September 5, 2001

Mr. Oliver D. Kingsley, President
Exelon Nuclear
Exelon Generation Company, LLC
1400 Opus Place, Suite 500
Downers Grove, IL 60515

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3, AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE (ASME CODE) - RELIEF FOR RISK-INFORMED INSERVICE INSPECTION OF PIPING (TAC NOS. MB0362 AND MB0363)

Dear Mr. Kingsley:

By letter dated October 18, 2000, Commonwealth Edison Company (ComEd) requested approval of an alternate risk-informed inservice inspection (RI-ISI) program for Dresden Nuclear Power Station Units 2 and 3. This request was identified as a Cost Beneficial Licensing Action. Additional clarifying information was provided in your letter dated February 19, 2001.

The Dresden Units 2 and 3 RI-ISI program was developed in accordance with Electric Power Research Institute Topical Report TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, Revision B-A, using the Nuclear Energy Institute "template" methodology. The results of our review indicate that your proposed RI-ISI program is an acceptable alternative to the requirements of the ASME Code Section XI, and that implementation of the RI-ISI program will result in a reduction in piping weld examinations, with an associated reduction in occupational radiation exposure, with little or no change in risk to the public due to piping failures. Therefore, your request for relief is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the alternative provides an acceptable level of quality and safety. This relief is granted for both units until the completions of the present 10-year intervals.

Subsequent to the date of the original amendment requests, ComEd was merged into Exelon Generation Company, LLC (Exelon or licensee). By letter dated February 7, 2001, Exelon informed the NRC that it assumed responsibility for all pending NRC actions that were requested by ComEd.

If you have questions regarding this matter, please contact Lawrence Rossbach at (301) 415-2863.

Sincerely,

/RA/

Anthony J. Mendiola, Section Chief, Section 2
Project Directorate III,
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosure: Safety Evaluation

cc w/encl: See next page

If you have questions regarding this matter, please contact Lawrence Rossbach at (301) 415-2863.

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cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RISK-INFORMED INSERVICE INSPECTION PROGRAM RELIEF REQUEST

EXELON GENERATION COMPANY

DRESDEN NUCLEAR POWER STATION UNITS 2 AND 3

DOCKET NOS. 50-237 and 50-249

1.0 INTRODUCTION

Current inservice inspection (ISI) requirements for the Dresden Nuclear Power Station (DNPS) are contained in the 1989 Edition of Section XI, Division 1 of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, entitled *Rules for Inservice Inspection of Nuclear Power Plant Components* (hereinafter referred to as the ASME Code). In a submittal dated October 18, 2000, (Ref. 1), Commonwealth Edison Company (ComEd, the licensee), proposed a new risk-informed inservice inspection (RI-ISI) program as an alternative to a portion of their current ISI program.

Subsequent to the date of the original amendment requests, ComEd was merged into Exelon Generation Company, LLC (Exelon or licensee). By letter dated February 7, 2001, Exelon informed the NRC that it assumed responsibility for all pending NRC actions that were requested by ComEd. Additional clarifying information was provided in a letter from the licensee dated February 19, 2001 (Ref. 2).

The RI-ISI program is limited to ASME Class 1 and Class 2 piping welds. The program was developed in accordance with the Electric Power Research Institute (EPRI) methodology contained in the NRC approved EPRI Topical Report TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, Revision B-A (Ref. 3).

In the proposed RI-ISI program, piping failure potential estimates were determined using TR-112657 guidance, which utilizes industry piping failure history, plant-specific piping failure history, and other relevant information. Using the failure potential and supporting insights on piping failure consequences from the licensee’s probabilistic risk assessment (PRA), safety ranking of piping segments was established for determination of new inspection locations. The proposed program maintains the fundamental requirements of the ASME Code, such as the examination technology, examination frequency, and acceptance criteria. However, the proposed program reduces the required examination locations significantly while demonstrating that an acceptable level of quality and safety is maintained. Thus, the proposed alternative approach is based on the conclusion that it provides an acceptable level of quality and safety and, therefore, is in conformance with Title 10, Code of Federal Regulations (10 CFR), Part 50.55a(a)(3)(i).

2.0 SUMMARY OF PROPOSED APPROACH

The licensee is required to perform ISI of ASME Code Category Class 1 and Class 2 piping welds during successive 10-year intervals. Currently, all Category B-F welds and 25 percent of all Category B-J piping welds in ASME Class 1 piping greater than 1-inch in nominal diameter are selected for volumetric and/or surface examination based on existing stress analyses and cumulative usage factors. For Category C-F piping welds, 7.5 percent of non-exempt welds are selected for surface and/or volumetric examination.

The licensee submitted the application as an RI-ISI "template" application. Template applications are short overview submittals intended to expedite preparation and review of RI-ISI submittals that comply with a pre-approved methodology. The licensee proposed to implement the staff-approved RI-ISI methodology delineated in TR-112657. As discussed in Table 6-2 of TR-112657, some augmented inspection programs may be integrated into the RI-ISI program. In accordance with the guidance in TR-112657, thermal fatigue is subsumed into the RI-ISI program since the issues raised by NRC Bulletin 88-08, are all addressed by the thermal fatigue assessment as part of the RI-ISI program. Augmented programs for intergrannular stress-corrosion cracking (IGSCC) Category B-G (Generic Letter 88-01), service water integrity (Generic Letter 89-13), flow accelerated corrosion (FAC, Generic Letter 89-09), and high energy line break (USNRC Branch Technical Position MEB 3-1) are not subsumed into the RI-ISI program and remain unaffected.

The licensee requested approval of this alternative for implementation during the third period of the third ISI interval for both Units 2 and 3. According to the information provided in Reference 2, DNPS Unit 2 is currently in the third 10-year interval that started on March 1, 1992 and ends on January 19, 2003. The current period (i.e., the third period of the interval) started on October 1, 1999, and ends on January 19, 2003. Unit 3 is currently in the third 10-year interval that started on March 1, 1992, and ends on October 31, 2002. The current period (i.e., the third period of the interval) started on November 1, 1999, and ends on October 31, 2002.

The implementation of an RI-ISI program for piping should be initiated at the start of a plant's 10-year inservice inspection interval consistent with the requirements of the ASME Code and Addenda committed to by the licensee in accordance with 10 CFR 50.55a. However, the implementation may begin at any point in an existing interval as long as the examinations are scheduled and distributed consistent with the ASME Code requirements (e.g., the minimum examinations completed at the end of the three inspection intervals under ASME Code Program B should be 16 percent, 50 percent, and 100 percent, respectively, and the maximum examinations credited at the end of the respective periods should be 34 percent, 67 percent, and 100 percent).

It is also the staff's view that the inspections for the RI-ISI program and for the balance of the ISI program should be on the same interval start and end dates. This can be accomplished by either implementing the RI-ISI program at the beginning of the interval or merging the RI-ISI program into the ISI program for the balance of the inspections if the RI-ISI program is to begin during an existing ISI interval. One reason for this view is that it eliminates the problem of having different Codes of record for the RI-ISI program and for the balance of the ISI program. A potential problem with using two different interval start dates and hence two different Codes of record would be having two sets of repair/replacement rules depending upon which program identified the need for repair (e.g., a weld inspection versus a pressure test). In Reference 2, the licensee stated that the ASME Code minimum and maximum inspection percentages for the first and second inspection periods have already been satisfied. The licensee also stated that the RI-ISI program implementation in the third period will result in 100 percent of the RI-ISI inspections completed during the current third interval for both units. Reference 2 also stated that the licensee would continue to submit its 10-year interval ISI program, including the RI-ISI program, and would submit the revised RI-ISI program prior to the end of the interval if significant impact on the RI-ISI program occurred due to any new risk insights, plant changes, industry information, or if changes to the basis for NRC's approval of the program were discovered. The licensee also stated that changes to the RI-ISI program would not take place without prior NRC approval.

The staff finds that the DNPS Units 2 and 3 RI-ISI programs meet the ASME Code and 10 CFR 50.55a requirements for minimum and maximum inspections during inspection periods and intervals and for program submittal to the NRC.

3.0 EVALUATION

The licensee's submittal was reviewed with respect to the methodology and criteria contained in TR-112657. Further guidance in defining acceptable methods for implementing an RI-ISI program is also provided in Regulatory Guide (RG) 1.174, RG 1.178, and Standard Review Plan (SRP) Chapter 3.9.8 (Refs. 4, 5, and 6).

3.1 Proposed Changes to ISI Program

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed to implement an RI-ISI program in accordance with the methodology contained in TR-112657 as an alternative to the ASME Code examination requirements for ASME Class 1 and 2 piping for DNPS Units 2 and 3. A general description of the proposed changes to the ISI program was provided in Section 3 of the licensee's submittal.

3.2 Engineering Analysis

In accordance with the guidance provided in RGs 1.174 and 1.178, an engineering analysis of the proposed changes is required using a combination of traditional engineering analysis and supporting insights from the PRA. The licensee elaborated as to how the engineering analyses conducted for the DNPS RI-ISI program ensures that the proposed changes are consistent with the principles of defense-in-depth and that adequate safety margins will be maintained. This is accomplished by evaluating a location's susceptibility to a particular degradation mechanism and then performing an independent assessment of the consequence of a failure at that location.

The licensee's RI-ISI program at DNPS is applicable to ASME Class 1 Categories B-F and B-J and ASME Class 2 Categories C-F-1 and C-F-2 piping welds. The licensee stated in its submittal that other non-related portions of the ASME Code will be unaffected by this program. Piping systems defined by the scope of the RI-ISI program were divided into piping segments. Piping segments are defined as lengths of pipe whose failure leads to similar consequences and that are exposed to the same degradation mechanisms. That is, some lengths of pipe whose failure would lead to the same consequences may be split into two or more segments when two or more regions are exposed to different degradation mechanisms.

The submittal states that failure potential categories were generated utilizing industry failure history, plant-specific failure history, and other relevant information using the guidance provided in TR-112657. The degradation mechanisms identified in the submittal include thermal fatigue, IGSCC, and FAC.

Augmented programs for IGSCC Category B-G (Generic Letter 88-01), service water integrity (Generic Letter 89-13), FAC, (Generic Letter 89-09), and high-energy line break (HELB) (USNRC Branch Technical Position MEB 3-1) are not subsumed into the RI-ISI program and remain unaffected. Elements in the scope of DNPS that were also covered by these augmented programs were included in the consequence assessment, degradation assessment, and risk categorization evaluations to determine whether the affected piping was subject to damage mechanisms other than those addressed by the augmented program. If another damage mechanism was identified, the element was retained within the scope of consideration for element selection as part of the RI-ISI program. When inspections are required under the RI-ISI and augmented programs, all inspection requirements for both RI-ISI and augmented programs are met. If no other damage mechanism was identified, the element was excluded from the RI-ISI element selection population (i.e., not included in the population of elements from which 25 percent or 10 percent must be selected for inspection) and retained in the appropriate augmented inspection program. The DNPS approach deviates from the approved methodology because the methodology in TR-112657 includes all elements in the RI-ISI element selection population but allows crediting up to 50 percent of the augmented inspections as RI-ISI element inspections. The deviation as described in References 1 and 2 is acceptable since inspections required only in the augmented programs are not credited as RI-ISI inspections, elements in the augmented programs will continue to be inspected for the appropriate degradation mechanisms, and the RI-ISI program will address other damage mechanisms.

The licensee stated that the consequences of pressure boundary failure were evaluated and ranked based on their impact on core damage probability and large early release probability. Both direct and indirect effects of pipe ruptures were evaluated and included in the consequence characterization. The licensee used their PRA models to directly support their estimation of the consequences of pressure boundary failure for each piping element in the evaluation. The licensee reported no deviations from the segment definition and consequence characterization methodology approved by the staff in TR-112657 and their analyses are acceptable.

3.3 Probabilistic Risk Assessment

To support this RI-ISI submittal, the licensee used the DNPS PRA documented in Calculations DRE99-0030, *Dresden PRA Model Update and OSPRE Version 2.0 Development for Unit 2 and Unit 3* for core damage frequency (CDF) and DRE00-0042, *Dresden LERF (Large Early*

Release Frequency) Model for LERF. The CDF and LERF estimates are 2.6E-6/yr and 1.4E-6/yr respectively. The licensee submitted its individual plant examination (IPE) on January 28, 1993, and a modified version of the IPE on June 28, 1996. The staff evaluation report, on the IPE submitted in June 1996, was issued in October 1997 and concluded that the IPE satisfied the intent of Generic Letter 88-20 but noted that the common cause factors used in the IPE were lower than the generic factors. The licensee incorporated the common cause factors from NUREG/CR-5497, *Common-Cause Failure Parameter Estimations* (Ref. 7) into the PRA analysis used to support the RI-ISI submittal. The licensee also reported that it has implemented a *PRA Maintenance and Update Procedure* that formalizes the PRA update process.

The approved TR-112657 requires that functions relied upon to mitigate external events and to mitigate transients during operation modes outside the scope of the PRA also be systematically included in the categorization. The licensee reported no deviations from the approved methodology in this area and, therefore, the staff finds its evaluation acceptable.

The staff did not review the PRA analysis to assess the accuracy of the quantitative estimates. Quantitative results of the PRA are used, in combination with a quantitative characterization of the pipe segment failure likelihood, to support the assignment of segments into broad safety significance categories reflecting the relative importance of pipe segment failures on CDF and LERF and to provide an illustrative estimate of the change in risk. Inaccuracies in the models or assumptions large enough to invalidate the analyses developed to support RI-ISI should have been identified in the licensee's or the staff's reviews. Minor errors or inappropriate assumptions will only affect the consequence categorization of a few segments and will not invalidate the general results or conclusions. The staff finds that the quality of the DNPS PRA is sufficient to support this submittal.

As required by Section 3.7 of TR-112657, the licensee evaluated the change in risk expected from replacing the current ISI program with the RI-ISI program. The analysis estimates the net change in risk due to the positive and negative influence of adding and removing locations from the inspection program. As discussed in Section 3.2 of this safety evaluation (SE), the licensee deviated from the EPRI methodology by excluding some elements from the population of elements from which RI-ISI locations for inspection were selected. In Reference 2, the licensee stated that the change in risk estimates included the increase in risk caused by discontinued Section XI inspections in the population of elements excluded from RI-ISI element selection. Therefore, excluding some elements from the population of elements for possible inspection does not affect the change in risk calculations. The failure frequencies used in the calculation are the frequencies excluding the degradation mechanism addressed by the augmented program. This is consistent with the staff's position that the augmented programs adequately control the degradation mechanism and is acceptable.

The licensee used the failure frequencies developed in EPRI Topical Report TR-111880, *Piping System Failure Rates and Rupture Frequencies for Use in Risk-Informed In-Service Inspection Applications* (Ref. 8) to support the estimate for the change in risk. The non-proprietary version of TR-111880 (Ref. 9) illustrates the characteristics and format of the information used, but does not include the calculated parameters. Reference 8 provides failure frequency estimates according to system type and exposure to a degradation mechanism. The method used to develop the frequencies in Reference 8 was reviewed and approved during the approval of TR-112657 although the process to select and to adapt the frequencies from the report for use in the change in risk calculations was not specified. In Reference 2, the licensee explained how failure frequencies were selected and adapted for use in the change in risk calculations. The methodology is the same as that reviewed and approved by the staff in Reference 10 and is, therefore, acceptable. The licensee stated that they used the failure frequencies from Table A-11 in TR-111880. This table was developed for a variety of systems of a General Electric boiling-water reactor (BWR). Dresden Units 2 and 3 are General Electric BWRs and the staff finds the use of these values reasonable and acceptable for this submittal.

The change in risk is calculated utilizing the Markov model described in EPRI Topical Report TR-110161, *Piping System Failure Rates and Rupture Frequencies for Use In Risk-Informed In-Service* Inspection Applications (Ref. 11). Reference 2 identifies the equations in TR-110161 that were used. The methodology used in the submittal does not calculate the steady state hazard rate as stated in the TR-110161 methodology but, instead, calculates the hazard rate at the end of the 40-year plant life. The staff's review of TR-110161 indicated that the use the steady state hazard rate is inadequate because the time required to reach steady state is on the order of many thousands of years and thus is an unrealistic model (Ref. 12). The staff finds that use of the hazard rate at the end of plant life addresses this concern. The SE approving the EPRI methodology (Ref. 3) approved the use of the Markov model as a basis for the estimation of pipe failure frequencies instead of the bounding pipe failure frequencies. The licensee did not use the Markov model to directly estimate pipe failure frequencies but, instead, uses the Markov model to estimate the "inspection efficiency factor" (IEF) used in Equation 3-9 in TR-112657. As illustrated in Equation 3-9, the IEF is subsequently used to modify the pipe failure frequency from TR-111880 to estimate the change in risk arising from adding and discontinuing weld inspections at different locations.

The staff's review of the Markov model (Ref. 12) determined that the model is a sound and appropriate first order model of pipe rupture. Using the Markov model to directly estimate pipe failure frequency or to indirectly estimate the pipe failure frequency through the estimation of an IEF is of limited significance given the uncertainties inherent in the models and input parameters. The IEF calculation incorporates the time between ISI inspections and the time between opportunities to detect a leak together with the probability of detection (POD) to estimate the reduction in pipe failure frequency arising from including the element in an ISI program. The licensee provided Table RAI 12-A (Ref. 2) with all the POD values and the corresponding IEF values used for all degradation mechanisms and all systems in the RI-ISI submittal. The POD values used are consistent with values used in previous RI-ISI submittals approved by the staff. The corresponding IEF estimates are similar in value to the PODs indicating that the calculations yield results that are consistent with currently acceptable values characterizing the change in pipe failure frequency associated with including an element in, or dropping an element from, an ISI program. The staff finds use of the frequencies from TR-111880, as generally acceptable POD estimates, and the Markov model as described in

Reference 2, provide change in risk estimates that can be used to illustrate the potential change in risk associated with replacing the Section XI ISI program with the proposed RI-ISI program.

The licensee estimated the change in CDF and LERF for Unit 2 and for Unit 3 with and without the IEF (Refs. 1 and 2). The estimated changes in risk are provided below in Table 1. The estimate without the IEF uses the pipe failure frequency from TR-111880 to estimate the change in risk. The estimate with the IEF uses the Markov model to estimate the IEF (including the change in the IEF arising from the improved inspection in the RI-ISI program) and modifies the pipe failure frequency from TR-111880 by the IEF. All the estimated changes in risk are below the EPRI guideline criteria for acceptable estimated changes in CDF and LERF. The licensee reported the estimated changes in CDF and LERF at the system level, and all these estimates are below the applicable EPRI guideline criteria.

Table 1: Change in risk estimates
Without (w/o) and With (w) the IEF calculations

	ΔCDF w/o IEF	ΔCDF (w) IEF	ΔLERF w/o IEF	ΔLERF (w) IEF
Unit 2	1.6E-8/yr	1.6E-9/yr	2.5E-9/yr	6.6E-10/yr
Unit 3	1.8E-8/yr	2.9E-9/yr	3.6E-9/yr	1.3E-9/yr

The staff finds that the licensee’s process to evaluate the potential change in risk is reasonable because it accounts for the change in the number and location of elements inspected, recognizes the difference in degradation mechanism related to failure likelihood, and considers the synergistic effects of multiple degradation mechanisms within the same piping segment. The staff finds that redistributing the welds to be inspected with, consideration of the safety-significance of the segments, provides assurance that segments whose failures have a significant impact on plant risk receive an acceptable and often improved level of inspection. Therefore, the staff concludes that the implementation of the RI-ISI program as described in the application is acceptable and, based on the reported quantitative results, any increase in risk associated with the implementation of the RI-ISI program is small and is consistent with the intent of the Commission’s Policy Statement and, therefore, is consistent with RG 1.178.

3.4 Integrated Decision-Making

As described in ComEd’s October 18, 2000, letter and attachment 2 (submittal), an integrated approach is utilized in defining the proposed RI-ISI program by considering in concert the traditional engineering analysis, risk evaluation, and the implementation and performance monitoring of piping under the program. This is in compliance with the guidelines of RG 1.178.

The selection of pipe segments to be inspected is described in Section 3.5 of the submittal using the results of the risk category rankings and other operational considerations. The submittal states that in accordance with the EPRI TR, 25 percent of high safety-significant

(HSS) and 10 percent of medium safety significant (MSS) elements are selected for inspection. The inspections are generally selected on a system-by-system basis. The licensee stated that an attempt is made to ensure that all damage mechanisms and all combinations of damage mechanisms are represented in the elements selected for inspection.

Table 2 of the submittal provides the failure potential assessment summary for Units 2 and 3. Tables 3 and 4 of the submittal identify on a per system basis for Units 2 and 3, respectively, the number of elements (welds) by risk category. Tables 5 and 6 of the submittal provide a summary comparing the number of inspections required under the existing ASME Code ISI program with the alternative RI-ISI program for each applicable system. The licensee used the methodology described in TR-112657 to guide the selection of examination elements within high and medium ranked piping segments. The EPRI report describes targeted examination volumes (typically associated with welds) and methods of examination based on the type(s) of degradation expected. The staff has reviewed these guidelines and has determined that, if implemented as described, the RI-ISI examinations should result in improved detection of service-related discontinuities over that currently required by the ASME Code.

The staff finds the location selection process to be acceptable since it is consistent with the process approved in TR-112657, takes into account defense-in-depth, and includes coverage of welds subjected to degradation mechanisms in addition to those covered by augmented inspection programs. As described in Section 3.2 of this SE, excluding elements exposed only to a damage mechanism addressed by an augmented program from the RI-ISI element selection population is an acceptable deviation from the EPRI methodology.

The objective of ISI required by the ASME Code is to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary that may impact plant safety. Therefore, the RI-ISI program must meet this objective to be found acceptable for use. Further, since the risk-informed program is based on inspection for cause, element selection should target specific degradation mechanisms. Chapter 4 of TR-112657 provides guidelines for the areas and/or volumes to be inspected as well as the examination method, acceptance standard, and evaluation standard for each degradation mechanism. Based on the review of the cited portion of the EPRI report, the staff concludes that the examination methods are appropriate since they are selected based on specific degradation mechanisms, pipe sizes, and materials of concern.

3.5 Implementation and Monitoring

Implementation and performance monitoring strategies require careful consideration by the licensee and are addressed in Element 3 of RG 1.178 and SRP 3.9.8. The objective of Element 3 is to assess the performance of the affected piping systems under the proposed RI-ISI program by implementing monitoring strategies that confirm the assumptions and analyses used in the development of the RI-ISI program. To approve an alternative pursuant to 10 CFR 50.55a(a)(3)(i), implementation of the RI-ISI program, including inspection scope, examination methods, and methods of evaluation of examination results, must provide an adequate level of quality and safety.

The licensee stated in its submittal that upon approval of the RI-ISI program, procedures that comply with the EPRI TR-112657 guidelines will be prepared to implement and monitor the RI-ISI program. The licensee confirmed that the applicable portions of the ASME Code not affected by the change, such as inspection methods, acceptance guidelines, pressure testing, corrective measures, documentation requirements, and quality control requirements would be retained.

The licensee stated in Section 4 of the submittal that the RI-ISI program is a living program and its implementation will require feedback of new relevant information to ensure the appropriate identification of high safety significant piping locations. Such relevant information would include major updates to the DNPS Units 2 and 3 PRA models which could impact both the risk characterization and risk impact assessments, any new trends in service experience with piping systems at DNPS and across the industry, and new information on element accessibility that will be obtained as the risk informed inspections are implemented. The submittal also states that as a minimum, risk ranking of piping segments will be reviewed and adjusted on an ASME-period basis and that significant changes may require more frequent adjustment as directed by NRC bulletin or generic letter requirements, or by industry or plant-specific feedback.

The proposed periodic reporting requirements meet existing ASME Code requirements and applicable regulations and, therefore, are considered acceptable. The proposed process for RI-ISI program updates meets the guidelines of RG 1.174 that risk-informed applications must include performance monitoring and feedback provisions; therefore, the process for program updates is considered acceptable.

4.0 CONCLUSIONS

In accordance with 10 CFR 50.55a(a)(3)(i), proposed alternatives to regulatory requirements may be used when authorized by the NRC when the applicant demonstrates that the alternative provides an acceptable level of quality and safety. In this case, the licensee's proposed alternative is to use the risk-informed process described in the NRC approved EPRI TR-112657. The staff concludes that the licensee’s proposed RI-ISI program which is consistent with the methodology described in EPRI TR-112657, will provide an acceptable level of quality and safety pursuant to 10 CFR 50.55a for the proposed alternative to the piping ISI requirements with regard to the number of inspections, locations of inspections, and methods of inspection.

The staff finds that the results of the different elements of the engineering analysis are considered in an integrated decision-making process. The impact of the proposed change in the ISI program is founded on the adequacy of the engineering analysis and acceptable change in plant risk in accordance with RG 1.174 and RG 1.178 guidelines.

DNPS methodology also considers implementation and performance monitoring strategies. Inspection strategies ensure that failure mechanisms of concern have been addressed and there is adequate assurance of detecting damage before structural integrity is affected. The risk significance of piping segments is taken into account in defining the inspection scope for the RI-ISI program.

System pressure tests and visual examination of piping structural elements will continue to be performed on all ASME Class 1, 2, and 3 systems in accordance with the ASME Code program. The RI-ISI program applies the same performance measurement strategies as existing ASME Code requirements and, in addition, increases the inspection volumes at some weld locations.

DNPS methodology provides for conducting an engineering analysis of the proposed changes using a combination of engineering analysis with supporting insights from a PRA. Defense-in-depth and quality are not degraded in that the methodology provides reasonable confidence that any reduction in existing inspections will not lead to degraded piping performance when compared to existing performance levels. Inspections are focused on locations with active degradation mechanisms as well as selected locations that monitor the performance of piping systems.

The licensee has stated that the ASME Code minimum and maximum inspection requirements for Program B will be met and that the RI-ISI inspections and the balance of the inspections will be on the same interval start and end dates. The licensee has also stated that the DNPS Units 2 and 3 would continue to submit their 10-year interval ISI programs including the RI-ISI programs every 10 years. The licensee has also stated in Reference 2 that DNPS would submit the revised RI-ISI program prior to the end of the interval if significant impact on the RI-ISI program occurred due to any new risk insights, plant changes, industry information, or changes to the basis for NRC's approval of the program were discovered. The licensee also stated that changes to the RI-ISI program would not take place without prior NRC approval. The staff finds that the DNPS Units 2 and 3 RI-ISI programs meet the ASME Code requirements for minimum and maximum inspections during inspection periods and intervals. The staff also finds that the DNPS Units 2 and 3 RI-ISI programs meet the 10 CFR 50.55a requirements for program submittal to the NRC. This relief is granted for both units until the completions of the present 10-year intervals.

The recent event at the V.C. Summer facility in which through-wall cracking was discovered in a 34-inch main coolant loop hot leg to reactor pressure vessel nozzle weld may call into question the conclusions that have been made regarding the frequency of large-bore piping examination. The NRC staff will evaluate the results of the V.C. Summer root cause analysis to determine whether any generic conclusions apply to this evaluation, for example, to the frequency of large-bore piping examination. If generic implications are found, the NRC staff will take actions, as appropriate.

The staff has concluded, based on the considerations discussed above, that the proposed alternative in relief request CR-21 will provide an acceptable level of quality and safety and will ensure structural integrity of associated piping and components.

5.0 <u>REFERENCES</u>

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12. Martz, *Final (Revised) Review of the EPRI-Proposed Markov Modeling/Baysian Updating Methodology for Use in Risk-Informed Inservice Inspection of Piping in Commercial Nuclear Power Plants*, Los Angeles National Laboratory,TSA-1/99-164, June 1999.

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