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Committed to Nuclear Excellence

Prairie Island Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

JUN 07 2006

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10 CFR 50.90

U S Nuclear Regulatory Commission
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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

By letter dated December 13, 2005, Nuclear Management Company (NMC) submitted the referenced 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). This letter supplements the referenced LAR to address NRC Staff requests for additional information (RAIs) on the referenced LAR. 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 description of the probabilistic risk assessment model used to respond to question 1 and the results of the evaluation.

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.

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.

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I declare under penalty of perjury that the foregoing is true and correct.
Executed on JUN 0 7 2006

Thomas J. Palmisano
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

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.**

Nuclear Management Company, LLC (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 to 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 large early release frequency (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 4.49E-7/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 7.70E-7/yr, and the LERF increase associated with an ILRT interval increase from 1 in 10 years to 1 in 15 years is estimated at 3.21E-7/yr.

Two sensitivity cases are provided to address (in part) the conservatism associated with the bounding external events LERF assumptions. These two sensitivity cases calculate more realistic (but still conservative) increases in LERF ranging from 1.44E-7/yr to 1.65E-7/yr for the interval increase to 1 per 10 years, and from 2.48E-7/yr to 2.83E-7/yr for the interval increase to 1 per 15 years (see Enclosure 2, Tables A-4 and A-5). All of these calculated increases are in the range of 1E-7/yr to 1E-6/yr, which is in Region II of the Regulatory Guide (RG) 1.174 LERF acceptability curve. Note that, due to the conservative nature of the sensitivity studies and of the underlying external events risk assessments, it is expected that a more detailed external event study would reduce the estimated increase in LERF from external events to less than 1E-07/yr.

Per RG 1.174, 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. This condition is met by a large margin, as shown by the Class 3b Combined (Internal and External) LERF results in Tables A-3 through A-5 of Enclosure 2. 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 results range from 9.63E-7/yr (in the most conservative calculation) to 3.10E-7/yr. These results meet 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.

2. For the examination of seals and gaskets, and examination and testing of bolts associated with the primary containment pressure boundary (Examination Categories E-D, and E-G), you had requested relief from the requirements of the Code (Section 4.2.4.3 of Exhibit A of the Reference). As an alternative, you plan to examine them during the leak rate testing of the primary containment. With the flexibility provided in Option B of Appendix J for Type B and Type C testing (as per NEI 94-01 and RG 1.163), and the extension requested in this amendment for the Type A testing interval, please provide an examination schedule for examination and testing of seals, gaskets, and bolts (pressure seating and pressure unseating penetrations) that provides periodic assurance regarding the integrity of the containment pressure boundary.

NMC response:

Tables 1 and 2 provide for PINGP Units 1 and 2, respectively, the current frequency and schedule for the next local leakage rate test (LLRT) for each containment penetration containing seals, gaskets or bolts. The tables also provide when a visual inspection of the bolted joints was or will be completed for each containment penetration that includes seals, gaskets or bolts associated with the primary containment pressure boundary. The current interval for the IWE program will end September 9, 2008. At that time the IWE program will be updated to the latest approved Edition and Addenda of ASME Section XI, 12 months prior to the end of the interval as specified in 10 CFR 50.55a.

Table 1
Unit 1 Penetrations with Seals, Gaskets or Bolts
Testing and Inspection Schedule

Penetration	Description	LLRT Frequency	LLRT Scheduled	VT-1 Scheduled
18	Fuel Transfer Tube	Each refueling outage	January 2008	1999
19	Station Air	Each refueling outage	January 2008	2008
25A	Containment Purge Exhaust	120 months	November 2014	2006
25B	Containment Purge Supply	120 months	November 2014	2006
27B	Fire Protection Supply	Each refueling outage	January 2008	2008
27C-1	Containment Pressure to ILRT Test Panel	Each refueling outage	May 2006	2008
27C-2	Containment Pressure to ILRT Test Panel	Each refueling outage	May 2006	2008

Penetration	Description	LLRT Frequency	LLRT Scheduled	VT-1 Scheduled
34A	Electrical Penetrations (Grouping)	120 months	December 2012	No bolting
34B	Electrical Penetrations (Grouping)	120 months	December 2012	2006
34C	Electrical Penetrations (Grouping)	120 months	December 2012	2006
34D	Electrical Penetrations (Grouping)	120 months	December 2012	2006
34E	Electrical Penetrations (Grouping)	120 months	December 2012	2006
34F	Electrical Penetrations (Grouping)	120 months	December 2012	No bolting
42B	Containment Inservice Purge Supply	Each refueling outage	January 2008	2002
42C	Steam Heating	120 months	December 2012	2008
42F-1	Steam Heating Condensate Return	Each refueling outage	January 2008	2001
42F-2	Steam Heating Condensate Return	Each refueling outage	January 2008	2001
43A	Containment In-Service Purge Exhaust	Each refueling outage	January 2008	2002
44	Containment Vessel Pressurization	Each refueling outage	January 2008	1999
49B	Demineralized Water	Each refueling outage	January 2008	2008
EH	Equipment Hatch	Each refueling outage	January 2008	1999
MAL	Maintenance Airlock	Each refueling outage	January 2008	2001
PAL	Personnel Airlock	Each refueling outage	January 2008	2002

Table 2
Unit 2 Penetrations with Seals, Gaskets or Bolts
Testing and Inspection Schedule

Penetration	Description	LLRT Frequency	LLRT Scheduled	VT-1 Scheduled
18	Fuel Transfer Tube	Each refueling outage	November 2006	2000
19	Station Air	Each refueling outage	November 2006	2006
25A	Containment Purge Exhaust	120 months	April 2015	2006
25B	Containment Purge Supply	120 months	April 2015	2006
27C-1	Containment Pressure to ILRT Test Panel	Each refueling outage	November 2006	2006
27C-2	Containment Pressure to ILRT Test Panel	Each refueling outage	November 2006	2006
34A	Electrical Penetrations (Group)	120 months	November 2006	No bolting
34B	Electrical Penetrations (Group)	120 months	November 2006	2000
34C	Electrical Penetrations (Group)	120 months	November 2006	2000
34D	Electrical Penetrations (Group)	120 months	November 2006	2000
34E	Electrical Penetrations (Group)	120 months	November 2006	2000
34F	Electrical Penetrations (Group)	120 months	November 2006	No bolting
42E-1	Steam Heating Condensate Return	Each refueling outage	November 2006	2000
42E-2	Steam Heating Condensate Return	Each refueling outage	November 2006	2000
44	Containment Vessel Pressurization	Each refueling outage	November 2006	2006
51	Fire Protection	Each refueling outage	November 2006	2006

Penetration	Description	LLRT Frequency	LLRT Scheduled	VT-1 Scheduled
52	Containment Inservice Purge Exhaust	Each refueling outage	November 2006	2003
53	Containment Inservice Purge Supply	Each refueling outage	November 2006	2003
54	Steam Heating Supply	120 months	November 2006	2002
55	Demineralized Water	Each refueling outage	November 2006	2006
EH	Equipment Hatch	Each refueling outage	November 2006	2002
MAL	Maintenance Airlock	Each refueling outage	November 2006	2000
PAL	Personnel Airlock	Each refueling outage	November 2006	2002

3. **Based on the review of Section 4.2.3.2 of Exhibit A of the Reference, the staff understands that you are using the 1992 Edition and the 1992 Addenda of Subsections IWE of the ASME Section XI Code for the examination of containment steel shell. Section 4.2.3.6 indicates that you perform VT-1 examinations for areas accessible from both sides, and perform ultrasonic thickness measurements for surface areas accessible from only one side. Please provide the locations of the containment surfaces where you have identified measurable degradation (other than coating irregularities), and a summary of findings of the examinations performed.**

NMC response:

Degradation of the liner has been identified at PINGP. The areas of concern where measurable degradation was found were discussed in Exhibit A of the LAR dated December 13, 2005. Section 4.2.4.2 identified an area where measurable degradation has been observed (other than coating irregularities), provided a summary of examination findings and stated the status of any subsequent examinations. Sections 4.2.4.3 and 4.2.4.4 identified areas where surface degradation has been observed but was not measurable.

4. **Section 4.2.3.3 of Exhibit A of the Reference indicates a number of areas exempt from the ISI examinations. Inspections of some steel containments have indicated degradation from the uninspectable (embedded) side of the primary containments. These degradations cannot be found by VT-3 or VT-1 examinations unless they are through the thickness of the shell. For the**

ellipsoidal bottom of the containment, it is not feasible to examine any part of it. Please provide information as to how potential leakages due to aging-related degradation of the primary containment areas, exempted from the ISI examinations, are factored into the risk assessment related to the ILRT interval extension.

NMC response:

Exhibit D of the LAR dated December 13, 2005, Section 5.1, first paragraph of "Class 3 Sequences" discussion on page 32 of 102 discusses how potential leakages due to aging-related degradation of the primary containment areas, exempted from the ISI examinations, are factored into the risk assessment related to the ILRT interval extension. The baseline frequency for Class 3b sequences (pre-existing leakage in the containment structure) was increased by the factor of 1.000269 (0.0269% increase for the 3 to 15 year extension as calculated in Appendix A to Exhibit D). However, the number was incorrectly stated as 1.00269 instead of 1.000269. The number is correctly listed elsewhere in the document (for example, page 40 of 102). Tables 5-2 and 5-4 show the EPRI Class 3b frequency without the corrosion factor included.

The actual application of the corrosion factor to Class 3b is presented in Section 5.3, where the process is reiterated with a little more detail under the "Risk Impact of Corrosion-Related Leakage on Increase to 15-year Test Interval" discussion (page 40 of 102). Here the discussion states incorrectly that the corrosion factor was applied to the Class 7 sequences when in reality, it was applied to Class 3b sequences. Table 5-5 shows the Class 3b accident class frequencies after they are increased by the correct corrosion factor (factor of 1.000269) and the 10-year interval extension failure to detect probability (factor of 1.1).

The incorrect statement that the factor was applied to the Class 7 sequences reappears on page 66 of 102, where the application of the NEI Methodology is discussed. The factors and tables are correct; the text should have stated "Class 3b" instead of "Class 7".

To summarize, Exhibit D of the LAR dated December 13, 2005 is corrected as follows:

- Page 32 of 102: The corrosion factor value listed should have been 1.000269 instead of 1.00269;
- Page 40 of 102: "Risk Impact of Corrosion-Related Leakage on Increase to 15-year Test Interval" first paragraph, second to last sentence should be changed to read, "The increased likelihood of corrosion related leakage is assumed to increase LERF frequency contributions from containment structure pre-existing leakage (EPRI Class 3b) ..."; and
- Page 66 of 102: Second paragraph reference to "Class 7" should have been to "Class 3b".

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:

<u>Step 1:</u> Determine the PINGP HCLPF seismic capacity (C_{HCLPH}) from the SMA analysis

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

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

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

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 β_c values in the range of 0.30 to 0.35 (the plant damage state β_c value is equal to or less than the β_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:

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

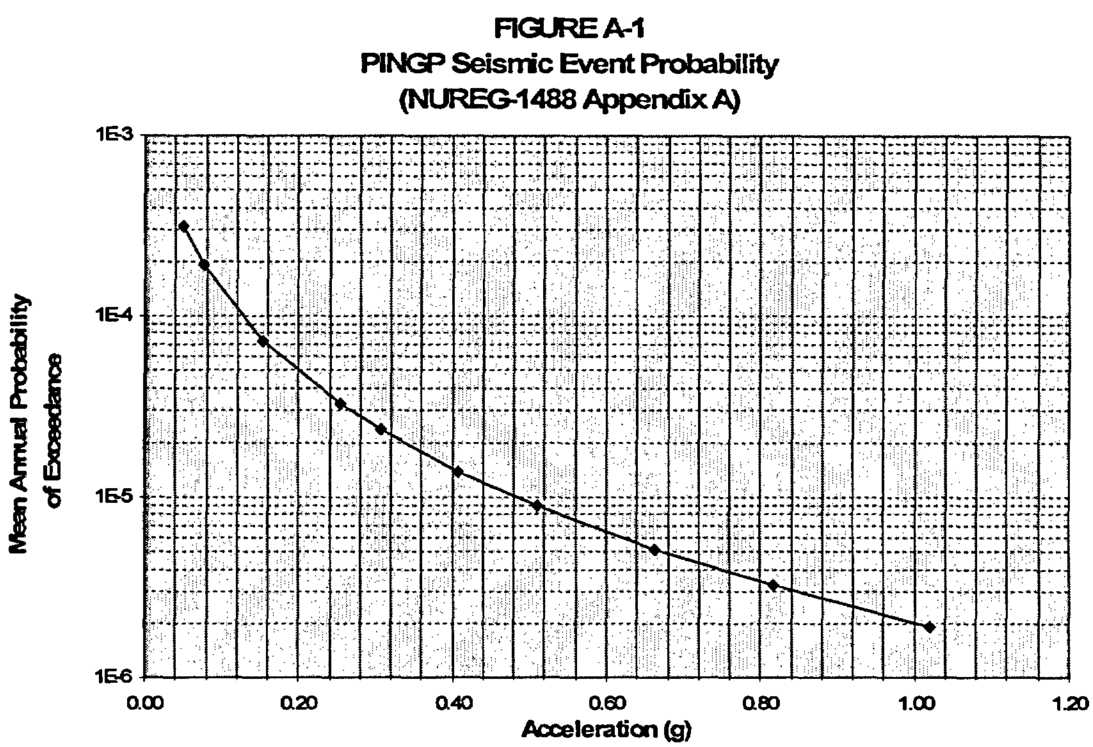
Step 3: Determine the hazard exceedance frequency ($H_{10\%}$) that corresponds to $C_{10\%}$ from the hazard curves.

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[1]	1.56E-05[1]
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:

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

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:

External Events CDF = 7.82E-6/yr (seismic) + 4.93E-5/yr (internal fires)
= 5.71E-5/yr.

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
(Bounding) External Event Contribution	1.57E-07	5.23E-07	7.85E-07	3.66E-07	6.28E-07	2.62E-07
Internal Event Contribution	3.56E-08	1.19E-07	1.78E-07	8.31E-08	1.42E-07	5.93E-08
Combined (Internal+External)	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-07/yr to 1E-06/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.

To provide a closer (but still conservative) estimate of the actual LERF increase from external events for the ILRT interval extension request, two additional sensitivity cases were performed. In the first case

(Case 1), the LERF contribution from internal fires is estimated by applying the CDF-to-LERF split fraction from the internal events results to the internal fires CDF. In the second, more conservative case (Case 2), the internal fires LERF contribution is assumed to be 10% of the internal fires CDF. Note that in both cases, no attempt to partition the seismic event CDF (to obtain a closer estimate of the seismic event LERF) has been included.

Tables A-4 and A-5 below provide the results of the LERF increase calculations using the two alternate methods of determining the LERF from external events.

TABLE A-4
Calculation of LERF Impact Including External Events (Sensitivity 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
External Event Contribution	2.63E-08	8.77E-08	1.32E-07	6.14E-08	1.05E-07	4.39E-08
Internal Event Contribution	3.56E-08	1.19E-07	1.78E-07	8.31E-08	1.42E-07	5.93E-08
Combined (Internal+External)	6.19E-08	2.06E-07	3.10E-07	1.44E-07	2.48E-07	1.03E-07

Case 1: Internal Fires LERF contribution based on Internal Events CDF/LERF split fraction (seismic LERF = seismic CDF).

TABLE A-5
Calculation of LERF Impact Including External Events (Sensitivity 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
External Event Contribution	3.50E-08	1.17E-07	1.75E-07	8.17E-08	1.40E-07	5.84E-08
Internal Event Contribution	3.56E-08	1.19E-07	1.78E-07	8.31E-08	1.42E-07	5.93E-08
Combined (Internal+External)	7.06E-08	2.35E-07	3.53E-07	1.65E-07	2.83E-07	1.18E-07

Case 2: Internal Fires LERF contribution based on 10% of Internal Fires CDF (seismic LERF = seismic CDF).

Note that in both sensitivity cases, the LERF increase results slightly exceed the NRC Regulatory Guide 1.174 [A-6] acceptance guidelines for Region III (very small changes in risk). 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 entire seismic event CDF to the Class 3b frequency, etc.). Therefore, it is expected that a more detailed external event study would reduce the estimated increase in LERF from external events to less than 1E-07/yr. 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. This condition is met by a large margin, as shown by the Class 3b Combined LERF results in Tables A-3, A-4 and A-5 above.

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".