states, "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, except as provided by ISTC-3520, ISTC3540, ISTC-3550, ISTC-3560, ISTC-5221, and ISTC-5222. Power-operated relief valves shall be exercise tested once per fuel cycle."

ISTC-3560, "Fail-Safe Valves," states, "Valves with fail-safe actuators shall be tested by observing the operation of the actuator upon loss of valve actuating power in accordance with the exercising frequency of ISTC-3510."

ISTC-5151, "Valve Stroke Testing" for Solenoid-Operated Valves (SOVs), states, in part, "Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500."

ISTC-5152, "St[r]oke Test Acceptance Criteria" for SOVs, states, in part, "Test results shall be compared to reference values established in accordance with ISTC-3300, ISTC-3310, or ISTC-3320."

ISTC-5153, "Stroke Test Corrective Action" for SOVs, states, in part, "If a valve fails to exhibit the required change of obturator position or exceeds the limiting values of full-stroke time, the valve shall be immediately declared inoperable. Valves with measured stroke times that do not meet the acceptance criteria of ISTC-5152 shall be immediately retested or declared inoperable."

3.3.1 Licensee's Reason for Relief Request RV-23H (as requested by the licensee)

The licensee requested alternative testing to ISTC-5151, ISTC-5152, and ISTC-5153 (b), which requires that SOVs have their stroke-times measured and compared to reference values. The alternative testing was requested for the HPCI system solenoid valves 2(3)-2301-032-SO. These are ASME Code Class 2, Category B, valves.

These solenoid valves 2(3)-2301-032-SO function as a backup to the exhaust line drain pot steam trap. During normal operation of the HPCI turbine using high quality steam, the drain path from the drain pot to the torus via the steam trap is adequate to remove condensate from the turbine exhaust line. However, during HPCI turbine operation with low-pressure and low-quality steam (which is seen during HPCI surveillance testing during plant startup and would be expected during HPCI operation during a small break loss of coolant accident), condensate collects in the drain pot faster than it can be drained through the trap. Under these conditions, solenoid valves 2(3)-2301-032-SO open automatically to drain to the gland seal condenser upon receipt of a signal from a drain pot high level switch when the drain pot level reaches the high level alarm set point. The high level condition sounds an alarm in the control room.

These valves are equipped with hand switches to enable remote manual operation from control room; however, they are not equipped with position indicators and the valves are totally enclosed, so valve position cannot be verified by the direct observation. Valve actuation may be indirectly verified by removing the HPCI system from service, filling the drain pot with water until the high level alarm is received, and observing that the high level alarm clears. The time for alarm to clear would depend primarily on variables such as the rate of filling and the level of the drain pot when the filling is secured. The steam line drain pot is not equipped with the direct level indication; therefore, the time required for alarm to clear may vary significantly and operation of valve 2(3)-2301-032-SO cannot be verified by operation of the hand switch.

Failure of these valves to perform their safety function would be indicated by a drain pot high level alarm during operation with low pressure steam. Functional tests are conducted on the drain pot level alarm switches at least once each cycle to verify their operability. Additionally, condensate entrapped in the steam would cause significant fluctuations in exhaust steam header pressure.

Compliance with the quarterly exercising and stroke-timing requirements of the ASME OM Code would require either system modification to replace these valves with ones of testable design, or to purchase non-intrusive test equipment, and develop new test methods and procedures.

The station design does not include remote light indication for the 2(3)-2301-032-SO valves. These valves are completely enclosed such that the valve position cannot be verified by direct observation. Due to the absence of a visible valve stem and light indication, "switch to light" stroke timing cannot be performed. In addition, there are no known reliable non-intrusive test methods for measuring stroke-times for these valves.

In order to perform stroke-timing of these valves, a design change would have to be implemented. The modification would include: (1) changing the valve design to include position limit switches, (2) routing light indication cabling from the plant through containment boundaries to the control room, and (3) installing position indication lights in the main control room panels. It is estimated that this modification would cost in excess of $300,000 per unit. This remote valve indication would be installed solely for meeting the ASME OM Code requirements and would serve no other operational purpose.

A semi-annual exercise of the 2(3)-2301-032-SO valves is currently performed and its associated level switches operate as proven by the receipt of the "HPCI TURBINE EXH DRAIN POT HIGH LEVEL" alarm (i.e., water level increase) and reset (i.e., water level decrease due to the open exercise of valves 2(3)-2301-032-SO). During this same evolution, the valve solenoid is also verified actuated (i.e., valve solenoid is magnetized) by use of a test probe. This testing approach provides adequate assurance that the valves function as required.

A review of the work and the IST history of these valves did not identify any cases of these valves failing to stroke open since they were added to the IST program scope in November 1994. DNPS has a preventive maintenance activity to replace these valves once every six years. This valve replacement activity was last performed on March 11, 2013, on DNPS, Unit 2, and on December 8, 2007, on DNPS, Unit 3, and no defects were noted.

The exercising of these valves without stroke timing provides no measure of valve degradation, maintenance activities will be instituted to compensate for testing deficiencies.

3.3.2 Licensee's Proposed Alternative for Relief Request RV-23H

The licensee states:

These solenoid valves 2(3)-2301-32-SO will be exercised quarterly using the hand switch. They will also be functionally tested semi-annually (i.e., every six months). During the semi-annual test valve 2(3)-2301-32 actuation will be verified by the receipt of the "HPCI TURBINE EXH DRAIN POT HIGH LEVEL" alarm (i.e., water level increase) and reset (i.e., water level decrease due to the open exercise of valves 2(3)-2301-32-SO). During this same semi-annual test, the valve solenoid is also verified to actuate (i.e., valve solenoid is magnetized) by use of a small

metallic object. This testing approach provides reasonable assurance that the valves function as required.

3.3.3 NRC Staff Evaluation

The NRC staff finds that solenoid valves 2(3)-2301-032-SO at DNPS are not equipped with position indication or remote light indication and the valves are totally enclosed, so valve position cannot be verified by direct observation. Due to the absence of a visible valve stem and light indication, stroke timing from moving the switch to the open position to receiving an open light indication cannot be performed. In addition, there are no reliable non-intrusive test methods for measuring stroke times for these valves. Therefore, the NRC staff finds that it is not feasible to exercise and stroke-time these valves in accordance with the requirements of the ASME OM Code. Compliance with the ASME OM Code requirements would require major system modifications.

In lieu of the ASME OM Code-required stroke-time test for 2(3)-2301-032-SO, the licensee proposed to perform a functional verification test. The licensee states that valve actuation may be indirectly verified by isolating valves 2(3)-2301-032-SO from the HPCI system, filling the drain pot with water until high alarm is received, and observing that the high level alarm clears. Failure of these valves to perform their safety function can be indicated by a drain pot high level alarm during operation with low-pressure steam. Additionally, the licensee has alternate means to drain the condensate pot should these valves fail to open.

The licensee states that these 2(3)-2301-32-SO valves will be quarterly exercised using hand switches. They will also be functionally tested semi-annually. During the semi-annual test, valve 2(3)-2301-32 actuation will be verified by the water level alarm for the HPCI turbin drain. During this same semi-annual test, the valve solenoid is also verified to actuate by use of a small metallic object. Based on the testing discussed above, the NRC staff finds that this testing approach provides reasonable assurance that the valves function as required.

The licensee performed a review of the work and IST of these solenoid valves and did not identify any failure to stroke open since these were added to the IST program scope in November 1994. The licensee also has a preventive maintenance program to replace these valves once every six years. The DNPS, Unit 2, valve, 2-2301-032-SO, was last replaced on May 11, 2013, and the DNPS, Unit 3, valve, 2-2301-032-SO, was replaced on December 2, 2007. No defects were noted with either valve that was replaced.

Additionally, the licensee will continue to use the stroke test corrective action provisions of ISTC-5153 as follows:

- If a valve fails to exhibit the required change of obturator position, the valve shall be immediately declared inoperable.
- Valves declared inoperable may be repaired, replaced, or the data may be analyzed to determine the cause of the deviation and the valve shown to be operating acceptably.
- Valve operability based upon analysis shall have the results of the analysis recorded in the record of the tests.
- Before returning a repaired or replacement valve to service, a test demonstrating satisfactory operation shall be performed.

The NRC staff finds that imposition of the Code requirements would result in a burden on the licensee in that modification to the valves, valve replacement, or the purchase of more advance testing equipment would be necessary to comply with Code requirements, which would represent a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff finds that the proposed alternative will provide reasonable assurance of the operational readiness of valves 2(3)-2301-032-50 because (1) the proposed verification test and high water level alarms in the control room will confirm the functionality of the valve (2) historical performance of the valve is favorable, and (3) the licensee will replace these valves every six years.

4.0 CONCLUSION

As set forth above, the NRC staff concludes that for relief requests RV-01, RV-02C, and RV-23H, the proposed alternatives provide reasonable assurance that the components are operationally ready. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii) for RRs RV-01, RV-02C, and RV-23H, and is in compliance with the ASME OM Code requirements. All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests remain applicable. Therefore, the NRC staff authorizes alternatives for Relief Requests RV-01, RV-02C and RV-23H, at DNPS, Units 2 and 3, for the fifth 10-year IST program interval, which begins on November 1, 2013, and is scheduled to conclude on October 31, 2023.

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If you have any questions on this action, please contact the NRC Project Manager, Brenda Mozafari, at (301) 415-2020.

Sincerely,

/ ***RA*** /

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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

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