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ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Prairie Island Nuclear Generating Plant, Units 1 and 2
Docket Nos. 50-282 and 50-306
Renewed Facility Operating License Nos. DPR-42 and DPR-60

Response to Request for Additional Information Regarding License Amendment Request to Revise Emergency Plan Staff Augmentation Response Times (CAC Nos. MF9345 and MF9346)

References:

1) Letter from NSPM to the NRC, "Prairie Island Nuclear Generating Plant, Units 1 and 2 License Amendment Request: Revision to Emergency Plan Staff Augmentation Response Times," dated February 23, 2017. (ADAMS Accession Number ML17055C359)

2) Email from the NRC to NSPM, "Request for Additional Information for Prairie Island Nuclear Generating Plant License Amendment Request dated February 23, 2017 RE: Emergency Response Organization," dated August 7, 2017. (ADAMS Accession Number ML17219A076)

Pursuant to 10 CFR 50.90, Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), requested in Reference 1 an amendment to the Prairie Island Nuclear Generating Plant (PINGP) Renewed Operating Licenses. The proposed change would revise the PINGP Emergency Plan (E-Plan) to extend staff augmentation times for Emergency Response Organization (ERO) response functions. In Reference 2, the NRC provided NSPM with Requests for Additional Information (RAIs) pertaining to information needed to support the staff's review of NSPM's application in Reference 1. The enclosure to this letter provides NSPM's response to the NRC RAIs.

The supplemental information provided herein does not change the conclusions of the No Significant Hazards Consideration and the Environmental Consideration evaluations provided in Reference 1.

If there are any questions or if additional information is needed, please contact Mr. Peter Gohdes at (612) 330-6503 or Peter.Gohdes@xenuclear.com.

Summary of Commitments

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

I declare under penalty of perjury, that the foregoing is true and correct.
Executed on ~~September~~ 20, 2017.

Scott Northard
Site Vice President, Prairie Island Nuclear Generating Plant
Northern States Power Company – Minnesota

Enclosure

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

Response to Request for Additional Information:

**License Amendment Request to Revise
Emergency Plan Staff Augmentation Response Times**

On February 23, 2017, Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), submitted an amendment to the Prairie Island Nuclear Generating Plant (PINGP) Renewed Operating Licenses (Reference 1). The proposed change would revise the PINGP Emergency Plan (E-Plan) to extend staff augmentation times for Emergency Response Organization (ERO) response functions. By email dated August 7, 2017, the NRC requested the following additional information (Reference 2). The responses to this request for additional information (RAI) are provided below.

PINGP RAI-1

LAR Enclosure 1, Section 3.1.2.2, "Current on-shift dose assessment," states, in part (on page 12 of 43):

> RASCAL software was updated in 2014 to include the Unified RASCAL Interface (URI). The URI application is available on ERF [emergency response facility] dose assessment computers.

Clarify which ERFs have dose assessment computers, consistent with ERO responsibilities for performing dose assessment described in the PINGP Emergency Plan.

NSPM Response

The URI application is available in ERFs supporting the dose assessment function. These include:

- Control Room
- Technical Support Center (TSC)
- Emergency Operations Facility (EOF)
- Back-up Emergency Operations Facility (BEOF)

The Radiological Emergency Coordinator, Radiological Protection Support Supervisor, and Dose Projection Specialist operating in the Control Room, TSC, EOF or BEOF have access to computer workstations which have the URI dose-assessment software.

PINGP RAI-2

LAR Enclosure 1, Section 3.2.2, "Emergency Direction and Control," states (on page 18 of 43):

> This change is acceptable in that it identifies minimum staffing positions in the TSC and OSC which enable transfer of the command and control functions (Classification, Notification, Protective Actions and Emergency Exposure

> Authorization) in advance of the 60-minute activation requirement. Additionally, identification of minimum staffing positions in the EOF allows for the transfer of the Notification and Protective Action functions to the EOF in advance of the 90-minute activation requirement.

LAR Enclosure 1, Attachment 1, Section 5.3.1, "Direction and Coordination," states, in part (on page 21 of 162):

> Upon activation of the EOF, responsibility for ***offsite functions of notification and protective action recommendations*** transfer from the TSC to the EOF Emergency Manager (EM). [Emphasis added]

However, the table provided in Section 5.3.1 only illustrates responsibility for classification being transferred from the Control Room (On-Shift/Emergency Director) to the TSC Emergency Director.

In addition, LAR Enclosure 1, Attachment 1, Section 5.4.1, "EOF Direction and Control," states, in part (on page 41 of 162):

> The Emergency Manager relieves the Emergency Director of the following responsibilities:
>
> B. ***Authorization of emergency classification*** changes. The Emergency Director retains the primary responsibility for re-classifications and makes recommendations to the Emergency Manager who has the responsibility to review and authorize the new classification. [Emphasis added]

Clarify inconsistencies in regards to which ERO position has the responsibility for performing emergency classifications for the duration of an event, based on the activation of the TSC and EOF.

NSPM Response

Section 5.4.1 has been revised to clarify the classification function remains in the TSC, once activated, throughout a classified event as was originally noted in Section 5.3.1. The updated pages are provided as part of this RAI response (Attachment 1 of this Enclosure).

PINGP RAI-3

LAR Enclosure 1, Section 3.2.5, "Plant Stem [*sic*] Engineering, Repair and Corrective Actions Function" (Technical Support Major Task c), states, in part (on page 26 of 43):

> A review of procedural actions for this position demonstrated that failed fuel determinations as well as establishing recovery/reentry priorities would not be required during the first 60 minutes of the event. Initial reactor core stabilization

activities are performed by the Operations crew under the direction of the STA [Shift Technical Advisor].

Provide further justification for the extension in augmentation timing for the Core Thermal Engineer position. Specifically, clarify whether the STA has the necessary expertise with core/thermal hydraulics, and possesses the ability to offer adequate functional oversight to assess core conditions, in addition to providing direction to the Operations personnel who are performing initial reactor core stabilization activities. This justification should include a description of any procedure and information technology advances since the implementation of NUREG-0654, such as improvements that allow using a symptom-based emergency operating procedure network, and computerized or automated systems for the acquisition and display of parameters used to evaluate core conditions.

NSPM Response

Enhancements in the Shift Technical Advisor's (STA) ability to perform required actions on-shift have resulted from improvements in training, adoption of symptom-based Emergency Operating Procedures (EOPs), and significant improvements in the ability to use computer parameters to efficiently monitor core conditions.

STA Training

The required educational qualifications for individuals filling this function include one of the following:

- Bachelor degree in engineering from an accredited institution.
- Bachelor degree in engineering technology from an accredited institution, including course work in the physical, mathematical, or engineering sciences.

An STA candidate must currently meet the following entry-level training requirements:

- Hold a Senior Reactor Operator (SRO) license (active or inactive) at PINGP.

Additionally, the STA candidate must have at least one year of experience in the operation or engineering support of a nuclear power plant with at least six months of experience at PINGP.

STA candidates receive detailed training in the following areas:

- Systems
- Critical Safety Functions (CSF)
- Reactivity Calculations
- Accident and Transient Analysis
- Core Damage & Assessment

Subsequently qualified STA personnel receive continuing training including:

- Reactor Physics
- Core Characteristics over Core Life
- Reactivity Control during Normal, Abnormal and Emergency Conditions

STA Functions

Personnel performing the STA function on-shift are responsible for maintaining a broad perspective of operating activities and operating conditions during accident conditions and for providing assessment and advice to the Shift Manager responsible for plant operation.

Procedure and Technical Improvements

Since the approval of Revision 2 of the E-Plan on December 23, 1982 (Reference 3), the PINGP EOPs have been improved based upon internal operating experience and industry initiatives. EOPs now use a symptom-based approach that demands less assessment and interpretation of plant conditions by the operating crews. The EOPs interface well with new technology such as the site Emergency Response Computer System (ERCS). For example, monitoring of CSF Status Trees uses the ERCS to graphically display plant conditions relative to limits or required actions and provides a recommendation on which EOP applies.

Upgrades in plant computer capability have also contributed to the reduction in burden for the performance of STA related activities. The site ERCS, composed of the Plant Monitoring System (PMS) and Safety Assessment System (SAS), collects and processes field data for display to plant personnel. The data is displayed in a concise and consistent format on displays in the Control Room, TSC, EOF and BEOF. The SAS Primary display includes CSF Tree, trending, and top level displays. Additionally, the PMS provides for scan, log, alarm, display, trending, archival and periodic reporting functions. These display capabilities, which were not available at the time of the approval of Revision 2 of the E-Plan, enhance the STA's ability to monitor core thermal conditions and provide advice to the operating crew.

Summary

Plant data accessibility, combined with additional trending and core monitoring capability and the use of symptom-based procedures have significantly reduced on-shift burden for performance of STA functions. This allows the individual performing these functions to maintain this responsibility for the first 60 minutes without adversely impacting response to an event.

PINGP RAI-4

LAR Enclosure 1, Section 3.2.5 (Repair and Corrective Actions Major Task c, 2nd paragraph) states, in part (on page 27 of 43):

> Historically, the repair functions associated with an event have been completed by Auxiliary Operations (AOs) personnel on-shift who are qualified to respond to plant events and perform actions to stabilize the plant.

Please describe the training and qualifications provided to the AOs that would allow them to perform repair and corrective actions and justify the extension in augmentation times for the maintenance technicians. This justification should include a review that there will not be any conflict between the added collateral duties and other assigned emergency response functions.

NSPM Response

NSPM proposes to revise Table 1 (Attachment 1 of this Enclosure) of the PINGP E-Plan to remove the reference to performance of Mechanical and Electrical Maintenance expertise as a duty performed by shift personnel assigned other functions. The basis for the proposed change is the robust nature of the Emergency Core Cooling Systems (ECCS), which precludes the need for maintenance activities during the initial stages of the event, and the training provided to Licensed and Non-Licensed Operations personnel to respond to plant conditions through the use of EOPs and Abnormal Operating Procedures (AOPs).

PINGP ECCS

In accordance with the PINGP Updated Safety Analysis Report (USAR), PINGP was designed and licensed in conformance with the proposed Atomic Energy Commission 70 Design Criteria, Group VII Engineered Safety Features. Group VII features that apply to the PINGP ECCS include:

Criterion 41, “Engineered Safety Features Components Capability (Category A),” states:

> Engineered safety features such as emergency core cooling and containment heat removal systems shall provide sufficient performance capability to accommodate partial loss of installed capacity and still fulfill the required safety function. As a minimum, each engineered safety feature shall provide this required safety function assuming a failure of a single active component.

Criterion 44, “Emergency Core Cooling Systems Capability (Category A),” states:

> At least two emergency core cooling systems, preferably of different design principles, each with a capability for accomplishing abundant emergency core cooling, shall be provided. Each emergency core cooling system and the core shall be designed to prevent fuel and clad damage that would interfere with the emergency core cooling function and to limit the clad metal-water reaction to negligible amounts for all sizes of breaks in the reactor coolant pressure boundary, including the double-ended rupture of the largest pipe. The performance of each emergency core cooling system shall be evaluated conservatively in each area of uncertainty. The systems shall not share active

> components and shall not share other features or components unless it can be demonstrated that (a) the capability of the shared feature or component to perform its required function can be readily ascertained during reactor operation, (b) failure of the shared feature or component does not initiate a loss-of-coolant accident, and (c) capability of the shared feature or component to perform its required function is not impaired by the effects of a loss-of-coolant accident and is not lost during the entire period this function is required following an accident.

These design criteria are met at PINGP through provision of a redundant and diverse ECCS which assures the required emergency core cooling is provided even if there should be a single failure of any component in the system. Section 6.2 of the PINGP USAR provides a description of the ECCS which operates in three modes delineated as passive accumulator injection, active safety injection and residual heat removal recirculation. The major components of the ECCS are:

- Accumulators
- Refueling Water Storage Tank (RWST)
- High Head Safety Injection (HHSI)
- Residual Heat Removal (RHR) Pumps
- RHR Heat Exchangers

Accumulators

The two accumulators are pressure vessels filled with borated water and pressurized with nitrogen gas. During normal plant operation, each accumulator is isolated from the Reactor Coolant System (RCS) by two check valves in series. Should the RCS pressure fall below the accumulator pressure, the check valves open and borated water is forced into the RCS. Mechanical operation of the swing-disc check valves is the only action required to open the injection path from the accumulators to the core via the cold leg. The accumulators are passive engineered safety features because the gas forces injection; no external source of power or signal transmission is needed to obtain fast action, high-flow capability when the need arises. One accumulator is attached to each of the cold legs of the RCS. The design capacity of the accumulators is based on the assumption that flow from one of the accumulators spills onto the containment floor through the ruptured loop, and the flow from the remaining accumulator provides sufficient water to fill the volume outside of the core barrel below the nozzles, the bottom plenum, and one-half the core. The accumulators are located inside the containment, but outside the shield wall; therefore, each is protected against possible missiles.

RWST

The RWST provides borated water to the safety injection pumps, the residual heat removal pumps and the containment spray pumps for either a loss-of-coolant accident or a main steam line break accident. During plant operation it is aligned to the suction of the above pumps. The 275,000 gallon capacity of the RWST is sufficient to refill the reactor vessel above the nozzles; provide sufficient borated water to assure no return to criticality with the reactor at cold shutdown and all full-length control rods, except the most reactive rod cluster control

assembly, inserted into the core; and provide sufficient volume of water on the floor to permit the initiation of recirculation.

HHSI

The two redundant HHSI pumps supply borated water from the RWST to the RCS during the injection phase of ECCS actuation. For small breaks, HHSI will stabilize RCS pressure once break flow equals injection flow. This will occur at an RCS pressure above RHR pump shut-off head. During the recirculation phase the HHSI pumps are provided suction from the discharge of the RHR pumps through the RHR heat exchangers. The assures a recirculation path is provided for small break LOCA conditions in which the RCS pressure remains greater than the shut-off head of the RHR pumps.

RHR

Two redundant RHR trains are provided. Each train is completely independent and physically separated from the other. The out of containment portion is largely housed in separated below grade vaults, each containing an RHR pump, a heat exchanger and sump with associated sump pump. Supply and discharge valves are located in separate pipeways adjacent to the RHR pit. During the injection phase the two RHR low-head pumps inject borated water at low pressure to the RCS. One RHR pump is sufficient to quickly recover reactor water level following a large break LOCA to limit possible core damage. During the recirculation phase the RHR pumps take suction from the containment floor and deliver spilled reactor coolant and borated refueling water back to the core through the residual heat exchangers. The system is arranged to allow either or both of the residual heat removal pumps to take over the recirculation function. However, only one train of RHR (one RHR and its associated heat exchanger) is required. The Alternative flow paths are also provided from the discharge of the residual heat exchangers for both low and high head recirculation. The high head recirculation flow path via the high head safety injection pumps is only required for the range of small break sizes for which the RCS pressure remains in excess of the shut-off head of the residual heat removal pumps at the end of the injection phase.

The plant is supplied with normal, standby, and emergency power sources which assure independent alternate power systems are provided with adequate capacity to supply the required engineered safety features and protection systems. This includes redundant trains of AC and DC power supplied by redundant emergency diesel generators.

Redundancy and segregation of instrumentation and components of the ECCS are incorporated to assure that postulated malfunctions will not impair the ability of the system to meet the design criteria. The system is effective in the event of loss of normal plant auxiliary power coincident with the loss of coolant, and can accommodate the failure of any single component or instrument channel to respond actively in the system. A single active failure analysis is provided in section 6.2.3.5 of the PINGP USAR. All credible active system failures are considered. The analysis of the loss-of-coolant accident presented in Section 14 of the PINGP USAR is consistent with the single failure analysis. It is based on the worst single failure in both the safety injection and residual heat removal pumping systems. The analysis

shows that the failure of any single active component will not prevent fulfilling the ECCS design function. The actions required to place a redundant train in service can be accomplished from the control room.

Licensed and Non-Licensed Operator Event Response Actions

Licensed and Non-Licensed Operators are trained to perform actions in response to plant events consistent with their training on system response as noted in EOPs and AOPs. These actions may be used to restore system capability as initial corrective actions typically attributed to the Technical Support and Repair/Corrective Actions Major Task.

Licensed Operator event response actions directed by AOPs and EOPs include, but are not limited to, such actions as:

- Response to reactor SCRAM
- Response to an ATWS
- Response to Plant Fires
- Response to Security Events
- Response to Loss of Coolant Accidents
- Response to Steam Leaks/Breaks
- Response to Steam Generator Faults
- Response to a Loss of Off-Site Power
- Response to a Station Blackout
- Control of RCS/Reactor Level and Pressure
- Shutdown of the Plant from Outside the Control Room

Non-Licensed Operator (NLO) event response actions directed by AOPs and EOPs include, but are not limited to, such actions as:

- Starting/Stopping/Operating Pumps
- Manipulating System Valves
- Manipulating Electrical Breakers

Licensed Operator Training

Initial License Training (ILT) is designed to train license candidates to meet the requirements of 10 CFR 55 and NUREG-1021 for NRC license examinations and to perform the duties of a reactor operator or senior reactor operator. This includes training on AOP and EOP response activities. The knowledge portion of AOP/EOP training for ILT candidates is presented in the classroom and simulator as appropriate. This includes discussion of related bases documents. After the knowledge portion of training for a particular AOP/EOP is completed, a walkthrough session of the AOP/EOP is conducted in the simulator with the license candidates applying the knowledge presented to complete the performance objective portion of the EOPs.

Licensed Operator Requalification Training (LORT) is based upon a systems approach to training and conducted in accordance with 10 CFR 55.59 and National Academy for Nuclear

Training document, ACAD 07-001, “Guidelines for Continuing Training of Licensed Personnel,” which includes AOP and EOP response activities. A Biennial Training Plan (BTP) is developed every two years to support the subsequent biennial LORT cycle. The BTP provides a schedule to ensure regulatory and ACAD training commitments are covered at the prescribed frequency as well additional material identified by incumbents and various training and/or curriculum oversight committees. Insights from probabilistic risk assessment data is also considered when assigning the relative importance training needs for LORT. Biennial and annual examinations are conducted using written exams, dynamic simulator exams and job performance measures (JPMs) in accordance with 10 CFR 55.59 and ACAD-07-001.

Non-Licensed Operator Training

Initial Non-Licensed Operator Training (NLOT) is designed to provide the necessary knowledge and skill for candidates to perform the assigned tasks of the NLO. The initial NLOT includes training in general engineering concepts, fundamental power plant operations, specific plant systems, normal, abnormal and emergency plant operations and administrative procedures. The training is broken into two classroom training periods for Power Plant Fundamentals and Operations Introduction. Periodic written exams are conducted during training periods with a comprehensive exam at the end of each training period. Upon completion of the Power Plant Fundamentals and Operations Introduction training periods, the NLOT candidates complete a period of on the job training (OJT) to include completion of task performance evaluations.

The goal of Non-Licensed Operator Requalification Training (NLORT) is to maintain and enhance the required knowledge, skills, and abilities of personnel in order to perform assigned roles and responsibilities. A six-year training plan provides a schedule to ensure that required tasks and topics selected for continuing training will be accomplished. NLORT training cycle evaluations may consist of written examinations and/or JPMs Walkthrough Exam and a written exam.

Summary

Crediting the robust ECCS capability through redundant and diverse system design and protection against loss of ECCS capability due to a single component failure provides the basis for the position that no ECCS repair and corrective actions are necessary for on shift personnel prior to augmentation of maintenance personnel. However, in the unlikely event of an ECCS failure, on-shift licensed and non-licensed personnel will respond to restore ECCS functions as directed by AOPs and EOPs. As discussed above, licensed and non-licensed personnel are trained to perform these actions as part of their assigned duties and as such they would not be considered a collateral duty. The robust ECCS capability also provides the basis for the proposed changes to the augmentation times for maintenance personnel as ECCS repair and corrective actions performed by augmented personnel would address restoration of redundant equipment as opposed to restoration of minimum required equipment to provide core cooling capabilities. Therefore, the proposed change will not result in a reduction in response capability for performance of technical support, repair activities or corrective actions.

PINGP RAI-5

LAR Enclosure 1, Section 3.2.5 (Repair and Corrective Actions Major Task c, 4th paragraph) states, in part (on page 27 of 43):

> The proposed change to the E-Plan would eliminate the 60-minute RWO [RadWaste Operator] responder. A review of PINGP procedures indicated operation of, or support for the maintenance of, Radwaste equipment was not necessary for implementation of the PINGP AOPs [Abnormal Operating Procedures], EOPs [Emergency Operating Procedures] and SAMGs [Severe Accident Management Guidelines].

Clarify whether the review of PINGP procedures included a review of procedures used to implement and perform required E-Plan functions/duties.

NSPM Response

PINGP procedures were reviewed specifically in response to the RAI question. No tasks are assigned to the Rad Waste Operator designated in the current E-Plan or the following:

- AOPs
- EOPs
- SAMGs
- EPIPs

PINGP RAI-6

LAR Enclosure 1, Section 3.2.6.c, “Protective Actions (In-Plant) Function,” states, in part (on page 28 of 43):

> The proposed E-Plan would extend the response time for the Protective Actions 30-minute responder to 60-minutes and the two (2) 60 minute responders to 90 minutes.

However, Table 1, “Guidance for Augmentation of Plant Emergency Organization,” in Enclosure 1, Attachment 2, provides that the two 60 minute responders are reduced to one 90 minute responder.

Clarify if the number of responders is being reduced, and if so, provide justification for the reduction.

NSPM Response

The statement from Enclosure 1 of Reference 1 cited in the question above is incorrect. The intent of the submittal was to provide a single on-shift Radiation Protection (RP) Specialist

supporting the Protective Actions function augmented by one 60-minute responder and one 90-minute responder. This RAI response corrects the misstatement in Enclosure 1.

The staffing levels contained within Revision 2 of the E-Plan (Reference 3) were not based on past performance deficiencies or a specific NRC commitment beyond the initial alignment with the suggested augmented response in NUREG-0654, Revision 1. The ability to reduce the augmented responders is based on the improvements in technology limiting the need for augmented responders. Subsequent technical improvements reducing the need for in-plant support for Protective Actions include:

- Electronic Radiation Work Permit (RWP) and access control systems reducing the need for the physical presence of an RP Specialists in dispatching in-plant responders.[1]

- Availability of in-plant radiation monitoring supporting response actions reducing the need for RP Specialist coverage in areas covered by the radiation monitoring system.[2]

- Capabilities for remote monitoring allowing on-shift management personnel initially in the Control Room and then augmenting in the TSC and/or EOF to provide real time dose assessments of large areas of the plant without the need to dispatch RP Specialists to perform surveys.[3]

As a result, the number of 90-minute augmented RP Specialists can be reduced from two (2) to one (1) in the Protective Actions (In-Plant) Major Functional Area. The proposed E-Plan results in a total of three (3) RP Specialists at 90 minutes to cover radiological assessment and protective actions activities.

PINGP RAI-7

LAR Enclosure 1, Section 3.2.6, “Access Control/Dosimetry” states, in part (on page 28 of 43):

> Radiation work permits (RWPs) establish the necessary preset warnings/alarms associated with the use of electronic dosimetry. Dedicated emergency electronic dosimetry is provided for use during a declared emergency, which automatically provides the electronic dosimetry with emergency dose and dose rate alarms.

Provide further description about the tools and processes used for the task of access control, including a description of portal/contamination monitors, self-alarming dosimeters, and automated access control system for the radiologically controlled area (RCA) that maintain active radiation work permits, which are readily available if an emergency is declared (e.g., the system verifies qualifications, dose margins, and access requirements).

[1] See the response to PINGP RAI-7 for details on Emergency RWP and access control systems.
[2] See the response to PINGP RAI-8 for details on the improved monitoring capability.
[3] See the response to PINGP RAI-7 for details on remote monitoring capability.

NSPM Response

Capabilities implemented since Revision 2 of the E-Plan have resulted in improved efficiencies with respect to access control and dosimetry. Enhancements have been made to access control equipment and processes. These improvements have streamlined access control by automating the issuance of dosimetry and by providing Emergency RWPs that program the dosimeters with dose and dose rate thresholds appropriate to post-accident conditions. Finally, turnstiles are provided that verify proper dosimetry prior to allowing RCA access further reducing burden on the RP Specialist.

Dosimetry and RWP Equipment Description

Electronic Self Reading Dosimeters (SRDs) are used at PINGP that track dose and dose rate data and activate audible and visual alarms at independently programmed thresholds. Different audible signals designate dose and dose rate alarms and other faults such as a defective or low battery. Alarm messages are displayed either by symbols flashing at the same time as the displayed measurement or by alphanumeric messages alternating with the measurement. The dosimeters are used as part of an integrated system that tracks doses using access control software. This process allows the dosimeter to work as a “key” to unlock turnstiles to gain access to the RCA. Typically, plant personnel log on and log off their RWP upon entrance and exit from the RCA.

On-shift RP Specialists, Chemistry Technicians, and Auxiliary Building Operators log onto a specific non-emergency RWP at the beginning of their shift using SRDs tied to the access control software and remain logged on during their entire shift. The dose and dose rate pre-set limits are 21 mRem and 200 mRem/hr respectively. The RWP allows for access to High Radiation Areas (HRAs) and Contaminated Areas (CAs) and covers work related to system alignment. The electronic control system facilitates timely response to changing plant conditions through the use of the already distributed SRDs rather than requiring additional logging in to the system upon entry into the RCA.

An Emergency RWP has been established for use when an event is declared at the site. This RWP covers response to a fire as well as emergency related activities requiring access to HRAs, Locked HRAs, CAs and High CAs. The site maintains pre-staged SRDs with dose and dose rate preset limits of 51 mRem and 250 mRem/hr that are logged in to the Emergency RWP. Once an event is declared, on-shift personnel are able to use the pre-staged SRDs to enter the RCA in response to the emergency condition. Repair team members dispatched from the Operational Support Center (OSC), once activated, are issued SRDs and logged into the Emergency RWP via the access control software at the OSC login station.

Access Control/Dose Monitoring

An automated access control system is provided near the main access point to the RCA. The automated access control software verifies Radiation Worker and General Employee Training are current, determines whether an HRA briefing is required and displays annual dose and

dose margin to the administrative limit of 2000 mrem. The system also displays the dose and dose rate alarm thresholds that will be set in the SRD.

Remote Monitoring

A remote dose monitoring system is maintained at PINGP which is accessible from designated computers on the network. It allows for real time monitoring of workers wearing transmitting SRDs and monitoring of in-field instruments that are equipped with transmitters. Workers wearing a transmitting SRD will appear after logging into the automated access control and will be removed after log out.

Alarm set points are different from actual alarm set points on the electronic SRD. They are meant to assist the person providing job coverage by providing pre-alarms on the SRD screen. The actual dosimeter dose or dose rate alarm is set to respond when 100% of the RWP set point is reached in the SRD.

Use of the remote monitoring system allows the RP Specialist to monitor multiple work groups simultaneously from remote points reducing the time and effort required for job coverage while maintaining adequate protection for rad workers.

Contamination Monitoring

A portal monitor is used at Prairie Island at the exit of the RCA, before the worker has processed through the whole body contamination monitor. The PM-7 is a microprocessor based radiation detection system which provides quick indication of contamination on personnel. The monitor has 6 independent scintillation detectors and an internally mounted battery back-up that can maintain unit operation for up to 6 hours. The alarm setpoints for the PM-7 are based on site RP procedure requirements.

The whole body contamination monitor used at PINGP at the exit of the RCA is a Two-Step Exit (TSE) monitor. The monitor is a highly sensitive HP tool which can be used to locate contamination on a body and quantify the contamination activity. The TSE uses beta and gamma scintillation technology for detection of contamination. Measurement is accomplished in a two-step - front then back - sequence. Alarm set points are established in accordance with site RP procedures.

Summary

Equipment and process improvements, combined with the establishment of Emergency RWPs and emergency dose limits provide significant enhancements to efficient access control and reduce the need for direct RP Specialist support. These enhancements provide readily available information if an emergency is declared.

PINGP RAI-8

LAR Enclosure 1, Section 3.2.6, “Protective Actions (In-Plant) Function Summary” states, in part (on page 29 of 43):

> The proposed change maintains the existing on-shift RP [Radiation Protection] Specialist for the HP [Health Physics] Coverage task. The proposed change extends the 30-minute and 60-minute response time for the personnel to 60 minutes and 90 minutes respectively. NSPM has implemented improvements in technology in the areas of dosimetry and access control at the PINGP which reduced the need for RP Specialist actions in each of these areas during the early stages of event response.

Provide further justification for the extensions in time for the RP Coverage task, including a description of the availability of installed area, process, airborne and effluent radiation monitors, automated systems and information technology solutions, and enhanced work processes that would be available under accident conditions.

NSPM Response

The radiation monitoring system consists of a wide variety of monitoring covering key areas of the plant. These monitors are integrated into the ERCS and readings are available in the Control Room, RP Office, Chemistry Laboratory, TSC, OSC, and BEOF. The system provides the Emergency Director, RP and chemistry personnel with the ability to rapidly assess overall plant conditions throughout the site.

Monitoring Equipment Description

The Radiation Monitoring System consists of individual radiation monitoring channels mounted in six racks in the Control Room and two racks in the Control Rod Drive Rooms. The system fulfills the following functions:

- Warn operating personnel of radiological health hazards.
- Provide early warning of plant conditions which may lead to a radiological health hazard.
- Prevent or minimize the effects of inadvertent release of radioactivity to the environment by consequence-limiting automatic responses.
- Provide routine monitoring of controlled off-site releases.
- Provide dose rate information of critical areas during an accident.
- Provide indications for aiding accident assessment.

Radiation monitoring channels provide an output to the computer. The output signals are processed by the computer to provide Operations and RP with additional information on the status of plant radiation levels. Computer radiation alarm points can be set at the computer console independently of the monitoring channel set points to provide the operator and RP personnel in the Emergency Response Facilities with a warning of increases in radiation level

before a monitor channel alarms. Area monitors are also displayed on the "MISC 1.97", part of the ERCS.

The individual radiation monitoring channels are either process radiation monitors or area radiation monitors. The area radiation monitors provide information useful in assessing radiation exposure to personnel in areas that may have radiation and/or occupancy potential during both normal and abnormal plant conditions. The area monitors are equipped with an indicator and an alarm in the vicinity of the detector.

The process radiation monitors provide information about radioactive concentration in various systems; leakage across boundaries of closed systems; and radioactive concentrations in liquid and gaseous effluents. The process monitors consist of a remote detector and a rack mounted module which provides indication, control functions and alarms. Process radiation detectors are either "in-line", located in the process piping, or "off line" where part of the process flow is diverted to a separate detector chamber. Specifics regarding the various monitors are included below.

Area Radiation Monitors

Area monitors are located in areas where personnel perform routine duties, areas where personnel perform infrequent duties yet have a significant probability for hazardous dose rates, areas where there is a small probability for hazardous dose rates yet continuous surveillance is necessary and critical areas of the plant that may require entry during an accident condition. A local alarm buzzer warns personnel in the area and a common annunciator alerts Control Room personnel. The following area monitoring channels are used:

- Control Room
- Containment (both Units)
- In Core Seal Table Area (both Units)
- Letdown Areas (both Units)
- Safety Injection Areas (both Units)
- Containment Spray Areas (both Units)
- Multiple Elevations of the Auxiliary Buildings (both Units)
- Turbine Building (both Units)
- Radiation Chemistry Laboratory
- Sampling Room
- Spent Fuel Pool Area
- Waste Gas Valve Gallery
- Rad Waste Building (multiple areas monitored)
- TSC and OSC
- Security Guard area

Particulate Monitors

Air particulate monitors are provided for each unit to monitor beta activity which may be carried by particulate matter in the air. These monitors can be used to sample either the Containment atmosphere or the Shield Building ventilation stack. Air particulate monitors typically contain a detector, a filter paper roll, a pumping system, and a check source. The detector is a scintillation type beta sensitive optically coupled to a photomultiplier tube.

Gas Monitors

Gas is most easily detected by detecting beta particles using G-M tubes. The gas monitor detectors are designed to measure beta-gamma activity. Gas monitors used at PINGP include:

- Containment / Shield Building
- Spent Fuel Pool
- Auxiliary Building Ventilation Stack
- Control Room
- Rad Waste Building
- Air Ejector
- Waste Gas
- Residual Heat Removal
- Steam Line

Liquid Monitors

The liquid monitors are designed to measure the gamma activity in a liquid process line. Each liquid monitor line uses a NaI scintillation detector and is equipped with a check source to allow detector testing. Both in-line and off-line configurations are used at PINGP.

Summary

Integration of the radiation monitoring systems with the ERCS has increased the availability of normal and accident condition radiological information which results in enhanced work processes. The improved availability has reduced the need for in plant RP Specialist support.

References

1. Letter from NSPM to the NRC, “Prairie Island Nuclear Generating Plant, Units 1 and 2 License Amendment Request: Revision to Emergency Plan Staff Augmentation Response Times,” dated February 23, 2017. (ADAMS Accession Number ML17055C359)

2. Email from the NRC to NSPM, “Request for Additional Information for Prairie Island Nuclear Generating Plant License Amendment Request dated February 23, 2017 RE: Emergency Response Organization,” dated August 7, 2017. (ADAMS Accession Number ML17219A076)

3. Safety Evaluation Report from the NRC to NSPM, “Emergency Preparedness Safety Evaluation Report Related to the Operation of the Prairie Island Nuclear Generating Plant,” dated December 23, 1982. (Legacy ADAMS Accession Number 8301140190)

ENCLOSURE, ATTACHMENT 1

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

Response to Request for Additional Information Regarding
License Amendment Request to Revise Emergency Plan
Staff Augmentation Response Times

MARKED-UP COPY PAGES OF EMERGENCY PLAN

(4 Pages Follow)

Table 1 Guidance for Augmentation of Plant Emergency Organization

Major Functional Area	Major Tasks	Position Title or Expertise	On-Shift	Capability for Additions ~~3~~60 min	Capability for Additions ~~6~~90 min
Plant Operations and Shift Supervisor (SRO) Assessment of Control Room Reactor Operational Aspects		Shift Manager/ED	1	-	-
		Unit Supervisors	2	-	-
		Reactor Operators (RO)~~:~~	4	-	-
		Auxiliary Operators~~:~~	6	-	-
Notification/ Communication	Notify State, local and Federal personnel & maintain communication	Shift Emergency Communicator~~:~~	1	~~1~~	~~2~~
		Offsite Communicator	-	1	1
		ENS Communicator	-	1	1
Radiological Accident Assessment and Support of Operational Accident Assessment	Emergency Operations Facility (EOF) Director	Emergency Manager ~~(as per duty roster):~~	-	-	1 -
		Emergency Director (TSC)	-	1	-
	Offsite Dose Assessment	Radiological Emergency Coordinator~~:~~	-	1	-
		RP Support Supervisor	-	-	1
	Offsite Surveys	Radiation Protection Specialist~~:~~/ Support	-	2	2 ~~(2)~~
	Onsite Surveys (out-of-plant)/In-Plant Surveys	Radiation Protection Specialist~~:~~	1	1	1
	~~In-plant Surveys~~	~~Plant Operators and/or Radiation Protection Specialist:~~	~~1~~ (1,3)	~~1~~	~~1~~
	Chemistry/ Radiochemistry	Chemistry Technician~~:~~	1	1	~~1~~

Table 1 Guidance for Augmentation of Plant Emergency Organization

Major Functional Area	Major Tasks	Position Title or Expertise	On-Shift	Capability for Additions 30 min	Capability for Additions 90 min
Plant System Engineering,	Technical Support	Shift Technical Advisor	1	-	-
		Core/Thermal Engineer (TSC)	-	1	-
		Electrical	-	1	1
		Mechanical	-	1	1
Repair and Corrective Actions	Repairs and Corrective Actions	Mechanical Maintenance	1(1)	1	1
		Rad Waste Operator:	-	-	1
		Electrical Maintenance	1(1)	1	1
		Instrument Control	-	1	1
Protective Actions (In-Plant)	Radiation Protection: a. Access Control b. HP Coverage for repair, corrective actions, search and rescue, first-aid & firefighting c. Personnel monitoring d. Dosimetry	Radiation Protection Specialist and/or Plant Operators:	1 2(1,3)	1 -	2 -

Table 1 Guidance for Augmentation of Plant Emergency Organization

Major Functional Area	Major Tasks	Position Title or Expertise	On-Shift	Capability for Additions ~~3~~60 min	~~6~~90 min
Fire Fighting			Fire Brigade per F5	Local Support	
Rescue Operations and First Aid			2(1)	Local Support	
Site Access Control and Personnel Accountability	Security, firefighting communications, personnel accountability	Security Personnel~~:~~	As per Security Plan		
		TOTAL	18	14~~9~~	9~~15~~

(1) May be provided by shift personnel assigned other functions.

~~(2) Monticello RPG will arrive within approximately 2-3 hours to augment and relieve the Prairie Island RPG of offsite surveys.~~

~~(3) Chemistry Technicians are cross-trained in Radiation Protection and chemistry/radiochemistry. The non-licensed plant operators are fully trained to conduct post-accident in-plant surveys, during the first hour of the emergency.~~

The above table was developed in accordance with 10 CFR 50 Appendix E. This staffing analysis is documented in F3-1.1, Emergency Plan On-Shift Staffing Analysis.

5.4 EOF Organization

The EOF (Emergency Operations Facility) Organization consists of a Direction and Control Group and three subordinate groups. The EOF Organization is staffed by personnel from the site's Engineering and Project Management groups and Prairie Island Training Center staff. The Prairie Island EOF Organization is shown in Figure 2.

The EOF will be activated~~should be staffed and ready to assume its emergency responsibilities from the TSC~~ within ~~about 1 hour~~90 minutes of when an Alert, Site Area Emergency or Genral Emergency is declared~~notification~~. ~~Transfer of these responsibilities from the TSC to the EOF will be coordinated between the TSC and EOF and depend on the status of the TSC's emergency response. Actual transfer of offsite emergency response responsibilities to the EOF should occur within 60 to 90 minutes of notification.~~

5.4.1 EOF Direction and Control

The Emergency Manager is responsible for overall direction and control of NSPM's emergency response effort. Designated members of management staff the Emergency Manager position in the EOF. Specific personnel assignments to the Emergency Manager position are found in the MT & PI Nuclear Emergency Preparedness Telephone Directory. The Emergency Manager relieves the Emergency Director of the following responsibilities:

A. Off-site dose projections and coordination and direction of the utility off-site radiological monitoring teams.

~~B. Authorization of emergency classification changes. The Emergency Director retains the primary responsibility for re-classifications and makes recommendations to the Emergency Manager who has the responsibility to review and authorize the new classification.~~

~~C.~~B. Authorization of offsite Protective Action Recommendations.

~~D.~~C. Communications with off-site authorities including Federal, State, Local and Tribal authorities and MT & PI Offsite executive management located at the Minnesota State Emergency Operations Center.