

**JUL 11 2006**

L-PI-06-063  
10 CFR 50.90

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Prairie Island Nuclear Generating Plant Units 1 and 2  
Dockets 50-282 and 50-306  
License Nos. DPR-42 and DPR-60

Supplement to License Amendment Request (LAR) To Technical Specification (TS)  
5.5.14 For One-Time Extension Of Containment Integrated Leakage Rate Test Interval  
(TAC Nos. MC9272 and MC9273)

Reference 1) License Amendment Request (LAR) To Technical Specification (TS)  
5.5.14 For One-Time Extension of Containment Integrated Leakage Rate  
Test Interval, dated December 13, 2005 (Accession No. ML022210452).  
2) Supplement to License Amendment Request (LAR) To Technical  
Specification (TS) 5.5.14 For One-Time Extension of Containment  
Integrated Leakage Rate Test Interval, dated June 7, 2006 (Accession No.  
ML061600433).

By letter dated December 13, 2005, Nuclear Management Company (NMC) submitted the Reference 1 LAR to request an amendment to the TS for the Prairie Island Nuclear Generating Plant (PINGP) Units 1 and 2 to revise TS 5.5.14 "Containment Leakage Rate Testing Program" to allow a one-time interval extension of no more than 5 years for the Type A, Integrated Leakage Rate Test (ILRT). By letter dated June 7, 2006, NMC submitted Reference 2 to respond to NRC requests for additional information (RAIs) on the LAR (Reference 1). This letter supplements References 1 and 2 to address NRC Staff RAIs on Reference 2. NMC is submitting this supplement in accordance with the provisions of 10 CFR 50.90.

Enclosure 1 provides the NRC RAIs and NMC responses. Enclosure 2 provides a revised description of the probabilistic risk assessment model used to respond to NRC RAI question 1 in Reference 2 and the results of the evaluation. Enclosure 2 to this letter supersedes in its entirety the Enclosure 2 provided with the supplement dated June 7, 2006 (Reference 2).

The supplemental information provided in this letter and enclosures does not impact the conclusions of the Determination of No Significant Hazards Consideration and Environmental Assessment presented in the December 13, 2005 submittal and June 7, 2006 supplement.

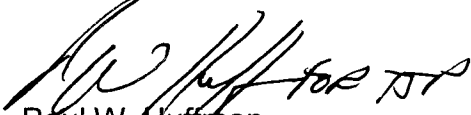
In accordance with 10 CFR 50.91, NMC is notifying the State of Minnesota of this LAR supplement by transmitting a copy of this letter and enclosures to the designated State Official.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on **JUL 21 2006**

A handwritten signature in black ink, appearing to read "Paul W. Huffman". The signature is written in a cursive, somewhat stylized script.

Paul W. Huffman  
Acting Site Vice President, Prairie Island Nuclear Generating Plant Units 1 and 2  
Nuclear Management Company, LLC

Enclosures (2)

cc: Administrator, Region III, USNRC  
Project Manager, Prairie Island, USNRC  
Resident Inspector, Prairie Island, USNRC  
State of Minnesota

**Enclosure 1**  
**Nuclear Management Company letter L-PI-06-063**

**NRC Request for Additional Information (RAI) 1:**

**With reference to the Nuclear Management Company response to the RAI 3A dated June 7, 2006, the NRC staff would like to get clarification of degradation noted in Section 4.2.4.3.**

**In discussion of degradation in Section 4.2.4.3 of the license amendment request (LAR), the licensee makes a judgment, "Because the corrosion is obviously due to the lack of paint on the vessel wall in these areas and moisture from the containment atmosphere, no degradation below the moisture barrier below, which is inaccessible, is suspected." The staff experience with corrosion in the inaccessible areas indicates that if the moisture barrier were degraded, the inaccessible area has to be identified as "suspect area" as per IWE-1241(a). The staff requests the licensee to provide information regarding the condition of moisture barrier in this area for both Prairie Island Nuclear Generating Plant (PINGP) units. If the moisture barrier was found degraded, provide justification for not characterizing the inaccessible area(s) as "suspect area".**

**Nuclear Management Company, LLC (NMC) Response:**

**NMC administrative processes require 100% inspection of the containment moisture barrier each refueling outage. The moisture barrier is in good condition on both the inside and outside of the containment structure and tightly adheres to both the steel and concrete in all locations.**

**RAI 2:**

**In the sensitivity cases described on p. A-6 of Enclosure 2, the licensee seems to have calculated the 3b frequency for the external event contribution (e.g.,  $3.50E-8$  in Table A-5) based on  $[LERF_{ext}] \times 0.0027$ . It should be based on  $[CDF_{ext} - LERF_{ext}] \times 0.0027$ . When this correction is made, the results of the two sensitivity cases would not be much different than the baseline calculation reported in Table A-3. We plan to rely on the baseline calculation, but the sensitivity cases should be corrected or eliminated.**

**NMC Response:**

**Enclosure 2 provides a revised calculation of the external events contribution to the Class 3b frequency for the sensitivity cases. These results of these cases, which represent alternate methods of estimating the baseline conditional large early release frequency (LERF) for external events, are now applied only to the discussion of the total LERF estimate (see RAI 3 below).**

Note that pages A-1 through A-4 have not been changed. Tables A-4 and A-5 have been replaced and the supporting discussion revised on pages A-5 through A-7.

RAI 3:

**The total LERF estimate (for internal + external events) of 9.63E-7 reported on p. 2 of 7 of Enclosure 1 seems to be based on: delta LERFint + ext (i.e., 7.70E-7 in Table A-3) + LERFint + ext from pre-existing large leakage (i.e., 1.92E-7 in Table A-3). The second term is incorrect. Instead, the total LERF estimate should be based on: delta LERFint + ext (i.e., 7.70E-7) + LERFint (i.e., 5.74E-7 from p. 71 of 102 of the original LAR submittal) + LERFext. The value of the last term has not been provided in either the LAR submittal or the RAI response. It can be estimated based on the external event CDF (reported on p. A-4 of Enclosure 2) together with an appropriate conditional containment failure frequency, or "CDF to LERF split fraction". However, rather than have the NRC staff speculate on the appropriate value, the licensee should provide this estimate and its basis. The licensee should also provide a corrected total LERF estimate for internal and external events based on going from 3-per-10 to 1-per-15.**

NMC Response:

This NRC request for additional information (RAI) relates to the response to RAI Question 1 in NMC letter, "Supplement to License Amendment Request (LAR) To Technical Specification (TS) 5.5.14 For One-Time Extension of Containment Integrated Leakage Rate Test Interval, dated June 7, 2006". The NRC question and the revised response, which replaces the response to Question 1 in the NMC letter dated June 7, 2006 in its entirety, follows:

- 1. The approach used to assess the risk impact of the integrated leakage rate test interval extension considered only internal events risk. As stated in Section 2.2.4 of Regulatory Guide 1.174, the risk-acceptance guidelines (in this case, for large early release frequency (LERF)) are intended for comparison with a full-scope risk assessment, including internal and external events. Consistent with this guidance, and to the extent supportable by the available risk models for Prairie Island, provide an assessment of the impact of the requested change on delta LERF and total LERF (based on the Nuclear Energy Institute Interim Guidance Methodology) when external events are included within the assessment.***

NMC response:

External hazards were evaluated in the Prairie Island Nuclear Generating Plant (PINGP) Individual Plant Examination of External Events (IPEEE) submittal in response to the NRC IPEEE Program (Generic Letter 88-20 Supplement 4). The IPEEE Program was a one-time review of external hazard risk to identify potential plant vulnerabilities and to understand severe accident risks. Although

the external event hazards in the PINGP IPEEE were evaluated to varying levels of conservatism, the results of the PINGP IPEEE are nonetheless used in this risk assessment to provide a conservative comparison of the impact of external hazards on the conclusions of this Integrated Leakage Rate Test (ILRT) interval extension risk assessment.

The proposed ILRT interval extension impacts plant risk in a limited way. Specifically, the probability of a pre-existing containment leak being the initial containment failure mode given a core damage accident is potentially higher when the ILRT interval is extended. This impact is manifested in the plant risk profile in a similar manner for both internal events and external events.

The spectrum of external hazards has been evaluated in the PINGP IPEEE by screening methods with varying levels of conservatism. Therefore, it is not possible at this time to incorporate a realistic quantitative risk assessment of all external event hazards into the ILRT extension assessment. As a result, external events have been evaluated as a sensitivity case to show that the conclusions of the original analysis presented in the LAR dated December 13, 2005 would not be altered if external events were explicitly considered.

The quantitative consideration of external hazards is discussed in more detail in Enclosure 2 of this submittal. The evaluation presented in Enclosure 2 determined that the only significant contributions to external events risk relative to the ILRT interval extension are from internal fires and seismic events. The internal fires core damage frequency results were taken from the IPEEE evaluation. Numerical (core damage frequency) results presented in the IPEEE were for Unit 1 only, although the results and insights from the fire risk analysis were shown to also be applicable for Unit 2. Therefore, the numerical external events risk evaluation results presented here are for Unit 1 only, but are understood to approximate the results for Unit 2 as well.

As can be seen from Enclosure 2, Table A-3, if the external hazard risk results of the PINGP IPEEE are included in this assessment (that is, in addition to internal events), the total, overall change in LERF associated with the increase in ILRT interval from 3 in 10 years to 1 in 10 years (using bounding assumptions for external event impact) is estimated at  $4.49\text{E-}7/\text{yr}$ . Similarly, the total, overall change in LERF associated with the increase in ILRT interval from 3 in 10 years to 1 in 15 years (using bounding assumptions) is estimated at  $7.70\text{E-}7/\text{yr}$ , and the LERF increase associated with an ILRT interval increase from 1 in 10 years to 1 in 15 years is estimated at  $3.21\text{E-}7/\text{yr}$ .

Per Regulatory Guide (RG) 1.174, when the calculated increase in LERF due to the proposed plant change is in the range of  $1\text{E-}7$  to  $1\text{E-}6$  per reactor year (Region II, "Small Change" in risk), the risk assessment must also reasonably show that the total LERF from all hazards is less than  $1\text{E-}5/\text{yr}$ . As described above, the available external events assessments for PINGP do not include

calculations of LERF (core damage frequency (CDF) only). Therefore, two methods for developing a conservative estimate of the baseline LERF metric for external events were employed for this assessment.

The first method estimates the external events LERF from the calculated internal events LERF-to-CDF ratio. The internal events CDF and LERF metrics for the ILRT extension submittal were  $1.61\text{E-}5/\text{yr}$  and  $5.74\text{E-}7/\text{yr}$  respectively, resulting in a LERF-to-CDF ratio of 3.6%. Use of this ratio provides a baseline external events LERF of  $2.04\text{E-}6/\text{yr}$ . For the most limiting case (in which the ILRT interval is extended from 3 in 10 years to 1 in 15 years), the combined LERF result (internal events, external events, and the delta-LERF for the ILRT extension) is calculated to be  $3.36\text{E-}6/\text{yr}$ . This result meets the total LERF criterion of RG 1.174.

The second method estimates the external events LERF based on the assumption of a conservative LERF-to-CDF ratio of 10%. Use of this ratio provides a baseline external events LERF of  $5.71\text{E-}6/\text{yr}$ . For the most limiting case (in which the ILRT interval is extended from 3 in 10 years to 1 in 15 years), the combined LERF result (internal events, external events, and the delta-LERF for the ILRT extension) is calculated to be  $6.99\text{E-}6/\text{yr}$ . This result also meets the total LERF criterion of RG 1.174.

Therefore, incorporating external event hazard risk results into the ILRT interval extension analysis does not change the risk assessment conclusion of the ILRT extension LAR dated December 13, 2005, that is, increasing the PINGP ILRT interval from 3 in 10 years to either 1 in 10 years or 1 in 15 years is an acceptable plant change from a risk perspective.

**Enclosure 2**

**EXTERNAL EVENTS ASSESSMENT**

7 pages follow

## EXTERNAL EVENTS ASSESSMENT

### EFFECT OF EXTERNAL EVENTS ON RISK INFORMED/RISK IMPACT ASSESSMENT FOR EXTENDING CONTAINMENT TYPE A TEST INTERVAL

This enclosure discusses the external events assessment performed in support of the PINGP ILRT interval extension risk assessment.

External hazards were evaluated in the PINGP Individual Plant Examination of External Events (IPEEE) Submittal [A-2, A-3] in response to the NRC IPEEE Program (Generic Letter 88-20 Supplement 4). The IPEEE Program was a one-time review of external hazard risk to identify potential plant vulnerabilities and to understand severe accident risks. Although the external event hazards in the PINGP IPEEE were evaluated to varying levels of conservatism, the results of the PINGP IPEEE are nonetheless used in this risk assessment as a sensitivity study to provide a conservative comparison of the impact of external hazards on the conclusions of this ILRT interval extension risk assessment.

The proposed ILRT interval extension impacts plant risk in a limited way. Specifically, the probability of a pre-existing containment leak being the initial containment failure mode given a core damage accident is potentially higher when the ILRT interval is extended. This impact is manifested in the plant risk profile in a similar manner for both internal events and external events.

The spectrum of external hazards has been evaluated in the PINGP IPEEE by screening methods with varying levels of conservatism. Therefore, it is not possible at this time to incorporate a realistic quantitative risk assessment of all external event hazards into the ILRT extension assessment. As a result, external events have been evaluated as a sensitivity case to show that the conclusions of this analysis would not be altered if external events were explicitly considered.

#### A.1. Seismic Events

The PINGP IPEEE assessment [A-3] documented the performance and results of a focused scope Seismic Margins Assessment (SMA) following the guidance of NUREG-1407 and EPRI NP-6041. The SMA is a deterministic process which does not calculate risk on a probabilistic basis.

Although probabilistic risk information is not directly available from the Prairie Island SMA IPEEE analysis, Reference [A-1] provides a method (called the Simplified Hybrid Method) for obtaining a seismically-induced hazard estimate (in terms of CDF) based on the results of a SMA analysis. Reference [A-1] has shown that only the plant HCLPF (High Confidence Low Probability of Failure) seismic capacity is required in order to estimate the seismic CDF within a precision of approximately a factor of two. This approach, which has been used in previous NRC submittals, is as follows:

Step 1: Determine the PINGP HCLPF seismic capacity ( $C_{HCLPF}$ ) from the SMA analysis

Step 2: Estimate the 10% conditional probability of failure capacity ( $C_{10\%}$ ) from

$$C_{10\%} = F_{\beta} * C_{HCLPF}$$

$$F_{\beta} = e^{1.044\beta}$$

where 1.044 is the difference between the 10% NEP standard normal variable (-1.282) and the 1% NEP standard normal variable (-2.326).



Experience gained from previous high quality seismic PRA studies indicates the plant damage state fragility determined by rigorous convolution will tend to have  $\beta_c$  values in the range of 0.30 to 0.35 (the plant damage state  $\beta_c$  value is equal to or less than the  $\beta_c$  values for the fragilities of the individual components that dominate the seismic risk). Therefore, the Simplified Hybrid Model recommends:

$$C_{10\%} = 1.4 * C_{HCLPH}$$

Step 3: Determine the hazard exceedance frequency ( $H_{10\%}$ ) that corresponds to  $C_{10\%}$  from the hazard curves.

Step 4: Determine the seismic risk  $CDF_{SEISMIC}$  (i.e., seismic related CDF) from:

$$CDF_{SEISMIC} = 0.5 * H_{10\%}$$

Using the above steps the Simplified Hybrid Model can be applied to PINGP to estimate seismic risk in terms of CDF, as shown below:

Step 1: If the SMA analysis screens out every component on the seismic Safe Shutdown Equipment List (SSEL) defining the seismic event safe shutdown paths at the Review Level Earthquake (RLE), the plant HCLPF is equal to the RLE. Otherwise, the plant HCLPF is determined by the lowest seismic capacity component in the seismic SSEL. The results of the PINGP SMA at the 0.3g RLE concluded that [A-5] all important safety functions could be accomplished following a seismic event. All components included in the SMA that support these functions were found to have HCLPFs greater than or equal to 0.3g with the exception of the component cooling water heat exchangers. The component cooling heat exchangers had HCLPFs of 0.28g. Therefore, the plant HCLPF is (conservatively) assumed to be at least 0.28g peak ground acceleration (PGA).

Step 2: Using the relationship described above:

$$C_{10\%} = 1.4 * 0.28g \text{ PGA} = 0.39g \text{ PGA}$$

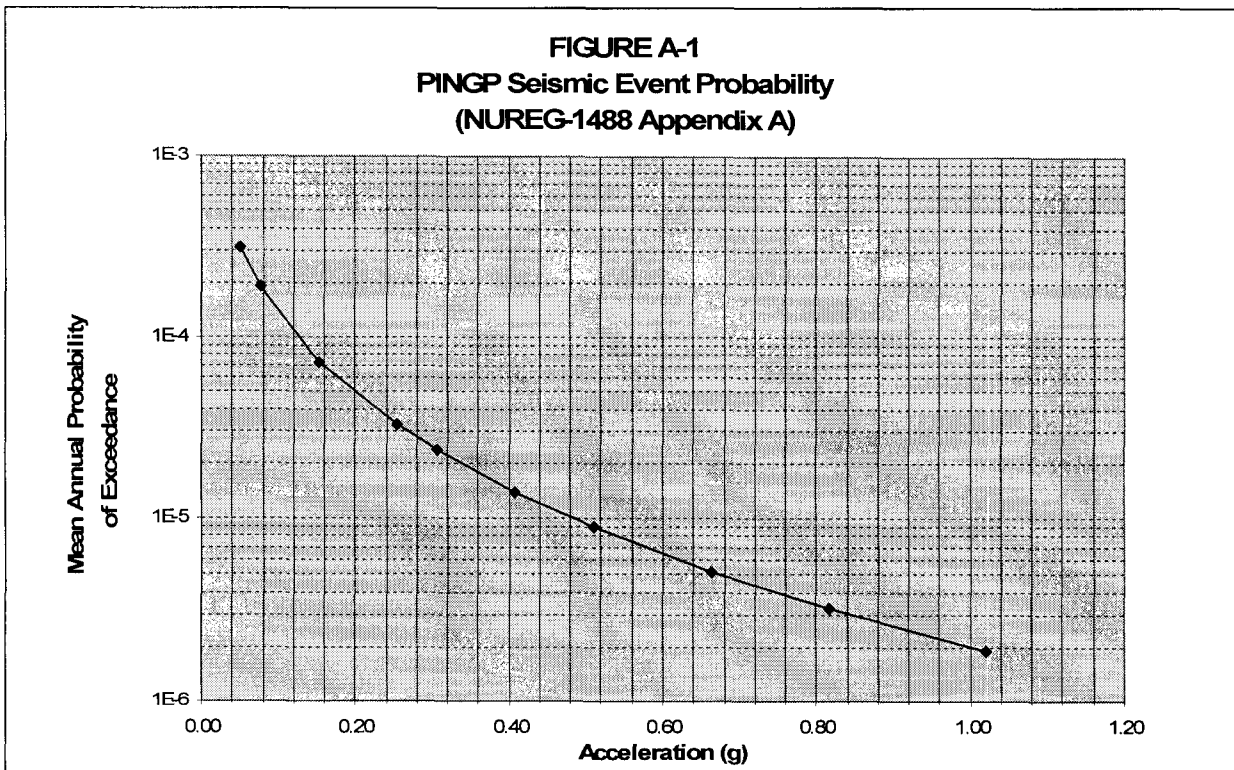
Step 3: Determine the hazard exceedance frequency ( $H_{10\%}$ ) that corresponds to  $C_{10\%}$  from the hazard curves.

The seismic hazard curve for PINGP was obtained from NUREG-1488 [A-4]. It is replicated below with the PINGP HCLPF of 0.39g PGA estimated from the available data points and added to Table A-1.

**Table A-1  
PINGP Seismic Hazard Curve (From NUREG-1488)**

Acceleration (g)	Mean Annual Exceedance Probability
0.05	3.15E-04
0.08	1.91E-04
0.15	7.27E-05
0.25	3.23E-05
0.31	2.36E-05
0.39 <sup>1</sup>	1.56E-05 <sup>1</sup>
0.41	1.39E-05
0.51	9.00E-06
0.66	5.19E-06
0.82	3.25E-06
1.02	1.91E-06

NOTE (1): The value of 1.56E-5/yr for 0.39g was obtained from interpolation of values on the NUREG-1488 seismic hazard curve (see Figure A-1 below).



Step 4: Using the recommended relationship described above:

$$CDF_{SEISMIC} = 0.5 * H_{10\%} = 0.5 * 1.56E-5/yr = 7.82E-6/yr$$

This information is used in Section A.4 of this enclosure to provide quantitative insights into the impact of external hazard risk on the conclusions of this ILRT risk assessment.

## A.2. Fire

The Prairie Island analysis of plant risk due to internal fires was updated in 1998 as part of the revised Prairie Island IPEEE assessment [A-2]. The study used an approach that combined the EPRI Fire Induced Vulnerability Evaluation (FIVE) Methodology screening approach and data with classical PRA techniques. The Fire PRA quantification of core damage frequency for the IPEEE used the Unit 1, Level 1 (internal events) PRA model (Revision 1) as the base model to which fire-related failures were applied. The results of the PINGP IPEEE showed that postulated fire events at PINGP contribute approximately 4.9E-5/yr to overall core damage risk. Fire-induced Large, Early Release Frequency (LERF) was not calculated as part of the IPEEE analysis, nor was a full Level 2 evaluation completed for the IPEEE. However, due to the significant conservatism included in the FIVE screening analysis, it is judged that the actual overall fire-induced core damage risk should be lower than that reported in the IPEEE.

The majority of the plant Appendix R Fire Areas evaluated in the IPEEE had calculated core damage frequencies less than 1.0E-6/yr. Table A-2 displays the fire areas that had calculated screening values greater than the FIVE screening criteria of 1.0E-6/yr.

**Table A-2  
IPEEE Internal Fires Results by Appendix R Fire Area**

Fire Area	Description	Fire-Induced Accident Class CDF	% of Total CDF
13	Control Room	3.22E-05	65%
32	"B" Train Hot S/D Panel & Air Comp/AFW Room	8.23E-06	17%
80	480V Safeguards Swgr Room (Bus 111)	2.24E-06	5%
20	Unit 1 4KV Safeguards Swgr. (Bus 16)	1.74E-06	4%
59	Aux Building Mezzanine Floor Unit 1	1.45E-06	3%
73	Aux Building Ground Floor Unit 2	1.28E-06	3%
18	Relay and Cable Spreading Rm., Units 1 & 2	1.08E-06	2%
69	Turbine Building Ground & Mezz Floor Unit 1	1.08E-06	2%
	Total Fire-Induced CDF:	4.93E-05	100%

Source: Reference [A-2], Table B.2.11.1

This information is used in Section A.4 of this enclosure to provide insight into the impact of external hazard risk on the conclusions of this ILRT risk assessment.

### A.3. Other External Hazards

In addition to internal fires and seismic events, the PINGP IPEEE assessment [A-3] analyzed a variety of other external hazards:

- High Winds/Tornadoes
- External Flooding
- Transportation and Nearby Industrial Facility Accidents
- Other External Hazards

The PINGP IPEEE analysis of these hazards was accomplished by reviewing the plant environs against regulatory requirements regarding these hazards. Based upon this review, it was concluded that PINGP meets the applicable Standard Review Plan requirements and therefore has an acceptably low risk with respect to these hazards. As such, these hazards were determined in the PINGP IPEEE to be negligible contributors to overall plant risk.

Accordingly, these other external event hazards are not included explicitly in this enclosure and are reasonably assumed not to impact the results or conclusions of the ILRT interval extension risk assessment.

### A.4. Impact of External Events on LERF and Comparison to RG 1.174 Acceptance Guidelines

Based on the previous discussion in Sections A.1 through A.3, the total PINGP external event initiated CDF is approximately:

$$\begin{aligned} \text{External Events CDF} &= 7.82\text{E-}6/\text{yr (seismic)} + 4.93\text{E-}5/\text{yr (internal fires)} \\ &= 5.71\text{E-}5/\text{yr.} \end{aligned}$$

For seismic risk, the Simplified Hybrid Model provides an overall estimate of seismic risk, but does not provide information as to the specific accident sequences. Also, the Fire IPEEE did not include Level 2 or LERF analyses, and classification of the results according to the EPRI accident classes cannot readily be

performed. As a conservative first approximation, the estimated values for seismic- and fire-induced CDF from Sections A.1 and A.2 above were used to calculate the Class 3b frequency. These values were not adjusted for sequences that will independently cause LERF, or will not cause LERF (factors used in other submittals to more accurately characterize the expected LERF from external events associated with the requested ILRT extension).

In order to determine the impact of external events on the proposed ILRT extension request, the impact on LERF was assessed in accordance with the NEI Interim Guidance described in Exhibit D of the LAR submittal [A-7]. The NEI Interim Guidance was used because it yields the most conservative results relative to the other two approaches used in the Exhibit D calculation.

The impact on the Class 3b frequency due to increases in the ILRT surveillance interval was calculated for external events using the relationships described in Exhibit D, Section 6.0 of the LAR submittal [A-7]. The EPRI Category 3b frequencies for the 3 per 10-year, 10-year and 15-year ILRT intervals were quantified using the total external events CDF. The change in the LERF risk measure due to extending the ILRT interval from 3 in 10 years to 1 in 10 years, or to 1 in 15 years, including both internal and external hazard risk, is provided on Table A-3.

**TABLE A-3**  
**Calculation of LERF Impact Including External Events Using NEI Interim Guidance**

	3b Frequency			LERF Increase		
	3-per-10 year ILRT	1-per-10 year ILRT	1-per-15 year ILRT	3-per-10 to 1-per-10	3-per-10 to 1-per-15	1-per-10 to 1-per-15
<b>(Bounding) External Event Contribution</b>	1.57E-07	5.23E-07	7.85E-07	3.66E-07	6.28E-07	2.62E-07
<b>Internal Event Contribution</b>	3.56E-08	1.19E-07	1.78E-07	8.31E-08	1.42E-07	5.93E-08
<b>Combined (Internal+External)</b>	1.92E-07	6.42E-07	9.63E-07	4.49E-07	7.70E-07	3.21E-07

Table A-3 shows that, under the bounding assumption that the entire external events CDF is applied to the Class 3b frequency, the total estimated increase in LERF is within the range of 1E-7/yr to 1E-6/yr for all three cases considered (Region II of the RG 1.174 LERF acceptability curve). However, this study counted the full estimated seismic CDF and full estimated fire CDF against the 3b frequency. Based on the conservative nature of this sensitivity study, it is expected that a more detailed external event study would provide a significant reduction in these results. Note that Exhibit D, Table 6-4 of the original LAR submittal [A-7] shows that the Class 3b frequency calculated for the internal events case (using the NEI Interim Guidance) represents only 1.1% of the total Internal Events CDF for the 15-year ILRT test interval.

As shown above, the majority of the external events CDF assumed in the bounding case (and therefore, the majority of the calculated LERF increase) is from the IPEEE fire analysis results. However, the IPEEE does provide insights regarding containment performance analysis for fire-induced core damage accidents ([A-2], Section B.2.12). The analysis concludes that the types of challenges to containment are similar to that evaluated in the internal events PRA. No new or unusual means of challenging the containment were identified as a part of the IPEEE. In addition, the containment systems discussion in the IPEEE containment performance analysis ([A-2], Section B.2.12.2) concludes that "(1) the majority of systems important to containment performance under severe accident conditions were considered as a part of the Level 1 analysis, and (2) the containment response to core damage following a fire event is similar to that analyzed in the internal events PRA". Therefore, internal fires are not expected to cause or result in containment breach concerns beyond those already addressed in the PINGP internal events risk model.

As discussed above, significant conservatisms exist in the risk values used in the external events calculations (for example, use of EPRI FIVE screening methodology for internal fires risk analysis,

application of the seismic fragility for the most limiting SSC to the overall plant fragility, etc.). It is expected that a more detailed external event study would significantly reduce the estimated increase in LERF from external events. However, per [A-6], when the calculated increase in LERF due to the proposed plant change is in the range of 1E-7 to 1E-6 per reactor year (Region II, "Small Change" in risk), the risk assessment must also reasonably show that the total LERF from all hazards is less than 1E-5/yr. As described above, the available external events assessments for PINGP do not include calculations of LERF (CDF only). Therefore, two methods for developing a conservative estimate of the baseline LERF metric for external events were employed for this assessment.

The first method (Case 1, see Table A-4 below) estimates the external events LERF from the calculated internal events LERF-to-CDF ratio. The internal events CDF and LERF metrics for the ILRT extension submittal were 1.61E-5/yr and 5.74E-7/yr respectively, resulting in a LERF-to-CDF ratio of 3.6%. Use of this ratio provides a baseline external events LERF of 2.04E-6/yr. For the most limiting case (in which the ILRT interval is extended from 3 in 10 years to 1 in 15 years), the combined delta-LERF result for the ILRT extension (from internal and external events) is calculated to be 7.48E-7/yr. The overall combined LERF result (from internal events, external events, and the delta-LERF for the ILRT extension) is calculated to be 3.36E-6/yr. These results meet the total LERF criterion of RG 1.174.

**TABLE A-4  
Calculation of LERF Impact Including External Events (Case 1)**

	3b Frequency			LERF Increase		
	3-per-10 year ILRT	1-per-10 year ILRT	1-per-15 year ILRT	3-per-10 to 1-per-10	3-per-10 to 1-per-15	1-per-10 to 1-per-15
<b>External Event Contribution</b>	1.51E-07	5.04E-07	7.57E-07	3.53E-07	6.05E-07	2.52E-07
<b>Internal Event Contribution</b>	3.56E-08	1.19E-07	1.78E-07	8.31E-08	1.42E-07	5.93E-08
<b>Combined (Internal+External)</b>	1.87E-07	6.23E-07	9.35E-07	4.36E-07	7.48E-07	3.12E-07

Case 1: External Events LERF contribution based on External Events CDF \* Internal Events LERF/CDF ratio (3.6%).

The second method (Case 2, see Table A-5 below) estimates the external events LERF based on the assumption of a conservative LERF-to-CDF ratio of 10%. Use of this ratio provides a baseline external events LERF of 5.71E-6/yr. For the most limiting case (in which the ILRT interval is extended from 3 in 10 years to 1 in 15 years), the combined delta-LERF result for the ILRT extension (from internal and external events) is calculated to be 7.07E-7/yr. The overall combined LERF result (from internal events, external events, and the delta-LERF for the ILRT extension) is calculated to be 6.99E-6/yr. These results also meet the total LERF criterion of RG 1.174.

**TABLE A-5  
Calculation of LERF Impact Including External Events (Case 2)**

	3b Frequency			LERF Increase		
	3-per-10 year ILRT	1-per-10 year ILRT	1-per-15 year ILRT	3-per-10 to 1-per-10	3-per-10 to 1-per-15	1-per-10 to 1-per-15
<b>External Event Contribution</b>	1.41E-07	4.71E-07	7.06E-07	3.30E-07	5.65E-07	2.35E-07
<b>Internal Event Contribution</b>	3.56E-08	1.19E-07	1.78E-07	8.31E-08	1.42E-07	5.93E-08
<b>Combined (Internal+External)</b>	1.77E-07	5.89E-07	8.84E-07	4.13E-07	7.07E-07	2.95E-07

Case 2: External Events LERF contribution based on External Events CDF \* assumed External Events LERF/CDF ratio of 10%.

Therefore, incorporating external event hazard risk results into this analysis does not change the conclusion of the ILRT Extension LAR risk assessment (i.e., increasing the PINGP ILRT interval from 3 in 10 years to either 1 in 10 years or 1 in 15 years is an acceptable plant change from a risk perspective).

#### **A.5. References**

- A-1. Reference: R. P. Kennedy, "Overview of Methods for Seismic PRA and Margin Analysis Including Recent Innovations", Proceedings of the OECD-NEA Workshop on Seismic Risk, Tokyo, Japan, August, 1999.
- A-2. Prairie Island Nuclear Generating Plant Individual Plant Examination of External Events (IPEEE), Revision 1. Northern States Power Company, NSPLMI-96001, September 1998.
- A-3. Prairie Island Nuclear Generating Plant Individual Plant Examination of External Events (IPEEE), Revision 0. Northern States Power Company, NSPLMI-96001, December 1996.
- A-4. NUREG-1488, "Revised Livermore Seismic Hazard Estimates for 69 Nuclear Plant Sites East of the Rocky Mountains," October 1993.
- A-5. Letter dated 2/28/2000, J. Sorensen, NSP to USNRC, "Response to Request for Additional Information Regarding Report NSPLMI-96001, Individual Plant Examination of External Events (IPEEE), Related to Generic Letter 88-20".
- A-6. NRC Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis".
- A-7. Letter dated 12/13/2005, T. Palmisano, NMC to USNRC, "License Amendment Request (LAR) To Technical Specification (TS) 5.5.14 For One-Time Extension Of Containment Integrated Leakage Rate Test Interval".