

## Prairie Island SF SIPEm Resource

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**From:** Ruffin, Steve  
**Sent:** Tuesday, January 29, 2013 10:33 AM  
**To:** Zelenak, Brian R  
**Cc:** Sampson, Michele  
**Subject:** Pre-issuance notification of the RAls (teleconference requested)  
**Attachments:** Prairie ISLAND RAl.pdf

Brian,

Consistent with NRC SFST office instructions and in order to ensure an effective and efficient review, I am notifying you in advance of our request for additional information to support the staff's review. The questions are attached to this email as part of the pre-notification review.

The purpose of this pre-notification conference call is to identify an agreed upon response date.

I can be reached at the phone number listed below.

*Regards,*

*Steve Ruffin*  
Project Manager, Licensing Branch  
Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Mail Stop EBB-3D-02M  
Phone: (301) 492-3219  
Fax: (301) 492-3342  
[steve.ruffin@nrc.gov](mailto:steve.ruffin@nrc.gov)

**Hearing Identifier:** Prairie\_Island\_ISFSI\_Public  
**Email Number:** 44

**Mail Envelope Properties** (Steve.Ruffin@nrc.gov20130129103300)

**Subject:** Pre-issuance notification of the RAIs (teleconference requested)  
**Sent Date:** 1/29/2013 10:33:26 AM  
**Received Date:** 1/29/2013 10:33:00 AM  
**From:** Ruffin, Steve

**Created By:** Steve.Ruffin@nrc.gov

**Recipients:**

"Sampson, Michele" <Michele.Sampson@nrc.gov>  
Tracking Status: None  
"Zelenak, Brian R" <brian.r.zelenak@xcelenergy.com>  
Tracking Status: None

**Post Office:**

Files	Size	Date & Time
MESSAGE	795	1/29/2013 10:33:00 AM
Prairie ISLAND RAI.pdf		104258

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

**REQUEST FOR ADDITIONAL INFORMATION ON  
THE LICENSE RENEWAL APPLICATION FOR  
THE PRAIRIE ISLAND NUCLEAR GENERATING  
PLANT INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION**

**PRAIRIE ISLAND NUCLEAR GENERATING PLANT**

**DOCKET NO. 72-10  
TAC NO. L24592**

<b>OFC:</b>	SFST	SFST	SFST	SFST	SFST	SFST
<b>NAME:</b>	NJordon	MGordon	JBorowsky	NDay	EGoldfiez	ZLi
<b>DATE:</b>	1/10 /2013	1/11 /2013	1/ 10/2013	1/9 /2013	1/10 /2013	1/ 12 /13
<b>OFC:</b>	SFST	SFST	SFST	SFST	SFST	OGC/NLO
<b>NAME:</b>	WWheatley	C Araguas	DPstrak	MRahimi	MSampson	CHair
<b>DATE:</b>	1/14/2013	1/17/2013	1/16/2013	1/17 /2013	1/18/2013	1/24 /2013

<b>ACRONYMS</b>	
AMP	Aging Management Program
CAP	Corrective Action Program
DOE	U.S. Department of Energy
HBU	high burnup
ISFSI	Independent Spent Fuel Storage Installation
NRC	U.S. Nuclear Regulatory Commission
NSPM	Northern States Power Company, a Minnesota corporation, d/b/a Xcel Energy
RAI	Request for Additional Information
SAR	Safety Analysis Report
SSC	Structures, Systems, and Components

## INTRODUCTION

By letter dated October 20, 2011, as supplemented on February 29, 2012, Northern States Power Company, a Minnesota corporation, d/b/a Xcel Energy (hereafter “NSPM”) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of the Prairie Island Nuclear Generating Plant Independent Spent Fuel Storage Installation (ISFSI) license, Special Nuclear Material License No SNM-2506 which expires on October 31, 2013.

In the application, NSPM requested to extend the license for an additional 40 years. The NRC staff performed an acceptance review of the application to determine if the application contained sufficient technical information in scope and depth to allow the staff to complete the detailed technical review. On March 30, 2012, NRC notified NSPM that the application contained sufficient information needed for the NRC staff to conduct a detailed technical review. The NRC staff has completed its initial review of the application and has determined that additional information is required to assess compliance with 10 CFR Part 72.

This request for additional information (RAI) identifies additional information the NRC staff needs in connection with its review of this application. The requested information is listed by chapter number and title in the license renewal application. The staff followed the guidance provided in NUREG-1927, Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance—Final Report, in its review of the application.

Each section (e.g., chapter, appendix, etc.) describes information the staff needs to complete its review of the application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

## Chapter 2: Scoping Evaluations

- 2-1 Justify why the Earthen Berm is not classified as a structure important to safety in determining if structures, systems, and components (SSCs) are within the scope of the license renewal.

In the Prairie Island ISFSI license renewal application (NSPM, 2011a), Section 2.4, Table 2.4-1, the Earthen Berm was selected as an in-scope SSC based upon Criterion 2. This selection criterion, as specified in Table 2.4-1, indicates the SSC is classified as not important to safety (or Non-Safety Related). But, according to the licensing basis, its failure could prevent fulfillment of a function that is important to safety, i.e., the radiation protection function of the ISFSI. In Table 2.4-4 of the license renewal application, the intended function of the Earthen Berm is specified as providing radiation shielding. Further, Section A7A.7 of the Prairie Island ISFSI Safety Analysis Report (SAR) (NSPM, 2011b), indicates that credit was taken for the ISFSI Earthen Berm for the offsite dose rate calculations. The applicant needs to provide justification why the Earthen Berm is not classified as important to safety in the determination of SSCs within the scope of the license renewal. If the Earthen Berm is to be considered important to safety (or Safety Related) provide a detailed description for any relevant changes to the aging management program consistent with the Earthen Berm being classified under Criterion 1.

This information is required to evaluate compliance with 10 CFR 72.122(b)(2)(i)(B) and (f).

Enclosure

## Chapter 3: Aging Management Reviews

- 3-1 Clarify how the Aging Management Program (AMP) will address the potential for freeze-thaw damage to subsurface concrete.

A typical slab control joint is shown in Figure 4.2-1 of the Prairie Island ISFSI SAR (NSPM, 2011b). Freeze-thaw is identified as an aging mechanism for the concrete pad in Table 3.4.1 of the Prairie Island ISFSI renewal application (NSPM, 2011a). Freeze-thaw can affect the non-accessible areas of concrete and prevent the concrete pad from fulfilling its functions which are important to safety. The staff requests the applicant to clarify how the AMP will address the potential for freeze-thaw damage to the subsurface of the concrete pad and consider the critical characteristics of the sealants used between the concrete joints.

This information is needed to determine compliance with 10 CFR 72.122(b)(1) and 72.122(f).

- 3-2 Provide justification for the acceptability of the storage of high burnup (HBU) fuel by providing analyses and an aging management program to demonstrate that HBU fuel is protected against possible degradation that may lead to gross ruptures for storage periods beyond 20 years and potential operation safety issues during removal from storage.

The requirements in 10 CFR 72.122(h) state that the spent fuel cladding must be protected during storage against degradation that leads to gross ruptures or the fuel must be otherwise confined such that degradation of the fuel during storage will not pose operational safety problems with respect to removal from storage. The analyses should address reasonable and known physical or degradation phenomena associated with storage periods from 20 to 60 years, such as embrittlement of cladding from the ductile to brittle transition from hydride reorientation in the radial direction in HBU fuel.

The aging management program should define specific confirmatory inspection or monitoring of storage, HBU fuel to address conflicting information, uncertainties, or indications of the presence of a specific potential aging effect of the fuel. The program may specify inspection and monitoring of HBU fuel within the cask system after 20 years of storage and at periodic intervals (e.g. every 10-20 years) during the renewal period; and may define an alternative, optional program to periodically review and use surrogate confirmatory information from other confirmation programs in the U.S. with similar type of HBU fuel. The applicant may also consider proposing licensing conditions to limit the scope or storage time of HBU fuel during the renewal period to address uncertainties and lack of confirmatory data.

This information is needed to evaluate compliance with 10 CFR 72.122(h).

## **Appendix A: Aging Management Program**

- A-1 Provide radiation survey data that are to be used in performing activities (3), (4), and (5) of an AMP as defined in NUREG-1927, Section 3.6.

Justify why these data are appropriate and adequate to serve this purpose, i.e., AMP item (3): Parameters monitored or inspected.

Justify why these data can be used to detect degradation of the cask and/or fuel in the cask, i.e., AMP item (4): Detection of aging effects.

Provide trending analysis to demonstrate that the proposed approach is capable of detecting the degradation of the cask and/or fuel degradation, i.e., AMP item (5): Monitoring and Trending.

The historic data and trending analyses of these data should include the mean, variance, number of samples and control values, and the significance of these results of the trending.

Provide a detailed description of and justification for the effectiveness of the aging management program activities performed to verify the shielding performance of the polymeric neutron shielding materials and how the activities contribute to the detection of polymeric shielding degradation in the period of extended operation.

As stated in the Prairie Island ISFSI renewal application (NSPM, 2011a), Section A2.3, radiation surveys are used to verify that radiation levels remain within the specified limits and that the shielding materials in the in-service casks are intact and are effectively performing their intended function. In Section A2.10, it is indicated that periodic radiation surveys of the in-service casks are performed and trending of survey results for these casks are presented in Figures A2.10-1 and A2.10-2 for gamma and neutron dose. The applicant also needs to demonstrate which activities are used to detect degradation of the polymeric shielding. For example, this may include a description of the radiation survey detection equipment used, type of radiation measured, and the frequency of survey measurements along with how the results of the surveys are used to detect degradation of the neutron shield of the casks and to distinguish between degradation of the fuel versus the cask.

This information is needed to evaluate compliance with 10 CFR 72.122(b),(f) and 72.128(a).

- A-2 Provide the inspection results of the three Corrective Action Program (CAP) reports (CAP 01291889, CAP 01290943, and CAP 01289682) mentioned in the ISFSI License Renewal Baseline Inspection Report, ILR-INSPECTION-01, Rev. 0. (NSPM, 2011c). Provide additional information regarding the root cause evaluation of the observed corrosion on the lead cask and how the conclusion of no measureable loss of material on the base metal of Cask 01 was determined. Justify why this condition will not lead to accelerated component degradation during the license renewal period and whether the frequency of visual inspections of inaccessible areas of the in-service casks is adequate to ensure timely detection of aging effects. Provide an analysis for the expected loss of material from the cask exterior based on the inspection results from the lead cask.



In the ISFSI License Renewal Baseline Inspection Report, the applicant stated that the inspection results are documented in the CAPs. The Baseline Inspection Report also stated that some corrosion and corrosion product stains were observed on the base metal of Cask 01 and the base metal did not have measureable loss of material. However, the applicant did not provide the CAPs and detailed discussions of its lead cask inspection operating experience. In Section A2.1.2, the applicant stated that the scope of the ISFSI Inspection and Monitoring Activities Program includes visual inspections of an in-service cask bottom and under an in-service cask protective cover prior to the end of the current license period. Per NUREG-1927, Section 3.6.1 (NRC, 2011), detection of aging effects should occur before there is a loss of any structure and component intended function. The basis for the inspection frequency should be established to ensure timely detection of aging effects.

This information is required to evaluate compliance with 10 CFR 72.120(d) and 10 CFR 72.172.

- A-3 Provide the chemistry testing results (e.g., pH, chlorides, and sulfur) for the soil or groundwater environment to which the inaccessible (buried) areas of the concrete pads are exposed and justification for why the concrete won't degrade in this environment.

NUREG-1801, Rev. 2 (NRC, 2010b), indicates that the aging effects of cracking, loss of bond, and loss of material could occur for concrete structures exposed to a soil or groundwater environment due to corrosion of the embedded steel rebar. Documentation and monitoring of soil or groundwater chemistry could provide indication of the presence of unfavorable conditions for degradation of concrete pads. However, no information about the chemistry of soil or groundwater environment to which the inaccessible areas of the concrete pads are exposed is provided. The applicant needs to provide the chemistry testing results (e.g., pH, chlorides, and sulfur) for the soil or groundwater environment to which the inaccessible (buried) areas of the concrete pads are exposed and justification for why the concrete won't degrade in this environment.

This information is required to evaluate compliance with 10 CFR 72.120(b)(1).

- A-4 Address the potential for the buildup of flammable gases due to radiation degradation of neutron absorbing material in enclosed spaces of the dry cask system.

Radiation degradation of polymer materials releases hydrogen or low-molecular weight hydrocarbons, which may reach flammable concentrations over extended periods of time.

This information is required to evaluate compliance with 10 CFR 72.120(d).

## General Issues

- GI-1 Confirm that the service life of the TN-40 and TN-40HT storage systems can be extended beyond 20 to 25 years. Calculations used throughout the SAR should be updated to reflect the license renewal period.

There are instances throughout the SAR that reference a 20 to 25 year performance period, e.g., “25 year storage periods” [Section A8.2.9.2], “25 year life of the cask” [Section A7A.8.4], “designed to provide storage of spent fuel for at least 25 years” [Section 3.3.1, A7A.8.5], “the 25 year storage period” [Section A3.3.2.1, Section 3.3.2-1], “25 year storage” [Section A3.4], “after 20 years” [Section 3.3.2.1], etc. The renewal application should explicitly demonstrate that those instances in the SAR (calculations, etc.) that refer to a 20 year or 25 year performance period have been updated to reflect the license renewal period.

This information is required to evaluate compliance with 10 CFR 72.120(a).

## REFERENCES

NRC. NUREG–1927, “Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance.” Final Report. Washington, DC: U.S. Nuclear Regulatory Commission. March 2011.

NRC. “Amendment 7 to Materials License No. SNM–2506 for the Prairie Island Independent Spent Fuel Storage Installation.” ML101590798. Washington, DC: U.S. Nuclear Regulatory Commission. August 20, 2010a.

NRC. NUREG–1567, “Standard Review Plan for Spent Fuel Dry Storage Facilities.” Final Report. Washington, DC: U.S. Nuclear Regulatory Commission. March 2000.

NRC. NUREG—1801, “Generic Aging Lessons Learned (GALL) Report—Final Report.” Rev. 2. Washington, DC: U.S. Nuclear Regulatory Commission. December 2010b.

NSPM. “Responses to Requests for Supplemental Information—Prairie Island Independent Spent Fuel Storage Installation (ISFSI) License Renewal Application (TAC No. L24595).” Materials License No. SNM–2506. Docket No. 72-10. Welch, Minnesota: Northern States Power Company. February 29, 2012a.

NSPM. “Prairie Island Independent Spent Fuel Storage Installation, Responses to Observations, License Renewal Application.” Materials License No. SNM–2506. Docket No. 72-10. Welch, Minnesota: Northern States Power Company. April 26, 2012b.

NSPM. “Prairie Island Independent Spent Fuel Storage Installation Application for Renewed ISFSI Site-Specific License.” Materials License No. SNM–2506. Docket No. 72-10. Welch, Minnesota: Northern States Power Company. October 20, 2011a.

NSPM. “Prairie Island Independent Spent Fuel Storage Installation Safety Analysis Report.” Rev. 14. Materials License No. SNM–2506. Docket No. 72-10. Welch, Minnesota: Northern States Power Company. September 2011b.

NSPM. “ISFSI License Renewal Baseline Inspection Report,” ILR-INSPECTION-01, Rev. 0. Welch, Minnesota: Northern States Power Company. July 2011c.

NSPM. “Prairie Island Independent Spent Fuel Storage Installation Technical Specifications and Safety Analysis Report.” Rev. A 8/90. ML060720170. Welch, Minnesota: Northern States Power Company. October 16, 1990.