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Committed to Nuclear Excellence

Monticello Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

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10 CFR Part 50
Section 50.55a

U. S. Nuclear Regulatory Commission
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MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Alternative to the ASME Boiler and Pressure Vessel Code
Section XI Requirements for Class 1 and 2 Piping Welds
Risk Informed Inservice Inspection Program

Reference 1: Electric Power Research Institute (EPRI) Topical Report (TR) 112657 Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure"

Reference 2: W. H. Bateman (NRC) to G. L. Vine (EPRI) letter dated October 28, 1999, transmitting "Safety Evaluation Report Related to EPRI Risk-Informed Inservice Inspection Evaluation Procedure (EPRI TR-112657, Revision B, July 1999)"

Pursuant to and in accordance with the requirements of 10 CFR Part 50, Section 50.55a(a)(3)(i), Nuclear Management Company, LLC (NMC) hereby submits for Nuclear Regulatory Commission (NRC) review and approval a proposed Risk Informed Inservice Inspection (RI-ISI) program for the Monticello Nuclear Generating Plant. This RI-ISI is being submitted as an alternative to existing American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," requirements for the selection and examination of Class 1 and 2 piping welds. The alternative proposed by NMC uses the Reference 1 methodology for a RI-ISI program approved by the NRC to the extent and within the limitations specified in Reference 2.

Nuclear Management Company, LLC has developed the RI-ISI program for Monticello in accordance with the Electric Power Research Institute (EPRI) Topical Report TR-112657, Revision B-A, using the Nuclear Energy Institute (NEI) template methodology. The NRC acceptance of the EPRI TR-112657 report is discussed in Reference 2. The implementation of the RI-ISI program will result in a reduction in piping weld examinations, with an associated reduction in occupational radiation exposure and little or no change in risk to the public due to piping failure. Therefore, this request is being submitted as an alternative that provides an acceptable level of quality and safety in accordance with the requirements of 10 CFR 50.55a(a)(3)(i).

A047
Rec'd 01/23/02

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The methodology for assessing thermal stratification, cycling and striping potential used in the Monticello RI-ISI submittal is identical to the methodology described in the EPRI letter to the NRC dated March 28, 2001. NMC will update the RI-ISI program based on the final EPRI material reliability program guidance as warranted.

Attachment A to this letter provides the proposed RI-ISI program for Monticello. Upon NRC approval of this request, NMC intends to incorporate this alternative risk based approach to the selection and examination of Class 1 and 2 piping welds for the fourth Inservice Inspection Interval for Monticello, which will begin on June 1, 2002. The RI-ISI program will be updated and submitted to the NRC consistent with the regulatory requirements in effect at the time such update is required.

In this submittal, the Monticello Nuclear Generating Plant establishes the following new commitment:

> *Risk ranking of piping segments will be reviewed and adjusted on an ASME period basis.*

If you have any questions regarding this submittal please contact Doug Neve, Licensing Project Manager (Interim), at (763) 295-1353.

Jeffrey S. Forbes
Vice President
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Attachment A: Risk-Informed Inservice Inspection Program Plan – Monticello Nuclear Generating Plant

cc: Regional Administrator-III, NRC
NRR Project Manager, NRC
Sr. Resident Inspector, NRC
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J Silberg, Esq.

Attachment A

RISK-INFORMED INSERVICE INSPECTION

PROGRAM PLAN FOR THE

MONTICELLO NUCLEAR GENERATING PLANT

Revision 0

RISK-INFORMED INSERVICE INSPECTION PROGRAM PLAN

MONTICELLO NUCLEAR GENERATING PLANT - REVISION 0

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1. INTRODUCTION

The Monticello Nuclear Generating Plant (MNGP) is nearing the end of its 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. MNGP plans to implement a risk-informed inservice inspection (RI-ISI) program concurrent with the start of the fourth ISI interval, which will begin on June 1, 2002. Pursuant to 10 CFR 50.55a(g)(4)(ii), the applicable ASME Section XI Code for the fourth ISI interval will be the 1995 Edition through 1996 Addenda.

The objective of this submittal is to request the use of a risk-informed process for the inservice inspection of Class 1 and 2 piping. The risk-informed inservice inspection (RI-ISI) process used in this submittal is described in Electric Power Research Institute (EPRI) Topical Report (TR) 112657 Rev. 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 Monticello Level 1 and Level 2 Probabilistic Safety Assessment (PSA) results that are based on the January 1999 update were used to evaluate the consequences of pipe ruptures for the RI-ISI assessment during power operation. The base PSA Core Damage Frequency (CDF) is 1.5E-5 events per year and the base PSA Large Early Release Frequency (LERF) is 5.5E-7 events per year for the 1999 update. The original IPE result was a CDF of 2.6E-5 which was reported to the NRC in 1992. The PSA model update history is discussed below.

The NRC review of the Monticello Individual Plant Examination (IPE) was issued in May 1994. The Staff Evaluation Report (SER) concluded the following regarding the Monticello IPE:

- The IPE is complete with respect to the information requested in Generic Letter 88-20 and associated Supplement 1;

- The IPE analytical approach is technically sound and capable of identifying plant-specific vulnerabilities;

- Monticello employed a viable means to verify that the IPE models reflect the current plant design and operation at the time of submittal to the NRC;

- The IPE had been peer-reviewed;

- Monticello participated in the IPE process;
- The IPE specifically evaluated the Monticello decay heat removal functions for vulnerabilities;
- Monticello had responded appropriately to the Containment Performance Improvement program recommendations.

There were no areas of improvement to the PSA model that were identified by the NRC in their review of the plant's IPE submittal.

The internal events PSA used for the RI-ISI evaluation is based on a more current version of the PSA than the version used for the IPE. The PSA model was updated in 1994, 1995 and 1999.

The major differences in the PSA model between the original IPE and the PSA updates through the 1995 update are that the updated model includes the following:

- Addition of a non-safety 480kv diesel generator that can backfeed through emergency bus 15 to supply battery charges;
- Installation of a hard piped vent that provides an additional means for containment heat removal;
- Improvements to safety relief valve pneumatics (including power supplies);
- Addition of a crosstie for alignment of the diesel fire pump as an additional source of low pressure makeup water;
- Replacement of an instrument air compressor with one that is not dependent on service water;
- More realistic success criteria for service water by changing from 2 of 3 pumps required for success to 1 of 3 pumps required for success;
- Internal floods initiating event frequency and effects were updated.

The 1999 PSA update was performed to incorporate the effects of power uprate conditions.

In 1997, a BWROG PSA Peer Certification Review was performed on the 1995 update PSA model. The overall conclusion was positive and said that the Monticello PSA can be effectively used to support applications involving relative risk significance. The "Facts and Observations" for Monticello have been evaluated, and are being addressed by the Monticello PSA Program. No substantial changes to the RI-ISI consequence conclusions are anticipated due to planned PSA model revisions to address these "Facts and Observations".

2. PROPOSED ALTERNATIVE TO CURRENT ISI PROGRAM REQUIREMENTS

2.1 ASME Section XI

ASME 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 current 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. EPRI 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 following augmented inspection programs were considered during the RI-ISI application:

- 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 intergranular stress corrosion cracking (IGSCC) as addressed in NRC Generic Letter 88-01 and NUREG-0313, Rev. 2, have been resolved by Monticello's pipe replacement program wherein all susceptible material was replaced with resistant material. All welds are therefore classified as IGSCC Category "A". In accordance with EPRI TR-112657, piping welds identified as Category "A" are considered resistant to IGSCC, and as such are assigned a low failure potential provided no other damage mechanisms are present. Examination criteria for these welds will be in accordance with the RI-ISI process.

- The augmented inspection program for High Energy Line Break (HELB) piping includes 36 Class 1 welds that are classified as ASME Section XI, Examination Category B-J. Although MNGP is not committed to using the NUREG-0800 Standard Review Plan (SRP), Sections 3.6.1 and 3.6.2 of the SRP are used as guidance in determining appropriate design and examination requirements for specified high energy piping. The 36 Class 1 welds that require examination in accordance with the HELB augmented inspection program are between the containment penetration and the outboard isolation valve in the main steam, high pressure coolant injection, reactor core isolation cooling, reactor water clean-up, residual heat removal and core spray systems. Independent of the HELB program, the RI-ISI application selected 8 of these 36 HELB welds for examination. The remaining 28 HELB welds will continue to be examined in accordance with the HELB augmented inspection program.

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 MNGP. 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 (NPS) 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 a 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 susceptibility 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., RHR 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 of hot water can occur outward past a valve into a line that is relatively colder, creating 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 Table 3.1. 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 (i.e., 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.

Table 3.3 summarizes the failure potential assessment by system for each degradation mechanism that was identified as potentially operative.

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 (i.e., 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 Table 3.4.

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. For MNGP, the percentage of Class 1 welds selected per the RI-ISI process is 9.3% (76 of 817 welds), which is not a significant departure from 10%.

One additional factor that was considered during the evaluation was that the overall percentage of Class 1 selections included both socket and non-socket welds. Therefore, the percentage of Class 1 selections was 9.3% when both socket and non-socket piping welds were considered. This percentage increases to 13.2% (75 of 567 welds) when considering only those piping welds that are non-socket welded. It should be noted that

non-socket welds are subject to volumetric examination, so this percentage does not rely upon welds that are solely subject to a VT-2 visual examination.

As stated in TR-112657, the existing FAC augmented inspection program provides the means to effectively manage this mechanism. No additional credit was taken for any FAC augmented inspection program locations beyond those selected by the RI-ISI process to meet the sampling percentage requirements.

A brief summary is provided below, and the results of the selection are presented in Table 3.5. 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	817	76	901	12	1718	88

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.

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.

None of the existing MNGP relief requests are being withdrawn due to the RI-ISI application.

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 core damage frequency (CDF) and large early release frequency (LERF) be less than 1E-07 and 1E-08 per year per system, respectively.

Monticello 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 (9E-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_0 and is expected to have a value less than 1E-08. Piping locations identified as medium failure potential have a likelihood of $20x_0$. 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. The PBF likelihoods and POD values used in the analysis are consistent with those used in the approved RI-ISI pilot applications at Arkansas Nuclear One, Unit 2, and Vermont Yankee, as documented in References 9 and 14 of EPRI TR-112657.

Table 3.6-1 presents a summary of the RI-ISI program versus ASME Section XI Code requirements and identifies on a per system basis each applicable risk category. 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, Table 3.6-1 presents the information 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
FW	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 Table 3.6-1 but it is included in Table 5-2.

As indicated in the table below, 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.

Risk Impact Results

System[1]	$\Delta Risk_{CDF}$		$\Delta Risk_{LERF}$	
	w/ POD	**w/o POD**	**w/ POD**	**w/o POD**
RPV	9.00E-11	9.00E-11	9.00E-11	9.00E-11
RWCU	4.50E-11	4.50E-11	4.50E-11	4.50E-11
MS	9.90E-10	9.90E-10	9.90E-10	9.90E-10
SLC	-4.50E-11	-4.50E-11	-4.50E-11	-4.50E-11
RCR	6.98E-09	6.98E-09	6.98E-09	6.98E-09
RCIC	-1.38E-10	-1.10E-10	-9.48E-11	-9.20E-11
RHR	-9.71E-09	-2.13E-09	-9.72E-09	-2.16E-09
CS	1.22E-09	1.22E-09	1.22E-09	1.22E-09
HPCI	-6.15E-10	2.69E-09	-5.88E-10	2.66E-09
FW	-6.20E-09	3.90E-09	-6.17E-09	3.91E-09
CCW	negligible	negligible	negligible	negligible
CRD	negligible	negligible	negligible	negligible
FPEC	no change	no change	no change	no change
PCAC	negligible	negligible	negligible	negligible
Torus	negligible	negligible	negligible	negligible
Total	**-7.40E-09**	**1.36E-08**	**-7.30E-09**	**1.36E-08**

Note

1. Systems are described in Table 3.1.

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 Rev. 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. EPRI 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 leak 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 fourth inservice inspection interval. No changes to the Technical Specifications or Updated Final Safety Analysis Report are necessary for program implementation.

The applicable aspects of the ASME Code not affected by this change will 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 1986 Edition program requirements for in-scope piping is provided in Tables 5-1 and 5-2. (Since no examination selections had been made for the fourth interval ISI Program prior to the development of the RI-ISI Program, the third interval selections were used for comparison purposes. The Code of record for the third interval was the 1986 Edition of ASME Section XI.) Table 5-1 provides a summary comparison by risk region. Table 5-2 provides the same comparison information, but in a more detailed manner by risk category, similar to the format used in Table 3.6-1.

MNGP is implementing the RI-ISI program at the start of the first period of its fourth inspection interval. As such, 100% of the required RI-ISI program inspections will be completed in the fourth interval. Examinations shall be performed during the interval such that the period examination percentage requirements of ASME Section XI, paragraphs IWB-2412 and IWC-2412 are met.

6. REFERENCES/DOCUMENTATION

EPRI TR-112657, "Revised Risk-Informed Inservice Inspection Evaluation Procedure", Rev. 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

Structural Integrity Calculation/File No. NMC-01-301, "Degradation Mechanism Evaluation for Class 1 and 2 Piping Welds at Monticello Nuclear Generating Plant", Revision 1

Structural Integrity Calculation/File No. NMC-01-302, "Risk-Informed Inservice Inspection Consequence Evaluation of Class 1 and 2 Piping for Monticello Nuclear Power Plant", Revision 1

Structural Integrity Calculation/File No. NMC-01-303, "Risk Ranking Summary, Matrix and Report for the Monticello Nuclear Generating Plant ", Revision 0

Structural Integrity Calculation/File No. NMC-01-304, "Risk Impact Analysis for the Monticello Nuclear Generating Plant ", Revision 1

Structural Integrity File No. NMC-01-103-4, Record of Conversation No. ROC-002, "Minutes of the Element Selection Meeting for the Risk-Informed ISI Project at the Monticello Nuclear Generating Plant ", Revision 1, dated June 21, 2001

MNGP Calculation/File No. CA-01-216, "Monticello Nuclear Generating Plant, Risk-Informed Service History Report for Class I and II Piping Welds, ASME Categories B-F, B-J, C-F-1 and C-F-2", Revision 0

Table 3.1

System Selection and Segment / Element Definition

System Description	Number of Segments	Number of Elements
RPV – Reactor Pressure Vessel	19	112
RWCU – Reactor Water Clean-Up	10	85
MS – Main Steam	22	204
SLC -- Standby Liquid Control	3	35
RCR – Reactor Coolant Recirculation	22	135
RCIC – Reactor Core Isolation Cooling	13	65
RHR – Residual Heat Removal	97	476
CS – Core Spray	36	191
HPCI – High Pressure Coolant Injection	20	158
FW – Feedwater	37	78
CCW – Component Cooling Water	2	18
CRD – Control Rod Drive	7	41
FPEC – Fuel Pool Emergency Cooling	10	54
PCAC – Primary Containment and Atmospheric Control	8	47
Torus -- Torus Hard Vent	1	19
Totals	**307**	**1718**

Table 3.3

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
RPV											
RWCU											
MS											X
SLC											
RCR									X		
RCIC		X									X
RHR		X									X
CS									X		X
HPCI		X									
FW	X	X							X		X
CCW											
CRD											
FPEC											
PCAC											
Torus											

Note

1. Systems are described in Table 3.1.

Table 3.4

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
RPV							6	6			10	10	3	3
RWCU							9	9					1	1
MS	2[2]	0					5	7			14	14	1	1
SLC							1	1			2	2		
RCR			10	10			10	10					2	2
RCIC					3[3]	0	2	2	3	6	3	3	2	2
RHR			3	3	15[4]	0	13	13	5[5]	2	44	59	17	20
CS			2	2	1[6]	0	4	4	4[7]	0	6	7	19	23
HPCI			2	2			4	4	3	3	11	11		
FW	14[8]	0	14	21	2[9]	0	6	13	1	3				
CCW													2	2
CRD											2	2	5	5
FPEC											10	10		
PCAC											8	8		
Torus											1	1		
Total	16	0	31	38	21	0	60	69	16	14	111	127	52	59

Notes

1. Systems are described in Table 3.1.
2. These two segments become Category 4 after FAC is removed from consideration due to no other damage mechanisms being present.
3. These three segments become Category 5 after FAC is removed from consideration due to the presence of other "medium" failure potential damage mechanisms.
4. These fifteen segments become Category 6 after FAC is removed from consideration due to no other damage mechanisms being present.
5. Of these five segments, three segments become Category 7 after FAC is removed due to no other damage mechanisms being present.

Notes for Table 3.4 (cont'd)

6. This one segment becomes Category 6 after FAC is removed due to no other damage mechanisms being present.
7. These four segments become Category 7 after FAC is removed due to no other damage mechanisms being present.
8. Of these fourteen segments, seven segments become Category 2 after FAC is removed due to the presence of other "medium" failure potential damage mechanisms, and seven segments become Category 4 after FAC is removed due to no other damage mechanisms being present.
9. These two segments become Category 5 after FAC is removed due to no other damage mechanisms being present.

Table 3.5

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
RPV							21	3			83	0	8	0
RWCU							84	9					1	0
MS							105	11[2]			95	0	4	0
SLC							8	1			27	0		
RCR			10	3			113	12					12	0
RCIC							12	2	28	3	12	0	13	0
RHR			31	8			67	7	10	1	269	0	99	0
CS			2	1			20	2			35	0	134	0
HPCI			8	2			27	3	33	4	90	0		
FW			36	10			38	4[3]	4	2				
CCW													18	0
CRD											10	0	31	0
FPEC											54	0		
PCAC											47	0		
Torus											19	0		
Total			87	24			495	54	75	10	741	0	320	0

Notes

1. Systems are described in Table 3.1.
2. One of these eleven welds was selected for examination by both the FAC and RI-ISI Programs. Since FAC was the only damage mechanism identified for this weld, the FAC examination will be credited toward both programs.
3. Two of these four welds were selected for examination by both the FAC and RI-ISI Programs. Since FAC was the only damage mechanism identified for these welds, the FAC examinations will be credited toward both programs.

Table 3.6-1
Risk Impact Analysis Results

System[1]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[4]		LERF Impact[4]	
			DMs	Rank	Section XI[2]	RI-ISI[3]	Delta	w/ POD	w/o POD	w/ POD	w/o POD
RPV	4	High	None	Low	5	3	-2	9.00E-11	9.00E-11	9.00E-11	9.00E-11
RPV	6	Medium	None	Low	4	0	-4	negligible	negligible	negligible	negligible
RPV	7	Low	None	Low	2	0	-2	negligible	negligible	negligible	negligible
RPV Total								**9.00E-11**	**9.00E-11**	**9.00E-11**	**9.00E-11**
RWCU	4	High	None	Low	10	9	-1	4.50E-11	4.50E-11	4.50E-11	4.50E-11
RWCU	7	Low	None	Low	0	0	0	no change	no change	no change	no change
RWCU Total								**4.50E-11**	**4.50E-11**	**4.50E-11**	**4.50E-11**
MS	4 (1)	High	None (FAC)	Low (High)	2	0	-2	9.00E-11	9.00E-11	9.00E-11	9.00E-11
MS	4	High	None	Low	30	10	-20	9.00E-10	9.00E-10	9.00E-10	9.00E-10
MS	6	Medium	None	Low	21	0	-21	negligible	negligible	negligible	negligible
MS	7	Low	None	Low	0	0	0	no change	no change	no change	no change
MS Total								**9.90E-10**	**9.90E-10**	**9.90E-10**	**9.90E-10**
SLC	4	High	None	Low	0	1	1	-4.50E-11	-4.50E-11	-4.50E-11	-4.50E-11
SLC	6	Medium	None	Low	0	0	0	no change	no change	no change	no change
SLC Total								**-4.50E-11**	**-4.50E-11**	**-4.50E-11**	**-4.50E-11**
RCR	2	High	CC	Medium	10	3	-7	6.30E-09	6.30E-09	6.30E-09	6.30E-09
RCR	4	High	None	Low	27	12	-15	6.75E-10	6.75E-10	6.75E-10	6.75E-10
RCR	7	Low	None	Low	0	0	0	no change	no change	no change	no change
RCR Total								**6.98E-09**	**6.98E-09**	**6.98E-09**	**6.98E-09**

Table 3.6-1

Risk Impact Analysis Results

System[1]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[4]		LERF Impact[4]	
			DMs	Rank	Section XI[2]	RI-ISI[3]	Delta	w/ POD	w/o POD	w/ POD	w/o POD
RCIC	4	High	None	Low	0	2	2	-9.00E-11	-9.00E-11	-9.00E-11	-9.00E-11
RCIC	5 (3)	Medium	TT, (FAC)	Medium (High)	1	1	0	-1.20E-11	no change	-1.20E-12	no change
RCIC	5	Medium	TT	Medium	0	2	2	-3.60E-11	-2.00E-11	-3.60E-12	-2.00E-12
RCIC	6	Medium	None	Low	1	0	-1	negligible	negligible	negligible	negligible
RCIC	7	Low	None	Low	0	0	0	no change	no change	no change	no change
RCIC Total								**-1.38E-10**	**-1.10E-10**	**-9.48E-11**	**-9.20E-11**
RHR	2	High	TT	Medium	5	8	3	-1.03E-08	-2.70E-09	-1.03E-08	-2.70E-09
RHR	4	High	None	Low	19	7	-12	5.40E-10	5.40E-10	5.40E-10	5.40E-10
RHR	5	Medium	TT	Medium	4	1	-3	6.00E-12	3.00E-11	6.00E-13	3.00E-12
RHR	6 (3)	Medium	None (FAC)	Low (High)	5	0	-5	negligible	negligible	negligible	negligible
RHR	6	Medium	None	Low	20	0	-20	negligible	negligible	negligible	negligible
RHR	7 (5)	Low	None (FAC)	Low (High)	1	0	-1	negligible	negligible	negligible	negligible
RHR	7	Low	None	Low	8	0	-8	negligible	negligible	negligible	negligible
RHR Total								**-9.71E-09**	**-2.13E-09**	**-9.72E-09**	**-2.16E-09**
CS	2	High	CC	Medium	2	1	-1	9.00E-10	9.00E-10	9.00E-10	9.00E-10
CS	4	High	None	Low	9	2	-7	3.15E-10	3.15E-10	3.15E-10	3.15E-10
CS	6 (3)	Medium	None (FAC)	Low (High)	0	0	0	no change	no change	no change	no change
CS	6	Medium	None	Low	6	0	-6	negligible	negligible	negligible	negligible
CS	7 (5)	Low	None (FAC)	Low (High)	0	0	0	no change	no change	no change	no change
CS	7	Low	None	Low	18	0	-18	negligible	negligible	negligible	negligible
CS Total								**1.22E-09**	**1.22E-09**	**1.22E-09**	**1.22E-09**

Table 3.6-1

Risk Impact Analysis Results

System[1]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[4]		LERF Impact[4]	
			DMs	Rank	Section XI[2]	RI-ISI[3]	Delta	w/ POD	w/o POD	w/ POD	w/o POD
HPCI	2	High	TT	Medium	5	2	-3	-5.40E-10	2.70E-09	-5.40E-10	2.70E-09
HPCI	4	High	None	Low	2	3	1	-4.50E-11	-4.50E-11	-4.50E-11	-4.50E-11
HPCI	5	Medium	TT	Medium	7	4	-3	-3.00E-11	3.00E-11	-3.00E-12	3.00E-12
HPCI	6	Medium	None	Low	7	0	-7	negligible	negligible	negligible	negligible
HPCI	6	Low	TT	Medium	1	0	-1	negligible	negligible	negligible	negligible
HPCI Total								**-6.15E-10**	**2.69E-09**	**-5.88E-10**	**2.66E-09**
FW	2 (1)	High	TASCS, TT, (FAC)	Medium (High)	0	1	1	-1.62E-09	-9.00E-10	-1.62E-09	-9.00E-10
FW	2 (1)	High	TASCS, (FAC)	Medium (High)	4	1	-3	5.40E-10	2.70E-09	5.40E-10	2.70E-09
FW	2 (1)	High	TT, (FAC)	Medium (High)	2	1	-1	-5.40E-10	9.00E-10	-5.40E-10	9.00E-10
FW	2	High	TASCS, TT	Medium	0	1	1	-1.62E-09	-9.00E-10	-1.62E-09	-9.00E-10
FW	2	High	TASCS	Medium	6	4	-2	-3.24E-09	1.80E-09	-3.24E-09	1.80E-09
FW	2	High	TT	Medium	0	0	0	no change	no change	no change	no change
FW	2	High	CC	Medium	2	2	0	no change	no change	no change	no change
FW	4 (1)	High	None (FAC)	Low (High)	6	0	-6	2.70E-10	2.70E-10	2.70E-10	2.70E-10
FW	4	High	None	Low	3	2	-1	4.50E-11	4.50E-11	4.50E-11	4.50E-11
FW	5 (3)	Medium	TASCS, TT, (FAC)	Medium (High)	0	1	1	-1.80E-11	-1.00E-11	-1.80E-12	-1.00E-12
FW	5 (3)	Medium	TASCS, (FAC)	Medium (High)	0	0	0	no change	no change	no change	no change
FW	5	Medium	TASCS	Medium	0	1	1	-1.80E-11	-1.00E-11	-1.80E-12	-1.00E-12
FW Total								**-6.20E-09**	**3.90E-09**	**-6.17E-09**	**3.91E-09**
CCW	7	Low	None	Low	1	0	-1	negligible	negligible	negligible	negligible
CCW Total								**negligible**	**negligible**	**negligible**	**negligible**
CRD	6	Medium	None	Low	10	0	-10	negligible	negligible	negligible	negligible
CRD	7	Low	None	Low	21	0	-21	negligible	negligible	negligible	negligible
CRD Total								**negligible**	**negligible**	**negligible**	**negligible**

Table 3.6-1 Risk Impact Analysis Results											
System[1]	Category	Consequence Rank	Failure Potential		Inspections			CDF Impact[4]		LERF Impact[4]	
			DMs	Rank	Section XI[2]	RI-ISI[3]	Delta	w/ POD	w/o POD	w/ POD	w/o POD
FPEC	6	Medium	None	Low	0	0	0	no change	no change	no change	no change
FPEC Total								**no change**	**no change**	**no change**	**no change**
PCAC	6	Medium	None	Low	4	0	-4	negligible	negligible	negligible	negligible
PCAC Total								**negligible**	**negligible**	**negligible**	**negligible**
Torus	6	Medium	None	Low	1	0	-1	negligible	negligible	negligible	negligible
Torus Total								**negligible**	**negligible**	**negligible**	**negligible**
Grand Total								**-7.40E-09**	**1.36E-08**	**-7.30E-09**	**1.36E-08**

Notes

1. Systems are described in Table 3.1.
2. Only those ASME Section XI Code inspection locations that received a volumetric examination in addition to a surface examination were 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. Risk Category 4 (1) inspection locations selected for examination by both the FAC and RI-ISI Programs are not included in the count since they do not represent additional examinations.
4. 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

Inspection Location Selection Comparison Between 1986 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	1986 Section XI[2]		EPRI TR-112657		Weld Count	1986 Section XI[2]		EPRI TR-112657		Weld Count	1986 Section XI[2]		EPRI TR-112657	
			Vol/Sur	Sur Only	RI-ISI	Other[3]		Vol/Sur	Sur Only	RI-ISI	Other[3]		Vol/Sur	Sur Only	RI-ISI	Other[3]
RPV	B-F						5	3	2	1		3	1	2	0	
	B-J						16	2	3	2		88	5	24	0	
RWCU	B-F						1	1	0	1						
	B-J						83	9	15	8		1	0	0	0	
MS	B-J						105	32	1	11[4]		99	21	21	0	
SLC	B-F											1	0	1	0	
	B-J						8	0	3	1		26	0	6	0	
RCR	B-F	10	10	0	3		2	2	0	0						
	B-J						111	25	5	12		12	0	3	0	
RCIC	B-J											14	0	5	0	
	C-F-2						40	1	0	5		11	1	0	0	
RHR	B-F	1	1	0	0		2	2	0	0						
	B-J	30	4	0	8		75	21	0	8		7	4	0	0	
	C-F-2											361	30	2	0	
CS	B-F	2	2	0	1											
	B-J						20	9	0	2		8	2	0	0	
	C-F-2											161	22	0	0	
HPCI	B-F	2	2	0	0											
	B-J	6	3	0	2							9	1	0	0	
	C-F-2						60	9	0	7		81	7	0	0	
FW	B-J	29	9	0	10		41	8	0	6[5]						
	C-F-2	7	5	0	0		1	1	0	0						

Table 5-1 (cont'd)

Inspection Location Selection Comparison Between 1986 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	1986 Section XI[2]		EPRI TR-112657		Weld Count	1986 Section XI[2]		EPRI TR-112657		Weld Count	1986 Section XI[2]		EPRI TR-112657	
			Vol/Sur	Sur Only	RI-ISI	Other[3]		Vol/Sur	Sur Only	RI-ISI	Other[3]		Vol/Sur	Sur Only	RI-ISI	Other[3]
CCW	C-F-2											18	1	0	0	
CRD	C-F-1											31	28	0	0	
	C-F-2											10	3	0	0	
FPEC	C-F-2											54	0	0	0	
PCAC	C-F-2											47	4	0	0	
Torus	C-F-2											19	1	0	0	
Total	B-F	15	15	0	4		10	8	2	2		4	1	3	0	
	B-J	65	16	0	20		459	106	27	50		264	33	59	0	
	C-F-1											31	28	0	0	
	C-F-2	7	5	0	0		101	11	0	12		762	69	2	0	

Notes

1. Systems are described in Table 3.1.
2. Since no examination selections had been made for the fourth interval ISI Program prior to the development of the RI-ISI Program, the third interval selections were used for comparison purposes. The Code of record for the third interval was the 1986 Edition of ASME Section XI. The Code Categories listed in the table are therefore in accordance with the 1986 Edition of ASME Section XI.
3. 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 substantially less than a 10% sampling of the overall Class 1 weld population. As stated in Section 3.5 of this template, MNGP achieved a 9.2% 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.
4. One of these eleven welds was selected for examination by both the FAC and RI-ISI Programs. Since FAC was the only damage mechanism identified for this weld, the FAC examination will be credited toward both programs.
5. Two of these six welds were selected for examination by both the FAC and RI-ISI Programs. Since FAC was the only damage mechanism identified for these welds, the FAC examinations will be credited toward both programs.

Table 5-2
Inspection Location Selection Comparison Between 1986 ASME Section XI Code and EPRI TR-112657 by Risk Category

System[1]	Risk Category	Risk Rank	Consequence Rank	Failure Potential DMs	Failure Potential Rank	Code Category[2]	Weld Count	1986 Section XI[2] Vol/Sur	1986 Section XI[2] Sur Only	EPRI TR-112657 RI-ISI	EPRI TR-112657 Other[3]
RPV	4	Medium	High	None	Low	B-F	5	3	2	1	
						B-J	16	2	3	2	
RPV	6	Low	Medium	None	Low	B-F	3	1	2	0	
						B-J	80	3	22	0	
RPV	7	Low	Low	None	Low	B-J	8	2	2	0	
RWCU	4	Medium	High	None	Low	B-F	1	1	0	1	
						B-J	83	9	15	8	
RWCU	7	Low	Low	None	Low	B-J	1	0	0	0	
MS	4 (1)	Medium (High)	High	None (FAC)	Low (High)	B-J	6	2	0	1[4]	
MS	4	Medium	High	None	Low	B-J	99	30	1	10	
MS	6	Low	Medium	None	Low	B-J	95	21	18	0	
MS	7	Low	Low	None	Low	B-J	4	0	3	0	
SLC	4	Medium	High	None	Low	B-J	8	0	3	1	
SLC	6	Low	Medium	None	Low	B-F	1	0	1	0	
						B-J	26	0	6	0	
RCR	2	High	High	CC	Medium	B-F	10	10	0	3	
RCR	4	Medium	High	None	Low	B-F	2	2	0	0	
						B-J	111	25	5	12	
RCR	7	Low	Low	None	Low	B-J	12	0	3	0	

Table 5-2 (cont'd)

Inspection Location Selection Comparison Between 1986 ASME Section XI Code and EPRI TR-112657 by Risk Category

System(1)	Risk		Consequence Rank	Failure Potential		Code Category(2)	Weld Count	1986 Section XI(2)		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other(3)
RCIC	4	Medium	High	None	Low	C-F-2	12	0	0	2	
RCIC	5 (3)	Medium (High)	Medium	TT, (FAC)	Medium (High)	C-F-2	8	1	0	1	
RCIC	5	Medium	Medium	TT	Medium	C-F-2	20	0	0	2	
RCIC	6	Low	Medium	None	Low	B-J	5	0	2	0	
						C-F-2	7	1	0	0	
RCIC	7	Low	Low	None	Low	B-J	9	0	3	0	
						C-F-2	4	0	0	0	
RHR	2	High	High	TT	Medium	B-F	1	1	0	0	
						B-J	30	4	0	8	
RHR	4	Medium	High	None	Low	B-F	2	2	0	0	
						B-J	65	17	0	7	
RHR	5	Medium	Medium	TT	Medium	B-J	10	4	0	1	
RHR	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	42	5	0	0	
RHR	6	Low	Medium	None	Low	C-F-2	227	20	0	0	
RHR	7 (5)	Low (Medium)	Low	None (FAC)	Low (High)	C-F-2	10	1	0	0	
RHR	7	Low	Low	None	Low	B-J	7	4	0	0	
						C-F-2	82	4	2	0	
CS	2	High	High	CC	Medium	B-F	2	2	0	1	
CS	4	Medium	High	None	Low	B-J	20	9	0	2	
CS	6 (3)	Low (High)	Medium	None (FAC)	Low (High)	C-F-2	4	0	0	0	
CS	6	Low	Medium	None	Low	B-J	8	2	0	0	
						C-F-2	23	4	0	0	
CS	7 (5)	Low (Medium)	Low	None (FAC)	Low (High)	C-F-2	13	0	0	0	
CS	7	Low	Low	None	Low	C-F-2	121	18	0	0	

System[1]	Risk		Consequence Rank	Failure Potential		Code Category[2]	Weld Count	1986 Section XI[2]		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other[3]
HPCI	2	High	High	TT	Medium	B-F	2	2	0	0	
						B-J	6	3	0	2	
HPCI	4	Medium	High	None	Low	C-F-2	27	2	0	3	
HPCI	5	Medium	Medium	TT	Medium	C-F-2	33	7	0	4	
HPCI	6	Low	Medium	None	Low	C-F-2	81	7	0	0	
HPCI	6	Low	Low	TT	Medium	B-J	9	1	0	0	
FW	2 (1)	High (High)	High	TASCS, TT, (FAC)	Medium (High)	B-J	1	0	0	1	
FW	2 (1)	High (High)	High	TASCS, (FAC)	Medium (High)	B-J	1	1	0	1	
						C-F-2	4	3	0	0	
FW	2 (1)	High (High)	High	TT, (FAC)	Medium (High)	B-J	4	1	0	1	
						C-F-2	1	1	0	0	
FW	2	High	High	TASCS, TT	Medium	B-J	2	0	0	1	
						C-F-2	1	0	0	0	
FW	2	High	High	TASCS	Medium	B-J	12	5	0	4	
						C-F-2	1	1	0	0	
FW	2	High	High	TT	Medium	B-J	1	0	0	0	
FW	2	High	High	CC	Medium	B-J	8	2	0	2	
FW	4 (1)	Medium (High)	High	None (FAC)	Low (High)	B-J	18	5	0	2[5]	
						C-F-2	1	1	0	0	
FW	4	Medium	High	None	Low	B-J	19	3	0	2	
FW	5 (3)	Medium (High)	Medium	TASCS, TT, (FAC)	Medium (High)	B-J	1	0	0	1	
FW	5 (3)	Medium (High)	Medium	TASCS, (FAC)	Medium (High)	B-J	1	0	0	0	
FW	5	Medium	Medium	TASCS	Medium	B-J	2	0	0	1	

Table 5-2 (cont'd)

Inspection Location Selection Comparison Between 1986 ASME Section XI Code and EPRI TR-112657 by Risk Category

Table 5-2 (cont'd) Inspection Location Selection Comparison Between 1986 ASME Section XI Code and EPRI TR-112657 by Risk Category											
System[1]	Risk		Consequence Rank	Failure Potential		Code Category[2]	Weld Count	1986 Section XI[2]		EPRI TR-112657	
	Category	Rank		DMs	Rank			Vol/Sur	Sur Only	RI-ISI	Other[3]
CCW	7	Low	Low	None	Low	C-F-2	18	1	0	0	
CRD	6	Low	Medium	None	Low	C-F-1	10	10	0	0	
CRD	7	Low	Low	None	Low	C-F-1	21	18	0	0	
						C-F-2	10	3	0	0	
FPEC	6	Low	Medium	None	Low	C-F-2	54	0	0	0	
PCAC	6	Low	Medium	None	Low	C-F-2	47	4	0	0	
Torus	6	Low	Medium	None	Low	C-F-2	19	1	0	0	

Notes

1. Systems are described in Table 3.1.
2. Since no examination selections had been made for the fourth interval ISI Program prior to the development of the RI-ISI Program, the third interval selections were used for comparison purposes. The Code of record for the third interval was the 1986 Edition of ASME Section XI. The Code Categories listed in the table are therefore in accordance with the 1986 Edition of ASME Section XI.
3. 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 substantially less than a 10% sampling of the overall Class 1 weld population. As stated in Section 3.5 of this template, MNGP achieved a 9.2% 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.
4. This one weld was selected for examination by both the FAC and RI-ISI Programs. Since FAC was the only damage mechanism identified for this weld, the FAC examination will be credited toward both programs.
5. These two welds were selected for examination by both the FAC and RI-ISI Programs. Since FAC was the only damage mechanism identified for these welds, the FAC examinations will be credited toward both programs.