March 12, 2002

Mr. J. A. Price
Vice President - Nuclear Technical Services - Millstone
c/o Mr. David A. Smith
Dominion Nuclear Connecticut, Inc.
Rope Ferry Road
Waterford, CT 06385-0128

SUBJECT: MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3 - RISK-INFORMED INSERVICE INSPECTION PROGRAM PLAN - REQUEST FOR RELIEF FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CODE, SECTION XI (TAC NO. MA9740)

Dear Mr. Price:

In a letter dated July 25, 2000, as supplemented on September 26, 2001, Northeast Nuclear Energy Company (NNECO) requested approval of a risk-informed inservice inspection (RI-ISI) program for Class 1 piping welds as an alternative to the current ISI program at the Millstone Nuclear Power Station, Unit No. 3 (MP3).

At the time of the request, NNECO was the licensed operator of MP3. On March 31, 2001, the majority of the owners of MP3 transferred their ownership interest in MP3 to Dominion Nuclear Connecticut, Inc. (DNC/licensee), and NNECO's operating authority for MP3 was transferred to DNC. By letter dated April 2, 2001, DNC requested that the Nuclear Regulatory Commission (NRC) continue to review and act upon all requests before the NRC that had been submitted by NNECO.

The proposed RI-ISI program was developed in accordance with Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A. The results of our review conclude that the proposed RI-ISI program is an acceptable alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, for inservice inspection of Code Class 1 piping, Categories B-F and B-J welds. Therefore, DNC's 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.

The enclosed Safety Evaluation authorizes application of the proposed RI-ISI program during the second ISI interval of MP3.

Sincerely,

/RA C. Gratton for/ /

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-423

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RISK-INFORMED INSERVICE INSPECTION (ISI) PROGRAM

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

DOMINION NUCLEAR CONNECTICUT, INC.

DOCKET NO. 50-423

1.0 INTRODUCTION

For Millstone Nuclear Power Station, Unit No. 3 (MP3), the applicable edition of the Code for the current 10-year ISI interval is the 1989 Edition of the American Society of Mechanical Engineers (ASME) Code, Section XI. In a submittal dated July 25, 2000, as supplemented on September 26, 2001 (Refs. 1 and 2), Northeast Nuclear Energy Company (NNECO) requested approval of a risk-informed inservice inspection (RI-ISI) program for Class 1 piping welds as an alternative to the current ISI program at MP3. At the time of the request, NNECO was the licensed operator of MP3. On March 31, 2001, the majority of the owners of MP3 transferred their ownership interest in MP3 to Dominion Nuclear Connecticut, Inc. (DNC/licensee), and NNECO's operating authority for MP3 was transferred to DNC. By letter dated April 2, 2001, DNC requested that the Nuclear Regulatory Commission (NRC) continue to review and act upon all requests before the NRC that had been submitted by NNECO.

The RI-ISI program is limited to the ASME Code Class 1 piping. The program was developed in accordance with the methodology contained in the Westinghouse Owners Group (WOG) Topical Report, WCAP-14572, Revision 1-NP-A (Ref. 3), which was previously reviewed and approved by the NRC staff.

In the proposed RI-ISI program, piping failure potential estimates were determined using WCAP-14572, Revision 1-NP-A, Supplement 1, “Westinghouse Structural Reliability and Risk Assessment (SRRA)” Code 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 ASME Code Section XI, such as the examination technology, examination frequency and acceptance criteria. However, the proposed program reduces the required examination locations significantly and is able to demonstrate 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 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i).

2.0 SUMMARY OF PROPOSED APPROACH

The ASME Code, Section XI, requires that for each successive 10-year ISI interval, 100% of Category B-F welds and 25% of Category B-J welds for ASME Code Class 1 piping greater than 1 inch in nominal diameter be selected for volumetric and/or surface examination based on existing stress analyses and cumulative usage factors.

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 WCAP-14572, Revision 1-NP-A.

MP3 is currently in the first inspection period of its second 10-year ISI interval as defined by the ASME Code, Section XI for Program B. The licensee plans to implement the RI-ISI program by performing the examinations required under the program during the first refueling outage of the second inspection period of the current 10-year ISI interval. Other non-related portions of the Code requirements will remain unchanged.

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%, 50%, and 100%, respectively, and the maximum examinations credited at the end of the respective periods should be 34%, 67%, and 100%).

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 1, the licensee stated that the RI-ISI program will be integrated into the existing ASME Section XI interval. The licensee also stated that the applicable aspects of the Code not affected by this change would be retained, such as inspection methods, acceptance guidelines, pressure testing, corrective measures, documentation requirements, and quality control requirements.

The staff finds that the MP3 RI-ISI program meets 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 WCAP-14572, Rev. 1-NP-A. 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 the ISI Program

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee has proposed to implement the RI-ISI methodology described in WCAP-14572, Rev. 1-NP-A, as an alternative to the Code examination requirements for ASME Class 1 piping for MP3. 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 MP3 RI-ISI program ensures that the proposed changes are consistent with the principles of defense-in-depth. 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. No changes to the evaluation of design-basis accidents in the final safety analysis report are being made by the RI-ISI process. Therefore, sufficient safety margins will be maintained.

The licensee's RI-ISI program at MP3 is applicable to ASME Class 1 Categories B-F and B-J piping welds. The licensee stated in its submittal that other non-related portions of the ASME Code, Section XI ISI program will be unaffected by this program. Piping systems defined by the scope of the RI-ISI program were divided into piping segments. Pipe segments are defined as lengths of pipe whose failure leads to the same consequence, are separated by flow splits and locations of pipe size changes, and include piping to a point at which a pipe break could be isolated.

The NRC staff reviewed the proposed RI-ISI program against the guidelines contained in the previously approved WCAP-14572, Rev. 1-NP-A, which states, in part, that the SRRA computer models are to be used to estimate the failure probabilities of the structural elements in each of the piping segments. In Reference 2, the licensee states that the failure probabilities for MP3 piping segments were all derived using the SRRA software program. This is consistent with the guidelines in previously approved WCAP-14572, Rev. 1-NP-A. The degradation mechanisms identified in the submittal include thermal fatigue, vibratory fatigue, water hammer, and seismic loads.

The staff reviewed the qualifications, experience, and training of the users of the SRRA code on the capabilities and limitations of the code described in Reference 2. The staff found the users to be adequate because the licensee used personnel that were experienced and trained to cover all the areas required to implement the SRRA code. The licensee stated in Reference 2 that MP3 has no augmented programs applicable to Class 1 piping and the guidelines of WCAP-14572, Rev. 1-NP-A applicable to augmented programs were not used. The licensee further stated in Reference 2 that the SRRA code was used to calculate failure probabilities for

the failure modes, materials, degradation mechanisms, input variables, and uncertainties it was programmed to consider as discussed in the WCAP-14572, Supplement 1. All the piping configurations included in the RI-ISI program could be adequately modeled using the SRRA code. The licensee stated that no formal sensitivity studies were performed since the program was used within its capabilities, and validation of the program during its development was supported by studies documented in the WCAP-14572, Rev. 1-NP-A, Supplement 1. However, preliminary usage of the program included normal exploratory variation of the inputs to determine the impact on the results. For the final analyses, the engineering team assessed industry and plant experience, plant layout, materials, and operating conditions and identified potential failure mechanisms and causes. The staff finds this approach to be acceptable since resulting failure probabilities were compared against postulated damage mechanisms and industry/plant experience for reasonableness.

The licensee reported a deviation in the WCAP-14572, Rev. 1-NP-A methodology regarding credit taken for leak detection when calculating pipe failure probabilities. WCAP-14572, Rev. 1-NP-A allows credit for detecting (and isolating, repairing, or otherwise terminating a potential accident sequence) a leak in the reactor coolant system (RCS) piping before it develops into a pipe break for piping inside of containment. This credit reflects the highly developed leak detection systems used to monitor leakage from the reactor coolant piping (RCP). In Reference 2, the licensee states that detection of a leak before break is plausible for any non-RCS segment located inside the containment that interfaces with the RCS by use of radiation and sump level monitors that can detect a leak in the segment as reliably as that of an RCS leak. Because the segments are subject to essentially the same leak detection capabilities as that of an RCS leak, the extension of credit for leak detection in these segments is reasonable and acceptable.

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 (LERP). Both direct and indirect effects of pipe ruptures were evaluated and included in the consequence characterization. The licensee has reported no deviations from the consequence characterization methodology in WCAP-14572, Rev. 1-NP-A, and, therefore, its analyses are acceptable.

3.3 <u>Probabilistic Risk Assessment</u>

The staff review of the MP3 probabilistic risk analyses began in 1983 when NNECO (the former licensee) staff and analysts from Westinghouse completed and submitted to the NRC staff a then state-of the-art risk assessment entitled "Millstone 3 Probabilistic Safety Study (PSS)." This study extended the consequence calculation to include population dose estimates and contained a full range of both internal and external initiating events. The MP3 Individual Plant Examination (IPE) was submitted to the staff on August 31, 1990. The staff evaluation report for the IPE, dated May 5, 1992, documents extensive interactions between the NRC staff, the licensee staff, and contractors that resulted in six substantial updates between the 1983 PSS and the 1990 IPE submittals.

The staff evaluation report noted the following weaknesses in the IPE: a loss of offsite power contribution that was much smaller than previous staff studies; the lack of a loss of service water initiating event; lack of modeling of the heating ventilation and air conditioning (HVAC) and the DC electrical systems; and the need to validate generic unavailabilities for the (then) recently operating reactor. In Reference 1 the licensee stated that they had installed a third

air-cooled diesel, modeled the loss of service water as an initiating event, modeled the HVAC and DC systems, and established a PRA model update program. The PRA model Revision M3999927, dated October 1999 was used to evaluate the consequences of pipe ruptures for the RI-ISI submittal. In 1999 a Westinghouse Owner's Group (WOG) Peer Review Certification was conducted for the MP3 PRA model. Reference 1 provides estimates of core damage frequency (CDF) and large early release frequency (LERF) of 4.6E-5/yr and 1.6E-6/yr, respectively.

The staff noted that the licensee's evaluation placed only four segments in Region One of the Structural Element Selection Matrix, Figure 3.7-1 in WCAP-14572, Revision 1-NP-A. The region in which each segment is placed determines, to a large extent, the number of locations requiring inspection. Based on previous submittals, the staff expected more than four segments in Region One. Region One contains high-failure-importance/high-safety-significant segments and, therefore, both the PRA results and the SRRA results contribute to placing segments in this region. In Class 1 piping, the risk is dominated by loss-of-coolant accidents (LOCAs). In Reference 2, the licensee provided the conditional core damage probabilities (CCDPs) and conditional LERPs (CLERPs) estimates for the three different size LOCAs. The more recent human error probability methodology used to model operator actions associated with long-term decay heat removal caused the observed differences between the IPE and the current CCDP and CLERP estimates. The licensee also provided comments from the WOG peer review analysts related to parts of the PRA model used in support of the RI-ISI submittal. The licensee evaluated each of the comments and determined they had no, or minimal, impact on the RI-ISI program results or conclusions. As discussed in Reference 2, a total of 62 segments were designated as high-safety-significant and placed in Region One or Region Two. The staff notes that the CDF and the LERF estimates for the four segments placed in Region One are relatively small, are not dominating the risk profile and, therefore, are not dominating the safety significant ranking process.

The SRRA code estimates for the LOCA frequencies were also provided in Reference 2. The licensee stated that MP3 is one of the more modern plants and, therefore, the piping was designed using detailed definitions of transients and with a comprehensive analysis of the transients' effects on fatigue life. Furthermore, there are no known active piping degradation mechanisms and no augmented programs in the Class 1 piping. Segments are placed in Region One versus Region Two of the Structural Element Selection Matrix based solely on the estimated failure frequency. Only four segments were placed in Region One because the failure frequency estimates for the MP3 Class 1 piping tend to be relatively small. Based on the foregoing discussion, the staff finds that placing only four segments in Region one is reasonable.

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. Inaccuracies in the models or assumptions large enough to invalidate the broad categorizations developed to support the RI-ISI should have been identified in the licensee's or in the staff's review. 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 continuous use and maintenance of the PRA provides further opportunities to identify inaccuracies and inappropriate assumptions, if any, in the PRA models. The staff finds that the quality of the PRA is sufficient to support the submittal.

The licensee stated in Reference 2 that the risk ranking and change in risk calculations were performed according to the guidance provided in Section 4.4.2 of WCAP-14572, Rev. 1-NP-A, aside from the one deviation discussed in Section 3.2 of this Safety Evaluation. The change in CDF is estimated to be about -1E-8/yr with, and -2E-8/yr without, operator action. The change in LERF is estimated to be -1.4E-11/yr with, and -1.3E-11/yr without, operator action. The operator actions credited in RI-ISI analyses are actions that the operators can take to mitigate the affects of segment ruptures. For example, loss of inventory and diversion of flow can be stopped following a rupture in some segments by closing an isolation valve upstream of the rupture. Because operator actions mitigate the affects of ruptures, the estimated CDFs and LERFs without crediting these actions are greater, and sometimes much greater, than the estimates that credit the action. Consequently, the absolute magnitude of the estimated changes in CDF and LERF due to the implementation of an RI-ISI program may be greater for the without operator action estimates than the with operator action estimates.

The licensee did not submit estimates for the other risk change criteria in Section 4.4.2 of WCAP-14572, Rev. 1-NP-A, but stated in Reference 2 that all the changes in risk calculations were performed according to the guidance on page 213 of WCAP-14572, Revision 1-NP-A, as applicable, and all four criteria for evaluating the results were applied. Based on the use of the approved methodology and on the reported results, the staff finds that any change in risk associated with the implementation of the RI-ISI program will be small and consistent with the intent of the Commission's Policy Statement (Ref. 7) and, therefore, is consistent with RG 1.178.

3.4 Integrated Decisionmaking

As described in the November 16, 2000, and September 26, 2001, MP3 submittals, 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 consistent with the guidelines of RG 1.178.

The selection of pipe segments to be inspected is described in Section 3.8 of Reference 1 using the results of the risk category rankings and other operational considerations. The licensee stated that it used the methodology described in WCAP-14572, Rev. 1-NP-A to guide the selection of the number and the location of examination elements within the piping segments.

Table 3.4-1 in Reference 2 provides failure probability estimates for small leaks and disabling leaks corresponding to the dominant potential degradation mechanisms for various systems in MP3. Table 5-1 of Reference 1 provides a summary table comparing the number of inspections required under the existing ASME Section XI ISI program at MP3 with the alternative RI-ISI program.

The licensee used the methodology described in WCAP-14572, Rev. 1-NP-A for 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 discovery of service-related discontinuities over that currently provided by the Code.

The objective of ISI required by the 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. Section 4 of WCAP-14572, Rev. 1-NP-A 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 a review of the cited portion of WCAP-14572, Rev. 1-NP-A, 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 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 acceptable level of quality and safety.

The licensee stated in its submittal that upon approval of the RI-ISI program, procedures that comply with the WCAP-14572, Rev. 1-NP-A guidelines will be prepared to implement and monitor the RI-ISI program. The licensee also stated that the new program will be integrated into the existing ASME XI interval. The licensee confirmed that the applicable portions of the 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 Reference 1 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-significance piping locations. Reference 1 also stated that as a minimum, risk ranking of piping segments will be reviewed and evaluated on an ASME ISI period basis and that significant changes may require more frequent adjustments as recommended by an NRC Bulletin or Generic Letter, or by industry and plant-specific feedback.

The proposed periodic reporting requirements meet existing ASME Code requirements and applicable regulations and, therefore, are considered acceptable. The staff finds that the proposed process for RI-ISI program updates meets the guidelines of RG 1.174 that risk-informed applications should include performance monitoring and feedback provisions; therefore, the process for program updates is 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 RI-ISI process described in the NRC-approved report WCAP-14572, Rev. 1-NP-A. The staff concludes that the licensee’s proposed RI-ISI program which is

consistent with the methodology described in WCAP-14572, Rev. 1-NP-A, will provide an acceptable level of quality and safety pursuant to 10 CFR 50.55a(a)(3)(i) 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 different elements of the engineering analysis are considered in an integrated decision-making process. The impact of the proposed changes in the ISI program is founded on the adequacy of the engineering analysis and acceptable estimation of changes in plant risk in accordance with RG 1.174 and RG 1.178 guidelines.

The MP3 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.

The MP3 risk-informed methodology provides for conducting an 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 assurance 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.

There was a deviation from the WCAP-14572, Rev. 1-NP-A in the submittal related to taking credit for leak detection in non-RCS piping. The staff has reviewed this deviation as described by the licensee and finds it acceptable in this application.

The staff's review of the licensee's proposed RI-ISI program concludes that the program is an acceptable alternative to the current ISI program, which is based on ASME Code, Section XI, requirements for Code Class 1, Categories B-F and B-J welds.

The licensee's proposed RI-ISI program (Relief Request 1-RI-ISI-01) is authorized for the second 10-year ISI interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the request provides an acceptable level of quality and safety.

5.0 REFERENCES

1. Letter dated July 25, 2000, Stephen E. Scace (Northeast Nuclear Energy Company, Director, Nuclear Oversight and Regulatory Affairs) to U.S. Nuclear Regulatory Commission, *Millstone Nuclear Power Station, Unit No. 3, Risk-Informed Inservice Inspection Program Plan, Request for Relief from ASME Section XI.*

2. Letter dated September 26, 2001, J. Alan Price (Dominion Nuclear Connecticut, Inc., Vice President, Nuclear Technical Services - Millstone) to U.S. Nuclear Regulatory

Commission, *Millstone Power Station, Unit No. 3, Response to a Request for Additional Information, Risk-Informed Inservice Inspections (ISI) Program Plan.*

3. WCAP-14572, Revision 1-NP-A, *Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report*, February 1999.

4. NRC Regulatory Guide 1.174, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, July 1998.

5. NRC Regulatory Guide 1.178, *An Approach for Plant-Specific Risk-Informed Decision Making: Inservice Inspection of Piping*, September 1998.

6. NRC NUREG-0800, Chapter 3.9.8, *Standard Review Plan for Trial Use for the Review of Risk-Informed Inservice Inspection of Piping*, September 1998.

7. USNRC, “Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement,” *Federal Register*, Vol. 60, p. 42622, August 16, 1995.

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