Charles H. Cruse
Vice President
Nuclear Energy

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657
410 495-4455

Constellation
Nuclear

Calvert Cliffs
Nuclear Power Plant

A Member of the
Constellation Energy Group

May 29, 2002

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Third Interval Inservice Inspection Program Relief Request No. RR-RI-ISI-2;
Risk-Informed Inservice Inspection (ISI) Program

REFERENCE: (a) Letter from Mr. C. H. Cruse (CCNPP) to NRC Document Control Desk, dated October 27, 2000, Request for Relief From Certain ASME Code Requirements for Inservice Inspection; Relief Request No. RR-RI-ISI-1

Pursuant to 10 CFR 50.55a(a)(3), the proposed Risk-Informed Inservice Inspection (RI-ISI) Program (Attachment 1) is provided for your review and approval, as an alternative to current American Society of Mechanical Engineers (ASME) Section XI inspection requirements for Class 1 and 2 piping. The RI-ISI Program was prepared by Inservice Engineering and has been developed in accordance with Electric Power Research Institute (EPRI) methodology contained in EPRI Topical Report 112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure." Also, the RI-ISI Program has been developed in a manner consistent with ASME Code Case N578 "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B." The attached document supports the conclusion that the proposed alternative provides an acceptable level of quality and safety as required by 10 CFR 50.55a(a)(3)(i). Additional supporting documentation is available at Calvert Cliffs Nuclear Power Plant offices for your review.

Calvert Cliffs Nuclear Power Plant requests Nuclear Regulatory Commission approval of this relief request by December 2002. As stated in Reference (a), our intent is to complete 100 percent of the required RI-ISI Program inspections for Class 1 and 2 piping during the remaining periods of the third ten-year ISI interval. All other ASME Section XI Code requirements, augmented examinations, erosion corrosion examinations, inspections required for flaws dispositioned by analysis, system pressure tests, and inspection of components other than piping, will be performed as required.

A047

Should you have questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

CHC/TER/bjd

Attachment: (1) Relief Request No. RR-RI-ISI-2, Risk-Informed Inservice Inspection Program Plan Calvert Cliffs Nuclear Power Plant, Units 1 and 2, Revision 0

cc: R. S. Fleishman, Esquire
J. E. Silberg, Esquire
Director, Project Directorate I-1, NRC
D. M. Skay, NRC
H. J. Miller, NRC
Resident Inspector, NRC
R. I. McLean, DNR

ATTACHMENT (1)

RELIEF REQUEST NO. RR-RI-ISI-2

RISK-INFORMED INSERVICE INSPECTION PROGRAM PLAN

CALVERT CLIFFS NUCLEAR POWER PLANT,

UNITS 1 AND 2, REVISION 0

Table of Contents

1. INTRODUCTION

Calvert Cliffs Nuclear Power Plant (CCNPP) Units 1 and 2 are currently in the third inservice inspection (ISI) interval as defined by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Section XI Code for Inspection Program B. The third ISI interval for CCNPP Units 1 and 2 commenced on July 1, 1999. Pursuant to 10 CFR 50.55a(g)(4)(ii), the applicable ASME Section XI Code for the third ISI interval was the 1989 Edition. However, in Reference 6.1, CCNPP requested authorization to use the 1998 Edition of the ASME Section XI Code for the third ISI interval as an acceptable alternative to the requirements of 10 CFR 50.55a(g)(4)(ii). Due to the timing of the submittal, Nuclear Regulatory Commission (NRC) review was not completed prior to the start of the third ISI interval. Therefore, CCNPP submitted Reference 6.2 requesting continued use of the 1983 Edition of the ASME Section XI Code with the Summer 1983 Addenda (83S83) until such time that NRC Staff completed its review. In Reference 6.3 the NRC authorized continued use of the 83S83 Code until the conclusion of the Spring 2001 refueling outage for Unit 2. In Reference 6.4 the NRC ultimately authorized use of the 1998 Code for the third ISI interval.

The objective of this submittal is to request a change to the ISI Program for Class 1 and 2 piping through the use of a risk-informed inservice inspection (RI-ISI) program. The RI-ISI process used in this submittal is described in Electric Power Research Institute (EPRI) Topical Report (TR) 112657 Revision B-A "Revised Risk-Informed Inservice Inspection Evaluation Procedure." The RI-ISI application was also conducted in a manner consistent with ASME Code Case N-578 "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B."

1.1 Relation to NRC Regulatory Guides 1.174 and 1.178

As a risk-informed application, this submittal meets the intent and principles of Regulatory Guide 1.174 "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis" and Regulatory Guide 1.178 "An Approach for Plant-Specific Risk-Informed Decisionmaking Inservice Inspection of Piping." Further information is provided in Section 3.6.2 relative to defense-in-depth.

1.2 PSA Quality

The current Calvert Cliffs probabilistic risk assessment (CCPRA) is an at-power, Unit 1, internal and external events PRA. Both Level 1 and 2 are addressed. Unit 2's risk has been estimated based on qualitative evaluations of the differences between the units. Although the RI-ISI analysis was performed using an earlier version of the CCPRA, it was evaluated and found to be applicable to the current PRA, Revision 0.

The base core damage frequency (CDF) and base large early release frequency (LERF) from the current model are: 9E-05 per calendar year and 5E-06 per calendar year, respectively.

The CCPRA has undergone considerable evolution since the original Individual Plant Examination (IPE) submittal. Calvert Cliffs Nuclear Power Plant utility personnel constructed the CCPRA. Self-checking, training, industry experience and peer reviews are among the methods that were used to achieve a quality PRA. In addition, independent reviews have been performed at various stages of the PRA's development.

An overview of the developmental history of the CCPRA is depicted below.

Model	Description	Date
Revision 0	Current Model	October 2001
Revision A	An interim Update	March 1999
IPEEE + Update 2	First Internal & External Model	February 1998
IPEEE	Fire, Seismic and High Wind PRA	August 1997
Update 2	Updated GT Module [used for Integrated Plant Evaluation for External Events (IPEEE)]	August 1997
Update 1	Updated Internal Events	May 1994
IPE	Internal Events and Level 2	December 1993

The CCPRA Revision 0 underwent an industry peer review during the first week of November 2001. The review team found that the CCPRA meets the general expectations for the eleven technical review elements. A few issues were identified. These issues were reviewed and found to have no impact on the RI-ISI analysis.

The CCPRA peer review also included a review of the draft revision 14A ASME PRA Standard High Level Requirements (HLRs) for nine of ten key PRA areas. For the purposes of this review, PRA configuration control is considered a key area.

Overall, the CCPRA met with the requirements of 45 of the 46 assessed ASME PRA Standard HLRs for a Category II PRA. [Note: Compliance with an HLR does not imply 100% compliance with all Supporting Requirements for that HLR.] One HLR was not met due to the lack of uncertainty analyses.

2. PROPOSED ALTERNATIVE TO CURRENT ISI PROGRAM REQUIREMENTS

2.1 ASME Section XI

American Society of Mechanical Engineers Section XI Examination Categories B-F, B-J, C-F-1 and C-F-2 currently contain the requirements for the nondestructive examination (NDE) of Class 1 and 2 piping components. The alternative RI-ISI program for piping is described in EPRI TR-112657. The RI-ISI program will be substituted for the currently approved program for Class 1 and 2 piping (Examination Categories B-F, B-J, C-F-1 and C-F-2) in accordance with 10 CFR 50.55a(a)(3)(i) by alternatively providing an acceptable level of quality and safety. Other non-related portions of the ASME Section XI Code will be unaffected. Electric Power Research Institute TR-112657 provides the requirements for defining the relationship between the RI-ISI program and the remaining unaffected portions of ASME Section XI.

2.2 Augmented Programs

- The augmented inspection program for flow accelerated corrosion (FAC) per Generic Letter 89-08 is relied upon to manage this damage mechanism but is not otherwise affected or changed by the RI-ISI program.
- The Augmented Inspection Program for Main Steam and Main Feedwater piping (i.e., high energy line break examinations) is the subject of a separate and independent assessment.

3. RISK-INFORMED ISI PROCESS

The process used to develop the RI-ISI program conformed to the methodology described in EPRI TR-112657 and consisted of the following steps:

- Scope Definition
- Consequence Evaluation
- Failure Potential Assessment
- Risk Characterization
- Element and NDE Selection
- Risk Impact Assessment
- Implementation Program
- Feedback Loop

A deviation to the EPRI RI-ISI methodology has been implemented in the failure potential assessment for CCNPP. Table 3-16 of EPRI TR-112657 contains criteria for assessing the potential for thermal stratification, cycling and striping (TASCS). Key attributes for horizontal or slightly sloped piping greater than 1" nominal pipe size include:

1. Potential exists for low flow in a pipe section connected to a component allowing mixing of hot and cold fluids, or
2. Potential exists for leakage flow past a valve, including in-leakage, out-leakage, and cross-leakage allowing mixing of hot and cold fluids, or
3. Potential exists for convective heating in dead-ended pipe sections connected to a source of hot fluid, or
4. Potential exists for two phase (steam/water) flow, or
5. Potential exists for turbulent penetration into a relatively colder branch pipe connected to header piping containing hot fluid with turbulent flow,

   AND

$\Delta T > 50°F$,

   AND

Richardson Number > 4 (This value predicts the potential buoyancy of stratified flow.)

These criteria, based on meeting a high cycle fatigue endurance limit with the actual ΔT assumed equal to the greatest potential ΔT for the transient, will identify all locations where stratification is likely to occur, but allows for no assessment of severity. As such, many locations will be identified as subject to TASCS where no significant potential for thermal fatigue exists. The critical attribute missing from the existing methodology that would allow consideration of fatigue severity is a criterion that addresses the potential for fluid cycling. The impact of this additional consideration on the existing TASCS criteria is presented below.

➢ Turbulent Penetration TASCS

Turbulent penetration typically occurs in lines connected to piping containing hot flowing fluid. In the case of downward sloping lines that then turn horizontal, significant top-to-bottom cyclic ΔTs can develop in the horizontal sections if the horizontal section is less than about 25 pipe diameters from the reactor coolant piping. Therefore, TASCS is considered for this configuration.

For upward sloping branch lines connected to the hot fluid source that turn horizontal or in horizontal branch lines, natural convective effects combined with effects of turbulence penetration will keep the line filled with hot water. If there is no potential for in-leakage towards the hot fluid source from the outboard end-of-the-line, this will result in a well-mixed fluid condition where significant top-to-bottom ΔTs will not occur. Therefore, TASCS is not considered for these configurations. Even in fairly long lines, where some heat loss from the outside of the piping will tend to occur and some fluid stratification may be present, there is no significant potential for cycling as has been observed for the in-leakage case. The effect of TASCS will not be significant under these conditions and can be neglected.

- Low Flow TASCS

  In some situations, the transient startup of a system (e.g., residual heat removal suction piping) creates the potential for fluid stratification as flow is established. In cases where no cold fluid source exists, the hot flowing fluid will fairly rapidly displace the cold fluid in stagnant lines, while fluid mixing will occur in the piping further removed from the hot source and stratified conditions will exist only briefly as the line fills with hot fluid. As such, since the situation is transient in nature, it can be assumed that the criteria for thermal transients (TT) will govern.

- Valve Leakage TASCS

  Sometimes a very small leakage flow can occur outward past a valve into a line with a significant temperature difference. However, since this is a generally a "steady-state" phenomenon with no potential for cyclic temperature changes, the effect of TASCS is not significant and can be neglected.

- Convection Heating TASCS

  Similarly, there sometimes exists the potential for heat transfer across a valve to an isolated section beyond the valve, resulting in fluid stratification due to natural convection. However, since there is no potential for cyclic temperature changes in this case, the effect of TASCS is not significant and can be neglected.

In summary, these additional considerations for determining the potential for thermal fatigue as a result of the effects of TASCS provide an allowance for the consideration of cycle severity in assessing the potential for TASCS effects. The above criteria has previously been submitted by EPRI for generic approval (letter dated February 28, 2001, P. J. O'Regan (EPRI) to Dr. B. Sheron (USNRC), "Extension of Risk-Informed Inservice Inspection Methodology").

3.1 Scope of Program

The systems included in the RI-ISI program are provided in Tables 3.1-1 and 3.1-2 for Units 1 and 2, respectively. The piping and instrumentation diagrams and additional plant information including the existing plant ISI program were used to define the Class 1 and 2 piping system boundaries.

3.2 Consequence Evaluation

The consequence(s) of pressure boundary failures were evaluated and ranked based on their impact on core damage and containment performance (isolation, bypass and large, early release). The impact on these measures due to both direct and indirect effects was considered using the guidance provided in EPRI TR-112657.

3.3 Failure Potential Assessment

Failure potential estimates were generated utilizing industry failure history, plant specific failure history, and other relevant information. These failure estimates were determined using the guidance provided in EPRI TR-112657, with the exception of the previously stated deviation.

Tables 3.3-1 and 3.3-2 summarize the failure potential assessment by system for each degradation mechanism that was identified as potentially operative for Units 1 and 2, respectively.

3.4 Risk Characterization

In the preceding steps, each run of piping within the scope of the program was evaluated to determine its impact on core damage and containment performance (isolation, bypass and large, early release) as well as its potential for failure. Given the results of these steps, piping segments are then defined as continuous runs of piping potentially susceptible to the same type(s) of degradation and whose failure will result in similar consequence(s). Segments are then ranked based upon their risk significance as defined in EPRI TR-112657.

The results of these calculations are presented in Tables 3.4-1 and 3.4-2 for Units 1 and 2, respectively.

3.5 Element and NDE Selection

In general, EPRI TR-112657 requires that 25% of the locations in the high-risk region and 10% of the locations in the medium-risk region be selected for inspection using appropriate NDE methods tailored to the applicable degradation mechanism. In addition, per Section 3.6.4.2 of EPRI TR-112657, if the percentage of Class 1 piping locations selected for examination falls substantially below 10%, then the basis for selection needs to be investigated. As depicted below, a 10% sampling of the Class 1 elements has been achieved for both units. It should be noted that the 10% figure was achieved based on welds that are subject to volumetric examination rather than just a VT-2 visual examination. In addition, no credit was taken for any FAC or other existing augmented inspection program (e.g., high-energy line break) locations in meeting the sampling percentage requirements. A brief summary is provided below and the results of the selection are presented in Tables 3.5-1 and 3.5-2 for Units 1 and 2, respectively. Section 4 of EPRI TR-112657 was used as guidance in determining the examination requirements for these locations.

Unit	Class 1 Piping Welds(1)		Class 2 Piping Welds(2)		All Piping Welds(3)	
	Total	Selected	Total	Selected	Total	Selected
1	478	53	1572	51	2050	104
2	449	50	1616	55	2065	105

Notes:

(1) Includes all Category B-F and B-J locations.

(2) Includes all Category C-F-1 and C-F-2 locations.

(3) All in-scope piping components, regardless of risk classification, will continue to receive Code required pressure testing, as part of the current ASME Section XI program. VT-2 visual examinations are scheduled in accordance with the station's pressure test program that remains unaffected by the RI-ISI program.

3.5.1 Additional Examinations

The RI-ISI program in all cases will determine through an engineering evaluation the root cause of any unacceptable flaw or relevant condition found during examination. The evaluation will include the applicable service conditions and degradation mechanisms to establish that the element(s) will still perform their intended safety function during subsequent operation. Elements not meeting this requirement will be repaired or replaced.

The evaluation will include whether other elements in the segment or additional segments are subject to the same root cause conditions. Additional examinations will be performed on those elements with the same root cause conditions or degradation mechanisms. The additional examinations will include high-risk significant elements and medium-risk significant elements, if needed, up to a number equivalent to the number of elements required to be inspected on the segment or segments during the current outage. If unacceptable flaws or relevant conditions are again found similar to the initial problem, the remaining elements identified as susceptible will be examined. No additional examinations will be performed if there are no additional elements identified as being susceptible to the same root cause conditions.

3.5.2 Program Relief Requests

An attempt has been made to select RI-ISI locations for examination such that a minimum of >90% coverage (i.e., Code Case N-460 criteria) is attainable. However, some limitations will not be known until the examination is performed, since some locations may be examined for the first time by the specified techniques.

It is expected that all the RI-ISI examination locations that have been selected provide >90% coverage. In instances where locations are found at the time of the examination that do not meet the >90% coverage requirement, the process outlined in EPRI TR-112657 will be followed.

The following relief requests can be withdrawn for the reasons provided below, with all other relief requests remaining in place. These relief requests were initially submitted as part of the Third Interval ISI Program Plan in a letter to the NRC dated June 1, 1999 (Reference 6.5).

Relief Request	Brief Description
ISI-01(1)	Pertains to alternative surface examination criteria for examination category B-J piping welds located in the reactor vessel annulus.
ISI-12(2)	Pertains to alternative criteria for the selection of examination category B-J piping welds.
ISI-13(2)	Pertains to alternative criteria for the selection of examination category C-F-1 piping welds in Class 2 stainless steel systems less than 3/8 inch nominal wall thickness.

Notes:

(1) The twelve locations (two hot legs with two welds each and four cold legs with two welds each) per Unit in the reactor vessel annulus are Risk Category 4. A hot leg (two welds) and a cold leg (two welds) per Unit were selected for examination. Since only a volumetric examination will be performed on these locations, Relief Request ISI-01 can be withdrawn.

(2) Relief Requests ISI-12 and ISI-13 can be withdrawn since the alternative selection criteria these relief requests address have been replaced by the application of the RI-ISI process.

3.6 Risk Impact Assessment

The RI-ISI program has been conducted in accordance with Regulatory Guide 1.174 and the requirements of EPRI TR-112657, and the risk from implementation of this program is expected to remain neutral or decrease when compared to that estimated from current requirements.

This evaluation identified the allocation of segments into High, Medium, and Low risk regions of the EPRI TR-112657 and ASME Code Case N-578 risk ranking matrix, and then determined for each of these risk classes what inspection changes are proposed for each of the locations in each segment. The changes include changing the number and location of inspections within the segment and in many cases improving the effectiveness of the inspection to account for the findings of the RI-ISI degradation mechanism assessment. For example, for locations subject to thermal fatigue, examinations will be conducted on an expanded volume and will be focused to enhance the probability of detection (POD) during the inspection process.

3.6.1 Quantitative Analysis

Limits are imposed by the EPRI methodology to ensure that the change in risk of implementing the RI-ISI program meets the requirements of Regulatory Guides 1.174 and 1.178. The EPRI criterion requires that the cumulative change in CDF and LERF be less than 1E-07 and 1E-08 per year per system, respectively.

Calvert Cliffs Nuclear Power Plant conducted a risk impact analysis per the requirements of Section 3.7 of EPRI TR-112657. The analysis estimates the net change in risk due to the positive and negative influence of adding and removing locations from the inspection program. A risk quantification was performed using the "Simplified Risk Quantification Method" described in Section 3.7 of EPRI TR-112657. The conditional core damage probability (CCDP) and conditional large early release probability (CLERP) used for high consequence category segments was based on the highest evaluated CCDP (9E-03) and CLERP (2E-03), whereas, for medium consequence category segments, bounding estimates of CCDP (1E-04) and CLERP (1E-05) were used. The likelihood of pressure boundary failure (PBF) is determined by the presence of different degradation mechanisms and the rank is based on the relative failure probability. The basic likelihood of PBF for a piping location with no degradation mechanism present is given as x_o and is expected to have a value less than 1E-08. Piping locations identified as medium failure potential have a likelihood of $20x_o$. These PBF likelihoods are consistent with References 9 and 14 of EPRI TR-112657. In addition, the analysis was performed both with and without taking credit for enhanced inspection effectiveness due to an increased POD from application of the RI-ISI approach.

Tables 3.6-1 and 3.6-2 present summaries of the RI-ISI program versus ASME Section XI Code Edition program requirements and identifies on a per system basis, each applicable risk category for Units 1 and 2, respectively. The presence of FAC was adjusted for in the performance of the quantitative analysis by excluding its impact on the risk ranking. However, in an effort to be as informative as possible, for those systems where FAC is present, the information in Tables 3.6-1 and 3.6-2 is presented in such a manner as to depict what the resultant risk categorization is both with and without consideration of FAC. This is accomplished by enclosing the FAC damage mechanism, as well as all other resultant corresponding changes (failure potential rank, risk category, and risk rank), in parenthesis. Again, this has only been done for information purposes, and has no impact on the assessment itself. The use of this approach to depict the impact of degradation mechanisms managed by augmented inspection programs on the risk categorization is consistent with that used in the delta risk assessment for the Arkansas Nuclear One, Unit 2 pilot application. An example is provided below.

System	Risk		Consequence Rank	Failure Potential	
	Category	Rank[1]		DMs	Rank
FWS	5 (3)	Medium (High)	Medium	TASCS, TT, (FAC)	Medium (High)

In this example if FAC is not considered, the failure potential rank is "medium" instead of "high" based on the TASCS and TT damage mechanisms. When a "medium" failure potential rank is combined with a "medium" consequence rank, it results in risk category 5 ("medium" risk) being assigned instead of risk category 3 ("high" risk).

In this example if FAC were considered, the failure potential rank would be "high" instead of "medium". If a "high" failure potential rank were combined with a "medium" consequence rank, it would result in risk category 3 ("high" risk) being assigned instead of risk category 5 ("medium" risk).

Note:
(1) The risk rank is not included in Tables 3.6-1 or 3.6-2 but it is included in Tables 5.2-1 and 5.2-2.

As indicated in the following tables, this evaluation has demonstrated that unacceptable risk impacts will not occur from implementation of the RI-ISI program, and satisfies the acceptance criteria of Regulatory Guide 1.174 and EPRI TR-112657.

Unit 1 Risk Impact Results

System[1]	$\Delta Risk_{CDF}$		$\Delta Risk_{LERF}$	
	w/ POD	w/o POD	w/ POD	w/o POD
RCS	-2.10E-08	-4.77E-09	-4.66E-09	-1.06E-09
CVCS	-5.18E-09	-3.02E-09	-1.15E-09	-6.70E-10
SIS	-2.13E-09	-1.41E-09	-4.71E-10	-3.11E-10
SCS	-1.67E-09	-9.45E-10	-3.70E-10	-2.10E-10
CSS	-3.15E-10	-3.15E-10	-7.00E-11	-7.00E-11
MSS	negligible	negligible	negligible	negligible
FWS	-4.44E-27	4.00E-11	-4.44E-28	4.00E-12
Total	**-3.03E-08**	**-1.04E-08**	**-6.72E-09**	**-2.32E-09**

Note:
(1) Systems are described in Table 3.1-1.

Unit 2 Risk Impact Results

System[1]	ΔRisk$_{CDF}$		ΔRisk$_{LERF}$	
	w/ POD	w/o POD	w/ POD	w/o POD
RCS	-1.70E-08	-1.89E-09	-3.78E-09	-4.20E-10
CVCS	-5.09E-09	-2.93E-09	-1.13E-09	-6.50E-10
SIS	-2.06E-09	-1.34E-09	-4.59E-10	-2.99E-10
SCS	-1.67E-09	-9.45E-10	-3.70E-10	-2.10E-10
CSS	-3.15E-10	-3.15E-10	-7.00E-11	-7.00E-11
MSS	negligible	negligible	negligible	negligible
FWS	-6.00E-12	3.00E-11	-6.00E-13	3.00E-12
Total	**-2.61E-08**	**-7.39E-09**	**-5.81E-09**	**-1.65E-09**

Note:
(1) Systems are described in Table 3.1-2.

3.6.2 Defense-in-Depth

The intent of the inspections mandated by ASME Section XI for piping welds is to identify conditions such as flaws or indications that may be precursors to leaks or ruptures in a system's pressure boundary. Currently, the process for picking inspection locations is based upon structural discontinuity and stress analysis results. As depicted in ASME White Paper 92-01-01 Revision 1, "Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds," this method has been ineffective in identifying leaks or failures. Electric Power Research Institute TR-112657 and Code Case N-578 provide a more robust selection process founded on actual service experience with nuclear plant piping failure data.

This process has two key independent ingredients, that is, a determination of each location's susceptibility to degradation and secondly, an independent assessment of the consequence of the piping failure. These two ingredients assure defense-in-depth is maintained. First, by evaluating a location's susceptibility to degradation, the likelihood of finding flaws or indications that may be precursors to leaks or ruptures is increased. Secondly, the consequence assessment effort has a single-failure criterion. As such, no matter how unlikely a failure scenario is, it is ranked High in the consequence assessment, and at worst Medium in the risk assessment (i.e., Risk Category 4), if as a result of the failure there is no mitigative equipment available to respond to the event. In addition, the consequence assessment takes into account equipment reliability, and less credit is given to less reliable equipment.

All locations within the Class 1 and 2 pressure boundaries will continue to receive a system pressure test and visual VT-2 examination as currently required by the Code regardless of its risk classification.

4. IMPLEMENTATION AND MONITORING PROGRAM

Upon approval of the RI-ISI program, procedures that comply with the guidelines described in EPRI TR-112657 will be prepared to implement and monitor the program. The new program will be integrated into the third ISI interval. No changes to the Updated Final Safety Analysis Report are necessary for program implementation.

The applicable aspects of the ASME 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. Existing ASME Section XI program implementing procedures will be retained and modified to address the RI-ISI process, as appropriate.

The monitoring and corrective action program will contain the following elements:

A. Identify
B. Characterize
C. (1) Evaluate, determine the cause and extent of the condition identified
   (2) Evaluate, develop a corrective action plan or plans
D. Decide
E. Implement
F. Monitor
G. Trend

The RI-ISI program is a living program requiring feedback of new relevant information to ensure the appropriate identification of high safety significant piping locations. As a minimum, risk ranking of piping segments will be reviewed and adjusted on an ASME period basis. In addition, significant changes may require more frequent adjustment as directed by NRC Bulletin or Generic Letter requirements, or by industry and plant specific feedback.

5. PROPOSED ISI PROGRAM PLAN CHANGE

A comparison between the RI-ISI program and ASME Section XI Code program requirements for in-scope piping is provided in Tables 5.1-1 and 5.2-1 for Unit 1 and Tables 5.1-2 and 5.2-2 for Unit 2. Tables 5.1-1 and 5.1-2 provide summary comparisons by risk region. Tables 5.2-1 and 5.2-2 provide the same comparison information, but in a more detailed manner by risk category, similar to the format used in Tables 3.6-1 and 3.6-2.

In Reference 6.6, CCNPP proposed to complete 100% of the required RI-ISI program inspections for Units 1 and 2 in the second and third periods (begins November 1, 2002) of the third ISI interval. Per the resulting Safety Evaluation Report (Reference 6.7), the NRC stated that the first outage in the first period for both units fell within the two year grace period allowed by NRC Information Notice 98-44. Based on the pending RI-ISI application at CCNPP, standard ASME Section XI examinations were not required on Class 1 and 2 piping welds during these outages. However, the Unit 1 outage scheduled for Spring 2002 is beyond the two year grace period. As a result, standard ASME Section XI examinations will be performed on Class 1 and 2 piping welds during the Unit 1 Spring 2002, and period percentage requirements established by ASME Section XI, paragraphs IWB-2412 and IWC-2412 will be met.

Regardless of any standard ASME Section XI examinations that are performed in Unit 1 during the first period, CCNPP will perform examinations on 100% of the RI-ISI selections in both units during the second and third periods of the third ISI interval. Subsequent ISI intervals will also implement 100% of the examination locations selected per the RI-ISI program. These examinations will be distributed between periods such that the period percentage requirements of ASME Section XI, paragraphs IWB-2412 and IWC-2412 are met.

6. REFERENCES/DOCUMENTATION

6.1 Letter from Mr. C. H. Cruse (BGE) to NRC Document Control Desk, dated January 29, 1999, "Proposed Alternate American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI Edition for Unit Nos. 1 and 2 Third Ten-Year Inservice Inspection Intervals"

6.2 Letter from Mr. C. H. Cruse (BGE) to NRC Document Control Desk, dated June 16, 1999, "Proposed Alternative ASME Code Edition for the Third Ten-Year Inservice Inspection Interval"

6.3 Letter from Ms. M. Gamberoni (NRC) to Mr. C. H. Cruse (BGE), dated June 28, 2000, "Interim Use of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 1998 Edition for the Third 10-Year Inspection Interval - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. MA8723 and MA8724)"

6.4 Letter from Ms. M. K. Gamberoni (NRC) to Mr. C. H. Cruse (BGE), dated April 5, 2000, "Safety Evaluation of Proposed Alternate American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 1998 Edition for the Third 10-Year Inspection Interval - Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. MA4647 and MA4648)"

6.5 Letter from Mr. C. H. Cruse (BGE) to NRC Document Control Desk, dated June 1, 1999, "Submittal of Third Ten-Year Interval Inservice Inspection Program Plan"

6.6 Letter from Mr. C. H. Cruse (BGE) to NRC Document Control Desk, dated October 30, 2000, "Request for Relief from Certain ASME Code Requirements for Inservice Inspection; Relief Request No. RR-RI-ISI-1"

6.7 Letter from Ms. M. Gamberoni (NRC) to Mr. Charles H. Cruse (CCNPP), dated March 21, 2001, "Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 – Request for Relief from American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI (TAC Nos. MB0390 and MB0391)"

Other References

EPRI TR-112657, Revised Risk-Informed Inservice Inspection Evaluation Procedure, Revision B-A

ASME Code Case N-578, Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1

Regulatory Guide 1.174, An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis

Regulatory Guide 1.178, An Approach for Plant-Specific Risk-Informed Decisionmaking Inservice Inspection of Piping

Supporting Onsite Documentation

"Consequence Evaluation of Class 1 & 2 Piping in Support of ASME Code Case N-578," Revision 0, dated December 7, 2001

Calculation No. IE-01-301, "Degradation Mechanism Evaluation for the Calvert Cliffs Nuclear Power Plant (CCNPP) – Units 1/2," Revision 2, dated July 20, 2000

Calculation No. CCNP-002-001, "Service History and Susceptibility Review for CCNPP Units 1 and 2," Revision 0

Calculation No. CCNP-002-002, "Risk Ranking for Calvert Cliffs Nuclear Power Plant – Units 1 and 2," Revision 1

Calculation No. CCNP-002-003, "Risk Impact Analysis for CCNPP Units 1 and 2," Revision 2

Record of Conversation No. ROC-012, "Minutes of the Element Selection Meeting for the Risk-Informed ISI Project at the Calvert Cliffs Nuclear Power Plant held on July 13 and 14, 2000"

Table 3.1-1

Unit 1 - System Selection and Segment / Element Definition

System Description	ASME Code Class	Number of Segments	Number of Elements
RCS – Reactor Coolant System	Class 1	48	244
CVCS – Chemical and Volume Control System	Class 1	13	123
SIS – Safety Injection System	Class 1 and 2	73	1060
SCS – Shutdown Cooling System	Class 1 and 2	18	192
CSS – Containment Spray System	Class 2	8	191
MSS – Main Steam System	Class 2	6	183
FWS – Feedwater System	Class 2	4	57
Totals		**170**	**2050**

Table 3.1-2

Unit 2 - System Selection and Segment / Element Definition

System Description	ASME Code Class	Number of Segments	Number of Elements
RCS – Reactor Coolant System	Class 1	43	239
CVCS – Chemical and Volume Control System	Class 1	13	103
SIS – Safety Injection System	Class 1 and 2	83	1125
SCS – Shutdown Cooling System	Class 1 and 2	19	198
CSS – Containment Spray System	Class 2	8	187
MSS – Main Steam System	Class 2	6	164
FWS – Feedwater System	Class 2	4	49
Totals		**176**	**2065**

Table 3.3-1

Unit 1 - Failure Potential Assessment Summary

System[1]	Thermal Fatigue		Stress Corrosion Cracking				Localized Corrosion			Flow Sensitive	
	TASCS	TT	IGSCC	TGSCC	ECSCC	PWSCC	MIC	PIT	CC	E-C	FAC
RCS	X	X									
CVCS	X	X									
SIS	X		X								
SCS	X										
CSS											
MSS											X
FWS	X	X									X

Note:
(1) Systems are described in Table 3.1-1.

Table 3.3-2

Unit 2 - Failure Potential Assessment Summary

System[1]	Thermal Fatigue		Stress Corrosion Cracking				Localized Corrosion			Flow Sensitive	
	TASCS	TT	IGSCC	TGSCC	ECSCC	PWSCC	MIC	PIT	CC	E-C	FAC
RCS	X	X									
CVCS	X	X									
SIS	X		X								
SCS	X										
CSS											
MSS											X
FWS	X	X									X

Note:
(1) Systems are described in Table 3.1-2.

Table 3.4-1

Unit 1 – Number of Segments by Risk Category With and Without Impact of FAC

System[1]	High Risk Region						Medium Risk Region				Low Risk Region			
	Category 1		Category 2		Category 3		Category 4		Category 5		Category 6		Category 7	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
RCS			17	17			26	26			5	5		
CVCS			4	4			4	4			5	5		
SIS			1	1			27	27	4	4	41	41		
SCS			1	1			12	12			5	5		
CSS							4	4			2	2	2	2
MSS					6[2]	0					0	6		
FWS					4[3]	0			0	2	0	2		
Total	0	0	23	23	10	0	73	73	4	6	58	66	2	2

Notes:
(1) Systems are described in Table 3.1-1.
(2) These six segments become Category 6 after FAC is removed from consideration due to no other damage mechanisms being present.
(3) Of these four segments, two segments become Category 5 after FAC is removed from consideration due to the presence of other "medium" failure potential damage mechanisms, and two segments become Category 6 after FAC is removed from consideration due to no other damage mechanisms being present.

Table 3.4-2

Unit 2 – Number of Segments by Risk Category With and Without Impact of FAC

System[1]	High Risk Region						Medium Risk Region				Low Risk Region			
	Category 1		Category 2		Category 3		Category 4		Category 5		Category 6		Category 7	
	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without	With	Without
RCS			15	15			23	23			5	5		
CVCS			4	4			4	4			5	5		
SIS			2	2			32	32	4	4	45	45		
SCS			1	1			13	13			5	5		
CSS							4	4			2	2	2	2
MSS					6[2]	0					0	6		
FWS					4[3]	0			0	2	0	2		
Total	0	0	22	22	10	0	76	76	4	6	62	70	2	2

Notes:

(1) Systems are described in Table 3.1-2.

(2) These six segments become Category 6 after FAC is removed from consideration due to no other damage mechanisms being present.

(3) Of these four segments, two segments become Category 5 after FAC is removed from consideration due to the presence of other "medium" failure potential damage mechanisms, and two segments become Category 6 after FAC is removed from consideration due to no other damage mechanisms being present.

Table 3.5-1

Unit 1 - Number of Elements Selected for Inspection by Risk Category Excluding Impact of FAC

System[1]	High Risk Region						Medium Risk Region				Low Risk Region			
	Category 1		Category 2		Category 3		Category 4		Category 5		Category 6		Category 7	
	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected
RCS			65	17			169	17			10	0		
CVCS			12	3			65	7			46	0		
SIS			3	1			291	30	4	1	762	0		
SCS			1	1			125	13			66	0		
CSS							115	12			47	0	29	0
MSS											183	0		
FWS									11	2	46	0		
Total	0	0	81	22	0	0	765	79	15	3	1160	0	29	0

Note:
(1) Systems are described in Table 3.1-1.

Table 3.5-2

Unit 2 - Number of Elements Selected for Inspection by Risk Category Excluding Impact of FAC

System[1]	High Risk Region						Medium Risk Region				Low Risk Region			
	Category 1		Category 2		Category 3		Category 4		Category 5		Category 6		Category 7	
	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected
RCS			58	15			171	18			10	0		
CVCS			9	3			48	5			46	0		
SIS			3	1			327	33	6	1	789	0		
SCS			1	1			133	14			64	0		
CSS							117	12			52	0	18	0
MSS											164	0		
FWS									10	2	39	0		
Total	0	0	71	20	0	0	796	82	16	3	1164	0	18	0

Note:
(1) Systems are described in Table 3.1-2.

Table 3.6-1

Unit 1 - Risk Impact Analysis Results

System[(1)]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[(3)]		LERF Impact[(3)]	
			DMs	Rank	Section XI[(2)]	RI-ISI	Delta	w/ POD	w/o POD	w/ POD	w/o POD
RCS	2	High	TASCS, TT	Medium	1	4	3	-5.94E-09	-2.70E-09	-1.32E-09	-6.00E-10
RCS	2	High	TASCS	Medium	5	9	4	-1.19E-08	-3.60E-09	-2.64E-09	-8.00E-10
RCS	2	High	TT	Medium	5	4	-1	-3.78E-09	9.00E-10	-8.40E-10	2.00E-10
RCS	4	High	None	Low	31	17	-14	6.30E-10	6.30E-10	1.40E-10	1.40E-10
RCS	6	Medium	None	Low	0	0	0	no change	no change	no change	no change
RCS Total								**-2.10E-08**	**-4.77E-09**	**-4.66E-09**	**-1.06E-09**
CVCS	2	High	TASCS	Medium	0	1	1	-1.62E-09	-9.00E-10	-3.60E-10	-2.00E-10
CVCS	2	High	TT	Medium	0	2	2	-3.24E-09	-1.80E-09	-7.20E-10	-4.00E-10
CVCS	4	High	None	Low	0	7	7	-3.15E-10	-3.15E-10	-7.00E-11	-7.00E-11
CVCS	6	Medium	None	Low	0	0	0	no change	no change	no change	no change
CVCS Total								**-5.18E-09**	**-3.02E-09**	**-1.15E-09**	**-6.70E-10**
SIS	2	High	TASCS	Medium	0	1	1	-1.62E-09	-9.00E-10	-3.60E-10	-2.00E-10
SIS	4	High	None	Low	19	30	11	-4.95E-10	-4.95E-10	-1.10E-10	-1.10E-10
SIS	5	Medium	IGSCC	Medium	0	1	1	-1.00E-11	-1.00E-11	-1.00E-12	-1.00E-12
SIS	6	Medium	None	Low	40	0	-40	negligible	negligible	negligible	negligible
SIS Total								**-2.13E-09**	**-1.41E-09**	**-4.71E-10**	**-3.11E-10**
SCS	2	High	TASCS	Medium	0	1	1	-1.62E-09	-9.00E-10	-3.60E-10	-2.00E-10
SCS	4	High	None	Low	12	13	1	-4.50E-11	-4.50E-11	-1.00E-11	-1.00E-11
SCS	6	Medium	None	Low	5	0	-5	negligible	negligible	negligible	negligible
SCS Total								**-1.67E-09**	**-9.45E-10**	**-3.70E-10**	**-2.10E-10**

Table 3.6-1

Unit 1 - Risk Impact Analysis Results

System[(1)]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[(3)]		LERF Impact[(3)]	
			DMs	Rank	Section XI[(2)]	RI-ISI	Delta	w/ POD	w/o POD	w/ POD	w/o POD
CSS	4	High	None	Low	5	12	7	-3.15E-10	-3.15E-10	-7.00E-11	-7.00E-11
CSS	6	Medium	None	Low	7	0	-7	negligible	negligible	negligible	negligible
CSS	7	Low	None	Low	2	0	-2	negligible	negligible	negligible	negligible
CSS Total								**-3.15E-10**	**-3.15E-10**	**-7.00E-11**	**-7.00E-11**
MSS	6 (3)	Medium	None (FAC)	Low (High)	16	0	-16	negligible	negligible	negligible	negligible
MSS Total								**negligible**	**negligible**	**negligible**	**negligible**
FWS	5 (3)	Medium	TASCS, TT, (FAC)	Medium (High)	6	2	-4	-4.44E-27	4.00E-11	-4.44E-28	4.00E-12
FWS	6 (3)	Medium	None (FAC)	Low (High)	8	0	-8	negligible	negligible	negligible	negligible
FWS Total								**-4.44E-27**	**4.00E-11**	**-4.44E-28**	**4.00E-12**
Grand Total								**-3.03E-08**	**-1.04E-08**	**-6.72E-09**	**-2.32E-09**

Notes:

(1) Systems are described in Table 3.1-1.

(2) Only those ASME Section XI Code inspection locations that received a volumetric examination in addition to a surface examination are included in the count. Inspection locations previously subjected to a surface examination only were not considered in accordance with Section 3.7.1 of EPRI TR-112657.

(3) Per Section 3.7.1 of EPRI TR-112657, the contribution of low risk categories 6 and 7 need not be considered in assessing the change in risk. Hence, the word "negligible" is given in these cases in lieu of values for CDF and LERF Impact. In those cases where no inspections were being performed previously via Section XI, and none are planned for RI-ISI purposes, "no change" is listed instead of "negligible".

Table 3.6-2

Unit 2 - Risk Impact Analysis Results

System(1)	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact(3)		LERF Impact(3)	
			DMs	Rank	Section XI(2)	RI-ISI	Delta	w/ POD	w/o POD	w/ POD	w/o POD
RCS	2	High	TASCS, TT	Medium	3	4	1	-4.86E-09	-9.00E-10	-1.08E-09	-2.00E-10
RCS	2	High	TASCS	Medium	4	7	3	-9.18E-09	-2.70E-09	-2.04E-09	-6.00E-10
RCS	2	High	TT	Medium	5	4	-1	-3.78E-09	9.00E-10	-8.40E-10	2.00E-10
RCS	4	High	None	Low	36	18	-18	8.10E-10	8.10E-10	1.80E-10	1.80E-10
RCS	6	Medium	None	Low	0	0	0	no change	no change	no change	no change
RCS Total								**-1.70E-08**	**-1.89E-09**	**-3.78E-09**	**-4.20E-10**
CVCS	2	High	TASCS	Medium	0	0	0	no change	no change	no change	no change
CVCS	2	High	TT	Medium	0	3	3	-4.86E-09	-2.70E-09	-1.08E-09	-6.00E-10
CVCS	4	High	None	Low	0	5	5	-2.25E-10	-2.25E-10	-5.00E-11	-5.00E-11
CVCS	6	Medium	None	Low	0	0	0	no change	no change	no change	no change
CVCS Total								**-5.09E-09**	**-2.93E-09**	**-1.13E-09**	**-6.50E-10**
SIS	2	High	TASCS	Medium	0	1	1	-1.62E-09	-9.00E-10	-3.60E-10	-2.00E-10
SIS	4	High	None	Low	23	33	10	-4.50E-10	-4.50E-10	-1.00E-10	-1.00E-10
SIS	5	Medium	IGSCC	Medium	2	1	-1	1.00E-11	1.00E-11	1.00E-12	1.00E-12
SIS	6	Medium	None	Low	64	0	-64	negligible	negligible	negligible	negligible
SIS Total								**-2.06E-09**	**-1.34E-09**	**-4.59E-10**	**-2.99E-10**
SCS	2	High	TASCS	Medium	0	1	1	-1.62E-09	-9.00E-10	-3.60E-10	-2.00E-10
SCS	4	High	None	Low	13	14	1	-4.50E-11	-4.50E-11	-1.00E-11	-1.00E-11
SCS	6	Medium	None	Low	10	0	-10	negligible	negligible	negligible	negligible
SCS Total								**-1.67E-09**	**-9.45E-10**	**-3.70E-10**	**-2.10E-10**

Table 3.6-2

Unit 2 - Risk Impact Analysis Results

System[1]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[3]		LERF Impact[3]	
			DMs	Rank	Section XI[2]	RI-ISI	Delta	w/ POD	w/o POD	w/ POD	w/o POD
CSS	4	High	None	Low	5	12	7	-3.15E-10	-3.15E-10	-7.00E-11	-7.00E-11
CSS	6	Medium	None	Low	8	0	-8	negligible	negligible	negligible	negligible
CSS	7	Low	None	Low	2	0	-2	negligible	negligible	negligible	negligible
CSS Total								**-3.15E-10**	**-3.15E-10**	**-7.00E-11**	**-7.00E-11**
MSS	6 (3)	Medium	None (FAC)	Low (High)	10	0	-10	negligible	negligible	negligible	negligible
MSS Total								**negligible**	**negligible**	**negligible**	**negligible**
FWS	5 (3)	Medium	TASCS, TT, (FAC)	Medium (High)	5	2	-3	-6.00E-12	3.00E-11	-6.00E-13	3.00E-12
FWS	6 (3)	Medium	None (FAC)	Low (High)	7	0	-7	negligible	negligible	negligible	negligible
FWS Total								**-6.00E-12**	**3.00E-11**	**-6.00E-13**	**3.00E-12**
Grand Total								**-2.61E-08**	**-7.39E-09**	**-5.81E-09**	**-1.65E-09**

Notes:

(1) Systems are described in Table 3.1-2.

(2) Only those ASME Section XI Code inspection locations that received a volumetric examination in addition to a surface examination are included in the count. Inspection locations previously subjected to a surface examination only were not considered in accordance with Section 3.7.1 of EPRI TR-112657.

(3) Per Section 3.7.1 of EPRI TR-112657, the contribution of low risk categories 6 and 7 need not be considered in assessing the change in risk. Hence, the word “negligible” is given in these cases in lieu of values for CDF and LERF Impact. In those cases where no inspections were being performed previously via Section XI, and none are planned for RI-ISI purposes, “no change” is listed instead of “negligible”.

Table 5.1-1

Unit 1 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Region

System[1]	Code Category[2]	High Risk Region					Medium Risk Region					Low Risk Region				
		Weld Count	Section XI Code[3]		EPRI TR-112657		Weld Count	Section XI Code[3]		EPRI TR-112657		Weld Count	Section XI Code[3]		EPRI TR-112657	
			Vol/Sur	Sur Only	RI-ISI	Other[4]		Vol/Sur	Sur Only	RI-ISI	Other[4]		Vol/Sur	Sur Only	RI-ISI	Other[4]
RCS	B-F	2	2	0	1		2	2	0	1						
	B-J^{DMWs}	1	1	0	1		14	8	6	5						
	B-J	62	8	6	15		153	21	20	11		10	0	2	0	
CVCS	B-J^{DMWs}	2	0	2	1		1	0	1	1						
	B-J	10	0	1	2		64	0	15	6		46	0	14	0	
SIS	B-J^{DMWs}						4	4	0	4						
	B-J						25	0	0	3		44	7	0	0	
	C-F-1	3	0	0	1		266	15	6	24		718	33	13	0	
SCS	B-J^{DMWs}						1	1	0	1						
	B-J						8	2	0	1		29	3	0	0	
	C-F-1	1	0	0	1		116	9	0	11		37	2	0	0	
CSS	C-F-1						115	5	0	12		76	9	0	0	
MSS	C-F-2											183	16	7	0	
FWS	C-F-2						11	6	0	2		46	8	0	0	

Table 5.1-1

Unit 1 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Region

System[1]	Code Category[2]	High Risk Region					Medium Risk Region					Low Risk Region				
		Weld Count	Section XI Code[3]		EPRI TR-112657		Weld Count	Section XI Code[3]		EPRI TR-112657		Weld Count	Section XI Code[3]		EPRI TR-112657	
			Vol/Sur	Sur Only	RI-ISI	Other[4]		Vol/Sur	Sur Only	RI-ISI	Other[4]		Vol/Sur	Sur Only	RI-ISI	Other[4]
Total	B-F	2	2	0	1	0	2	2	0	1	0	0	0	0	0	0
	B-J^{DMWs}	3	1	2	2	0	20	13	7	11	0	0	0	0	0	0
	B-J	72	8	7	17	0	250	23	35	21	0	129	10	16	0	0
	C-F-1	4	0	0	2	0	497	29	6	47	0	831	44	13	0	0
	C-F-2	0	0	0	0	0	11	6	0	2	0	229	24	7	0	0

Notes:

(1) Systems are described in Table 3.1-1.

(2) The ASME Code Category is based on the 1998 Edition of the ASME Section XI Code. Starting with the 1989 Addenda, piping dissimilar metal welds (DMWs) are classified as Category B-J instead of B-F. Category B-F pertains only to vessel dissimilar metal welds, which for CCNPP, consists of the Pressurizer Surge, Spray, and two Safety nozzles.

(3) The 1998 Edition of the ASME Section XI Code was used for the selection of Class 1 (B-F and B-J) and Class 2 (C-F-1 and C-F-2) inspection locations for the third interval Unit 1 ISI program. Since this was accomplished prior to the development of the RI-ISI program, these selections were used for comparison purposes.

(4) The column labeled "Other" is generally used to identify augmented inspection program locations credited per Section 3.6.5 of EPRI TR-112657. The EPRI methodology allows augmented inspection program locations to be credited if the inspection locations selected strictly for RI-ISI purposes produce less than a 10% sampling of the overall Class 1 weld population. As stated in Section 3.5 of this template, CCNPP Unit 1 achieved greater than a 10% sampling without relying on augmented inspection program locations beyond those selected by the RI-ISI process. The "Other" column has been retained in this table solely for uniformity purposes with the other RI-ISI application template submittals.

Table 5.1-2

Unit 2 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Region

System[1]	Code Category[2]	High Risk Region					Medium Risk Region					Low Risk Region				
		Weld Count	Section XI Code[3]		EPRI TR-112657		Weld Count	Section XI Code[3]		EPRI TR-112657		Weld Count	Section XI Code[3]		EPRI TR-112657	
			Vol/Sur	Sur Only	RI-ISI	Other[4]		Vol/Sur	Sur Only	RI-ISI	Other[4]		Vol/Sur	Sur Only	RI-ISI	Other[4]
RCS	B-F	2	2	0	1		2	2	0	1						
	B-J^{DMWs}	1	1	0	1		14	8	6	5						
	B-J	55	9	6	13		155	26	29	12		10	0	3	0	
CVCS	B-J^{DMWs}	2	0	2	1		1	0	1	1						
	B-J	7	0	3	2		47	0	10	4		46	0	17	0	
SIS	B-J^{DMWs}						4	4	0	4						
	B-J						26	9	0	4		42	17	0	0	
	C-F-1	3	0	0	1		303	12	20	26		747	47	34	0	
SCS	B-J^{DMWs}						1	1	0	0						
	B-J						8	4	0	1		26	7	0	0	
	C-F-1	1	0	0	1		124	8	1	13		38	3	0	0	
CSS	C-F-1						117	5	0	12		70	10	0	0	
MSS	C-F-2											164	10	18	0	
FWS	C-F-2						10	5	0	2		39	7	0	0	

Table 5.1-2

Unit 2 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Region

System[(1)]	Code Category[(2)]	High Risk Region					Medium Risk Region					Low Risk Region				
		Weld Count	Section XI Code[(3)]		EPRI TR-112657		Weld Count	Section XI Code[(3)]		EPRI TR-112657		Weld Count	Section XI Code[(3)]		EPRI TR-112657	
			Vol/Sur	Sur Only	RI-ISI	Other[(4)]		Vol/Sur	Sur Only	RI-ISI	Other[(4)]		Vol/Sur	Sur Only	RI-ISI	Other[(4)]
Total	B-F	2	2	0	1	0	2	2	0	1	0	0	0	0	0	0
	B-J[DMWs]	3	1	2	2	0	20	13	7	10	0	0	0	0	0	0
	B-J	62	9	9	15	0	236	39	39	21	0	124	24	20	0	0
	C-F-1	4	0	0	2	0	544	25	21	51	0	855	60	34	0	0
	C-F-2	0	0	0	0	0	10	5	0	2	0	203	17	18	0	0

Notes:

(1) Systems are described in Table 3.1-2.

(2) The ASME Code Category is based on the 1998 Edition of the ASME Section XI Code. Starting with the 1989 Addenda, piping dissimilar metal welds (DMWs) are classified as Category B-J instead of B-F. Category B-F pertains only to vessel dissimilar metal welds, which for CCNPP, consists of the Pressurizer Surge, Spray, and two Safety nozzles.

(3) The 1983 Edition of the ASME Section XI Code with Summer 1983 Addenda was the Code of record for the recently completed second interval Unit 2 ISI program. As allowed by 10 CFR Part 50, the 1974 Edition of the ASME Section XI Code with Summer 1975 Addenda was used for the selection of Class 1 (B-F and B-J) inspection locations, while Code Case N-408 was used for the selection of Class 2 (C-F-1 and C-F-2) inspection locations. Since no selections had been made yet for the third interval Unit 2 ISI program prior to the development of the RI-ISI program, the second interval selections were used for comparison purposes.

(4) The column labeled "Other" is generally used to identify augmented inspection program locations credited per Section 3.6.5 of EPRI TR-112657. The EPRI methodology allows augmented inspection program locations to be credited if the inspection locations selected strictly for RI-ISI purposes produce less than a 10% sampling of the overall Class 1 weld population. As stated in Section 3.5 of this template, CCNPP Unit 2 achieved greater than a 10% sampling without relying on augmented inspection program locations beyond those selected by the RI-ISI process. The "Other" column has been retained in this table solely for uniformity purposes with the other RI-ISI application template submittals.

Table 5.2-1

Unit 1 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Category

System[1]	Risk		Consequence Rank	Failure Potential		Code Category[2]	Weld Count	Section XI Code[3]		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other[4]
RCS	2	High	High	TASCS, TT	Medium	B-J	13	1	0	4	
RCS	2	High	High	TASCS	Medium	B-J	43	5	4	9	
RCS	2	High	High	TT	Medium	B-F	2	2	0	1	
						B-J[DMWs]	1	1	0	1	
						B-J	6	2	2	2	
RCS	4	Medium	High	None	Low	B-F	2	2	0	1	
						B-J[DMWs]	14	8	6	5	
						B-J	153	21	20	11	
RCS	6	Low	Medium	None	Low	B-J	10	0	2	0	
CVCS	2	High	High	TASCS	Medium	B-J	2	0	0	1	
CVCS	2	High	High	TT	Medium	B-J[DMWs]	2	0	2	1	
						B-J	8	0	1	1	
CVCS	4	Medium	High	None	Low	B-J[DMWs]	1	0	1	1	
						B-J	64	0	15	6	
CVCS	6	Low	Medium	None	Low	B-J	46	0	14	0	
SIS	2	High	High	TASCS	Medium	C-F-1	3	0	0	1	
SIS	4	Medium	High	None	Low	B-J[DMWs]	4	4	0	4	
						B-J	21	0	0	2	
						C-F-1	266	15	6	24	
SIS	5	Medium	Medium	IGSCC	Medium	B-J	4	0	0	1	
SIS	6	Low	Medium	None	Low	B-J	44	7	0	0	
						C-F-1	718	33	13	0	

Table 5.2-1

Unit 1 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Category

System[(1)]	Risk		Consequence Rank	Failure Potential		Code Category[(2)]	Weld Count	Section XI Code[(3)]		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other[(4)]
SCS	2	High	High	TASCS	Medium	C-F-1	1	0	0	1	
SCS	4	Medium	High	None	Low	B-J[DMWs]	1	1	0	1	
						B-J	8	2	0	1	
						C-F-1	116	9	0	11	
SCS	6	Low	Medium	None	Low	B-J	29	3	0	0	
						C-F-1	37	2	0	0	
CSS	4	Medium	High	None	Low	C-F-1	115	5	0	12	
CSS	6	Low	Medium	None	Low	C-F-1	47	7	0	0	
CSS	7	Low	Low	None	Low	C-F-1	29	2	0	0	
MSS	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	183	16	7	0	
FWS	5 (3)	Medium (High)	Medium	TASCS, TT, (FAC)	Medium (High)	C-F-2	11	6	0	2	
FWS	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	46	8	0	0	

Notes:

(1) Systems are described in Table 3.1-1.

(2) The ASME Code Category is based on the 1998 Edition of the ASME Section XI Code. Starting with the 1989 Addenda, piping dissimilar metal welds (DMWs) are classified as Category B-J instead of B-F. Category B-F pertains only to vessel dissimilar metal welds, which for CCNPP, consists of the Pressurizer Surge, Spray, and two Safety nozzles.

(3) The 1998 Edition of the ASME Section XI Code was used for the selection of Class 1 (B-F and B-J) and Class 2 (C-F-1 and C-F-2) inspection locations for the third interval Unit 1 ISI program. Since this was accomplished prior to the development of the RI-ISI program, these selections were used for comparison purposes.

(4) The column labeled "Other" is generally used to identify augmented inspection program locations credited per Section 3.6.5 of EPRI TR-112657. The EPRI methodology allows augmented inspection program locations to be credited if the inspection locations selected strictly for RI-ISI purposes produce less than a 10% sampling of the overall Class 1 weld population. As stated in Section 3.5 of this template, CCNPP Unit 1 achieved greater than a 10% sampling without relying on augmented inspection program locations beyond those selected by the RI-ISI process. The "Other" column has been retained in this table solely for uniformity purposes with the other RI-ISI application template submittals.

Table 5.2-2

Unit 2 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Category

System[1]	Risk		Consequence Rank	Failure Potential		Code Category[2]	Weld Count	Section XI Code[3]		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other[4]
RCS	2	High	High	TASCS, TT	Medium	B-J	14	3	0	4	
RCS	2	High	High	TASCS	Medium	B-J	36	4	6	7	
RCS	2	High	High	TT	Medium	B-F	2	2	0	1	
						B-J^{DMWs}	1	1	0	1	
						B-J	5	2	0	2	
RCS	4	Medium	High	None	Low	B-F	2	2	0	1	
						B-J^{DMWs}	14	8	6	5	
						B-J	155	26	29	12	
RCS	6	Low	Medium	None	Low	B-J	10	0	3	0	
CVCS	2	High	High	TASCS	Medium	B-J	2	0	0	0	
CVCS	2	High	High	TT	Medium	B-J^{DMWs}	2	0	2	1	
						B-J	5	0	3	2	
CVCS	4	Medium	High	None	Low	B-J^{DMWs}	1	0	1	1	
						B-J	47	0	10	4	
CVCS	6	Low	Medium	None	Low	B-J	46	0	17	0	
SIS	2	High	High	TASCS	Medium	C-F-1	3	0	0	1	
SIS	4	Medium	High	None	Low	B-J^{DMWs}	4	4	0	4	
						B-J	20	7	0	3	
						C-F-1	303	12	20	26	
SIS	5	Medium	Medium	IGSCC	Medium	B-J	6	2	0	1	
SIS	6	Low	Medium	None	Low	B-J	42	17	0	0	
						C-F-1	747	47	34	0	

Table 5.2-2

Unit 2 - Inspection Location Selection Comparison Between ASME Section XI Code and EPRI TR-112657 by Risk Category

System[1]	Risk		Consequence Rank	Failure Potential		Code Category[2]	Weld Count	Section XI Code[3]		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other[4]
SCS	2	High	High	TASCS	Medium	C-F-1	1	0	0	1	
SCS	4	Medium	High	None	Low	B-J[DMWs]	1	1	0	0	
						B-J	8	4	0	1	
						C-F-1	124	8	1	13	
SCS	6	Low	Medium	None	Low	B-J	26	7	0	0	
						C-F-1	38	3	0	0	
CSS	4	Medium	High	None	Low	C-F-1	117	5	0	12	
CSS	6	Low	Medium	None	Low	C-F-1	52	8	0	0	
CSS	7	Low	Low	None	Low	C-F-1	18	2	0	0	
MSS	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	164	10	18	0	
FWS	5 (3)	Medium (High)	Medium	TASCS, TT, (FAC)	Medium (High)	C-F-2	10	5	0	2	
FWS	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	39	7	0	0	

Notes:

(1) Systems are described in Table 3.1-2.

(2) The ASME Code Category is based on the 1998 Edition of the ASME Section XI Code. Starting with the 1989 Addenda, piping dissimilar metal welds (DMWs) are classified as Category B-J instead of B-F. Category B-F pertains only to vessel dissimilar metal welds, which for CCNPP, consists of the Pressurizer Surge, Spray, and two Safety nozzles.

(3) The 1983 Edition of the ASME Section XI Code with Summer 1983 Addenda was the Code of record for the recently completed second interval Unit 2 ISI program. As allowed by 10 CFR Part 50, the 1974 Edition of the ASME Section XI Code with Summer 1975 Addenda was used for the selection of Class 1 (B-F and B-J) inspection locations, while Code Case N-408 was used for the selection of Class 2 (C-F-1 and C-F-2) inspection locations. Since no selections had been made yet for the third interval Unit 2 ISI program prior to the development of the RI-ISI program, the second interval selections were used for comparison purposes.

(4) The column labeled "Other" is generally used to identify augmented inspection program locations credited per Section 3.6.5 of EPRI TR-112657. The EPRI methodology allows augmented inspection program locations to be credited if the inspection locations selected strictly for RI-ISI purposes produce less than a 10% sampling of the overall Class 1 weld population. As stated in Section 3.5 of this template, CCNPP Unit 2 achieved greater than a 10% sampling without relying on augmented inspection program locations beyond those selected by the RI-ISI process. The "Other" column has been retained in this table solely for uniformity purposes with the other RI-ISI application template submittals.