



Nuclear Management Company, LLC
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East • Welch MN 55089

L-PI-03-016

April 21, 2003

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
DOCKET 50-306
LICENSE NO. DPR-60
RESPONSE TO OPPORTUNITY FOR COMMENT ON TASK INTERFACE
AGREEMENT (TIA) 2001-10, "DESIGN BASIS ASSUMPTIONS FOR ABILITY OF
PRAIRIE ISLAND, UNIT 2, EMERGENCY DIESEL GENERATORS TO MEET SINGLE-
FAILURE CRITERIA FOR EXTERNAL EVENTS" (TAC NO. MB2953)

By letter dated December 30, 2002, the NRC transmitted the NRR Staff's draft response to TIA 2001-10 and provided NMC the opportunity to comment on this draft response. This letter provides NMC's comments on the Staff's draft response to TIA 2001-10.

The draft TIA response appears to be based on a misunderstanding concerning the design basis for the Unit 2 Emergency Diesel Generators (EDGs) - D5 and D6 - of the Prairie Island Nuclear Generating Plant (PINGP). The draft response states: "As indicated in the licensee's "Design Report for the Station Blackout/Electrical Safeguards Upgrade Project, Revision 2" dated September 23, 1993, the subject emergency diesel generators (D5 and D6) were designed to meet the requirements specified in Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," including all Appendices [i.e., Appendix A to Part 50, General Design Criteria (GDC) for Nuclear Power Plants]." This statement is an incorrect description of the licensing and design bases for D5 and D6.

As explained in our letter dated March 18, 2002, commenting on TIA 2001-10 (attached), construction permits for PINGP Units 1 and 2 were granted on June 25, 1968, which predated the adoption of the GDC in Appendix A to 10 CFR Part 50. PINGP Units 1 and 2 were designed and constructed to comply with Northern States Power's understanding of the intent of the draft GDC as proposed by the Atomic Energy

A001

Commission on July 10, 1967.¹ A review of the Updated Safety Analysis Report for the plant identified no requirement for mitigation of an external event concurrent with a postulated single failure as part of the design and licensing bases for emergency alternating current (AC) power.

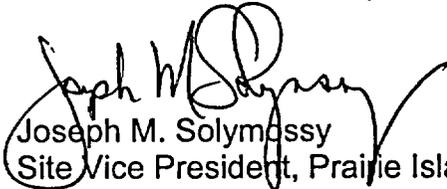
The PINGP was originally licensed with only two EDGs. By letter dated April 13, 1989, PINGP committed to add two additional safeguards EDGs, to upgrade the safeguards electrical distribution system, and support compliance with the new station blackout rule in 10 CFR 50.63. Detailed design descriptions of the two new EDGs, along with the applicable design criteria and codes and standards, were provided in the various submittals to the NRC cited in our March 18, 2002 letter. Contrary to the statement in the draft TIA response, the subject Design Report (Station Blackout/Electrical Safeguards Upgrade (SBO/ESU) Design Report) does not indicate that the D5 and D6 EDGs were designed to meet 10 CFR 50 and all appendices, including the GDC. Section 3.0 of the SBO/ESU Design Report, "DIESEL GENERATOR AND AUXILIARY SYSTEMS - DESIGN AND INSTALLATION" describes in Section 3.5 the design standards used in the D5 and D6 EDG design. Section 3.5 states that, "Within the existing plant boundary the existing design criteria as defined in the USAR will apply except as noted otherwise in this document." Section 3.5 makes no mention of 10 CFR 50 or the GDC. Section 4.0 of the SBO/ESU Design Report, "NEW D5/D6 BUILDING" describes in Sections 4.3 and 4.6 the design standards used in the design of the new building housing the new EDGs. Section 4.6 does include reference to 10 CFR 50, including all appendices. This is reflected in the fact that the tornado, wind, and missile loading for the new building did not use the criteria of the USAR, but rather a modified loading based on more current NRC guidance. However, the scope of this section is limited to the new building and does not apply to the design of the D5 and D6 EDGs.

In summary, NMC does not agree with the conclusion drawn in the draft TIA response that the "Unit 2 emergency ac power system should meet the single-failure criterion for external events." NMC has researched the licensing and design bases of D5 and D6 and has not identified a requirement that D5 and D6 mitigate an external event concurrent with a postulated single failure. The draft TIA response indicates that the NRC staff's long-standing position is that redundant trains of equipment be protected from external events in order to meet the single-active failure criterion. This position is

¹ The final version of the GDC was not incorporated into 10 CFR until February 1971. Therefore, the GDC do not apply to the design of plants that had received construction permits prior to that date. These plants, including PINGP Units 1 and 2, typically were designed and constructed based on the licensee's interpretation of the intent of the draft GDC. The design accepted by the NRC, together with any requirements imposed by the NRC, commitments made by the licensee, and any exemptions or exceptions to rules or requirements granted by the NRC, form the licensing and design bases for the facility.

beyond the design and licensing bases for the D5 and D6 EDGs. Imposing this new requirement on D5 and D6 would constitute a backfit.

This letter contains no new commitments and no revisions to existing commitments. Please contact Jeff Kivi (651-388-1121) if you have any questions related to this letter.



Joseph M. Solymossy
Site Vice President, Prairie Island Nuclear Generating Plant

CC Regional Administrator, USNRC, Region III
Project Manager, Prairie Island Nuclear Generating Plant, USNRC, NRR
NRC Resident Inspector – Prairie Island Nuclear Generating Plant

Attachment

ATTACHMENT TO LETTER L-PI-03-016

March 18, 2002 Letter from NMC to NRC

Prairie Island Nuclear Generating Plant Comments on TIA 2001-10,
"Design Basis Assumptions for Ability of Prairie Island, Unit 2, Emergency Diesel
Generators to Meet Single Failure Criteria for External Events" (TAC No. MB2953)

11 Pages Follow



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PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 50-306 License No. DPR-60

**Prairie Island Nuclear Generating Plant Comments on TIA 2001-10,
“Design Basis Assumptions for Ability of Prairie Island, Unit 2, Emergency Diesel
Generators to Meet Single Failure Criteria for External Events” (TAC No. MB2953)**

By letter dated January 16, 2002, the NRC transmitted TIA 2001-10 to Prairie Island and gave the Prairie Island staff an opportunity to comment on the TIA. This letter includes our comments and clarifies the Prairie Island design basis with respect to single failure and external events with respect to the Unit 2 emergency diesel generators (EDGs).

A review of the applicable documentation indicates that a single failure need not be assumed as part of the design basis for Unit 2 emergency AC with respect to mitigating external events. The detailed discussion is provided in Attachment 1.

In this letter we have made no new Nuclear Regulatory Commission commitments. Please contact Jeff Kivi (651-388-1121) if you have any questions related to this letter.

Mano K. Nazari
Site Vice President
Prairie Island Nuclear Generating Plant

USNRC
March 18, 2002
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NUCLEAR MANAGEMENT COMPANY, LLC

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC

Attachment:

Prairie Island Comments on TIA 2001-10

Attachment

Prairie Island Comments on TIA 2001-10

NRC Question:

Is the new Unit 2 emergency AC power system, which is not within the existing plant boundary and was designed to meet single failure criteria for external events, still required to meet single failure criteria for external events, for any single failure within the boundary of the new system?

Prairie Island Comments:

The Background discussion in the TIA notes the licensee agrees new systems were designed and licensed to meet single failure criteria for accidents and events, including external events. There appears to be some miscommunication on this point.

Because it changes the nature of the question itself, our comments relate to addressing whether Unit 2 emergency AC was designed and licensed to meet single failure criteria for external events. In summary, it is our conclusion that Unit 2 emergency AC was not designed and licensed to meet single failure criteria for external events.

I. Detailed Discussion

This report clarifies the design basis with respect to single failure criteria and external events for the D5 and D6 Emergency Diesel Generators (EDGs) at the Prairie Island Nuclear Generating Plant (PINGP). In particular, this report will describe the design basis for the plant with respect to D5 and D6, and distinguish between:

- the design basis of the plant with respect to D5 and D6, and
- the design, installation, and procurement of D5 and D6

II. Background

In accordance with 10CFR50.34, Northern States Power (NSP) filed with the Atomic Energy Commission (AEC) a Facility Description and Safety Analysis Report (FDSAR) in July of 1967 as a part of a request to obtain construction permits for PINGP Units 1 and 2. On June 25, 1968, NSP was granted construction permits. Due to the era of the design of these units, PINGP Units 1 and 2 were designed and constructed to comply with NSP's understanding of the intent of the draft AEC General Design Criteria (GDC) as proposed on July 10, 1967. As explained previously in our letter dated September 17, 2001, the position of the Prairie Island staff is that the original design and licensing basis of the plant does not require mitigation of an external event concurrent with a postulated single failure. Additional discussion below describes why this is also the

case for the new equipment installed in the Station Blackout/Electrical Safeguards Upgrade (SBO/ESU) Project.

In a letter dated April 13, 1989, PINGP committed to add two additional safeguards Emergency Diesel Generators (EDGs) to upgrade the safeguards electrical distribution system. This action supported compliance with the new station blackout rule in 10 CFR 50.63. PINGP provided further details regarding the project implementation plan to the NRC in a letter dated September 29, 1989. In this letter, PINGP identified the project licensing issues to the NRC including:

"...detailed design information for the project addressing the applicability of codes, standards, regulatory guides, NUREGs, General Design Criteria, and Generic Letters".

NSP made several submittals to the NRC concerning the project. These submittals provided additional detailed design descriptions of the EDGs, supporting systems and structures, along with the general design criteria, codes and standards that applied to the project. The SBO/ESU Design Report, Rev. 1 was submitted to the NRC by letter dated December 23, 1991. These documents were reviewed and approved by the NRC under SERs dated April 28, 1992, and January 4, 1993.

III. Prairie Island Position on the Question of TIA 2001-10

To address the question of whether Unit 2 emergency AC is required to mitigate an external event concurrent with a single failure, we focus on five areas:

1. SBO/ESU Project Focus;
2. SBO/ESU Design Report;
3. Specific Modifications to the Design Bases;
4. NRC Acceptance of the SBO/ESU Design Report; and
5. Detailed Review of IEEE Standards Invoked by SBO/ESU Design Report

SBO/ESU Project Focus

The SBO/ESU project was primarily initiated in response to the new station blackout rule in 10 CFR 50.63 (PINGP also upgraded the station electrical distribution system and the 121 Cooling Water pump power supply as part of the project.) 10 CFR 50.63 became effective on June 21, 1988; prior to this the PINGP was licensed with only two

EDGs. The SBO/ESU project focused compliance with the new regulation by the methods outlined therein. The emphasis of 10 CFR 50.63 was for the plant to:

"...be able to withstand for a specified duration and recover from a station blackout as defined in [10 CFR] 50.2. The specified station blackout duration shall be based on the following factors:

- i. The redundancy of the onsite emergency ac power sources;*
- ii. The reliability of the onsite emergency ac power sources;*
- iii. The expected frequency of loss of offsite power; and*
- iv. The probable time needed to restore offsite power."*

The regulation also contained specific reporting and schedular requirements that are not pertinent to this discussion.

10 CFR 50.2 defines a station blackout as:

"...the complete loss of alternating current (ac) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system). Station blackout does not include the loss of available ac power to buses fed by station batteries through inverters or by alternate ac sources as defined in this section, nor does it assume a concurrent single failure or design basis accident."

Thus, the SBO/ESU project was focused on providing an "Alternate AC Source" as prescribed by 10 CFR 50.63 and defined by 10 CFR 50.2. The event already assumes multiple failures (loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency AC power system) and 10 CFR 50.63 requires that the:

"...alternate ac source(s)... have acceptable capability to withstand station blackout provided an analysis is performed which demonstrates that the plant has this capability from onset of the station blackout until the alternate ac source(s) and required shutdown equipment are started and lined up to operate."

However, 10 CFR 50.2 already makes clear that a station blackout does not require the assumption of an additional single failure. Presumably, this is due to the multiple-failure scenario assumed to get the plant to station blackout conditions in the first place. The

language of the regulation does not modify the existing plant design bases to require the analysis of a station blackout with an assumed single failure, nor did the regulation require the Prairie Island SBO project to comply with such a design basis.

SBO/ESU Design Report

In the April 13, 1989, letter to the NRC, PINGP committed to addressing the SBO duration and coping issues by installing two new EDGs. The proposed system was arranged so that each unit had two dedicated EDGs. The modification to implement the proposed system included two projects: a SBO project and an ESU project. The SBO portion of the project was to install two additional EDGs. However, these were not just SBO diesel generators, these would be the Unit 2 safeguards emergency diesel generators, which would be used to satisfy the Unit 1 "alternate ac source" requirements of 10 CFR 50.63 and meet the coping duration of 4 hrs. Additional upgrades to the plant electrical system were made in the ESU portion of the project.

In the letter dated September 29, 1989, NSP described the approach that would be used, providing schedules, a project licensing plan and diesel qualification plan. Part of the licensing plan was to provide the NRC Staff with a design report that incorporated detailed design information for the Staff's review and approval.

In the SBO/ESU Design Report (and related) submittals, sections 3.5 (Design Standards, for the Diesel Generator and Auxiliary Systems) and 4.6 (Design Standards, for the New D5/D6 Building) of the Design Report, make the following statement:

*"...Within the existing plant boundary the existing design criteria as defined in the USAR will apply except as noted otherwise in this document."*¹

In addition, a similar statement is made in section 5.3.9.1 (entitled General Requirements, Detailed Design, for the Upgraded Safeguards Auxiliary AC Power System Design):

"Throughout this criteria, any design that affects existing plant components or systems and any design that adds new components or systems within the existing plant will be in conformance with the USAR as a minimum."

¹ Note, due to a clerical error this statement was dropped from section 3.5 in Rev. 1 (Ref. 8) of the SBO/ESU Design Report, but it was replaced in Rev. 2 (Ref. 9).

NSP made these statements to establish that compliance with 10 CFR 50.63 was not viewed at the PINGP as requiring a reanalysis and/or modification of the design criteria or design basis of the existing facility. PINGP did not intend to create new design bases for Unit 2 as a result of the SBO/ESU Project, except as explicitly identified in the SBO/ESU Project Report.

Further, the November 27, 1990, letter transmitting the original design report states the following:

“An important function of this report is to detail our commitments to various codes, standards, and Regulatory Guides. Our commitments, and exceptions, to the various ‘Standards’ are explicitly described in various sections of the report. Note, however, that these commitments are for design, procurement, fabrication and construction only; operational and surveillance commitments will be made through the License Amendment Request.”

These statements limited the extent of the commitments made to the standards and to help the NRC Staff understand that limit. Commitments to standards were limited to design, procurement, fabrication and construction activities. Changes to the operational and surveillance requirements were proposed in a License Amendment Request.

SBO Design Report – Modified Design bases

In conjunction with the previous section of this report, the existing plant design criteria was modified by the referenced Design Report in specific cases. For example, Section 4.3.1.7 of the SBO Design report states:

“These tornado, wind and missile loads represent current NRC guidance and were used in place of those from the USAR.”

This statement occurs under the umbrella of section 4.3, which is titled “Building Structures,” and when combined with section 4.2 identifies only the D5/D6 building as all of the new buildings associated with the project. Therefore, the statement means the tornado, wind and missile loading for the D5/D6 building did not use the criteria outlined in the USAR, but used a modified loading which was based on a more current NRC guidance. This is an example, where new design bases are identified as a result of the SBO/ESU Project, but these apply only to the new D5/D6 Building and not to other structures of the facility.

NRC Acceptance of SBO Design Report Positions

After publication of the SBO Design Report, Rev. 1, the NRC Staff reviewed and accepted the report by means of Safety Evaluation Reports (SERs). The SERs were divided into separate enclosures pertaining to different aspects of the review and different branches within the NRC that performed the review. In the SERs included with the NRC letter, dated April 28, 1992, Enclosure 1 contains the structural aspects, Enclosure 2 contains the electrical distribution aspects, Enclosure 3 contains the instrumentation/load sequencing aspects and Enclosure 4 contains the auxiliary/support systems. Enclosure 2 discusses essentially all aspects of the EDG design and electrical interface with the facility.

In this letter, the NRC states in Enclosure 2, Section 2.0 the following:

"NSP confirmed that within the existing plant boundary, the existing design criteria as defined in Prairie Island Updated Safety Analysis Report (USAR) will apply."

This statement indicates that the NRC acknowledged that PINGP was not changing the design bases of the entire facility when it reviewed the SBO/ESU Project Design Report, unless NSP specifically proposed a change to a particular design basis.

Detailed Review of IEEE Standards Invoked by SBO/ESU Design Report

It is our understanding that IEEE Standards referenced in the SBO/ESU Design Report may have been inferred to include the requirement that a single failure be assumed concurrent with an external event. However, careful reading of the requirements of these standards indicates that such is not the case. Specifically:

IEEE 279-1971

This standard gives the general guidance on application of the single failure criterion, but does not address external events.

IEEE 308-1974

Section 4.1, notes, "The Class 1E power systems shall be designed to assure that no design basis event will cause: (1) the loss of electric power to a number of engineered safety features, surveillance devices, or protection system devices sufficient to jeopardize the safety of the station. (2) A loss of electric power to

equipment that could result in a reactor power transient capable of causing significant damage to the fuel or to the reactor coolant system.”

Table 1, lists “Illustrative Design Basis Events” under two headings, “Natural Phenomena” and “Postulated Phenomena.” The Natural Phenomena list includes:

- earthquake,
- tornado,
- floods,

essentially, what we have been referring to as external events. The Postulated Phenomena list includes:

- fires
- accident generated missiles
- postulated loss of preferred power supply combined with any of the above
- single equipment malfunction

In this case, single equipment malfunction is presumably what we have been referring to as a single failure.

In defining single equipment malfunction as a design basis event, it is clear that the standard does not intend that the single equipment malfunction be applied concurrent with another design basis event (such as flood). In addition, the only Design Basis Event listed that notes it must be assumed concurrent with any of the other Design Basis Events is the loss of preferred power supply.

IEEE 379-1972

This standard is the draft guide for the application of the Single Failure Criterion to nuclear power station protection systems. Protection systems are defined in the standard as the devices and circuitry that generates signals that actuate a reactor trip and that, in the event of an accident, actuate engineered safeguards such as containment isolation, core spray, safety injection, pressure reduction and air cleaning.

This standard does not define design basis event, nor does it directly reference the IEEE 308 definition, although, it would not be unreasonable to assume the IEEE 308 definition applies.

Section 3(6) notes that a design basis event may cause the failure of a component, when this is the case, the system must be capable of performing assuming an additional single failure.

Section 6.5, which addresses multiple failures due to a single cause, notes, “The location and arrangement of protection system equipment should be analyzed to

determine the effects of common failure modes resulting from missiles, fire, flooding, earthquake, temperature, chemicals, etc.”

Thus, Section 3(6) does not directly state that an external event must be mitigated concurrent with a single failure, just that some design basis events may necessarily cause failure of channels or trains (and when this is the case, an additional failure must be tolerated). In general, design basis events would be limited to the Postulated Phenomena (from Table 1 of IEEE 308-1974), because the Natural Phenomena cannot be protected against via separation or redundancy, but only via protection and qualification. That is, Natural Phenomena have the same effect on all trains of a system, regardless of how many trains there are or how much they are physically separated.

Further, Section 6.5 requires protection against common mode failures due to Natural Phenomena (the single failure criterion is met by the ability to protect equipment against (or qualify it for) an environment caused by an external event (Natural Phenomena). This section does not invoke another assumed failure in addition to the listed Natural Phenomena.

Conclusion

Thus, based on the above discussion, Prairie Island concludes that:

1. The SBO/ESU project was primarily focused on achieving plant compliance with 10 CFR 50.63. The emphasis of this regulation is to provide redundant and reliable onsite emergency AC sources and to determine the expected frequency of loss of offsite power and the probable time needed to restore offsite power. This is achieved by providing an alternate power source for the unit under loss of power conditions.

The language of the regulation does not modify the plant design bases with respect to applying the single failure criteria to mitigating external events. In fact, in 10 CFR 50.2, the definition of Station Blackout specifically states, “*Station blackout does not include the loss of ...nor does it assume a concurrent single failure or design basis accident.*” Thus, no new requirements with respect to the single failure were added by the station blackout rule.

2. The SBO/ESU Project Design Report and related submittals specifically state in sections 3.5 and 4.6 that: “*...within the existing plant boundary the existing design criteria as defined in the USAR will apply except as noted otherwise in this document.*” This statement, along with a similar statement in section 5.3.9.1,

was made to establish that compliance with 10 CFR 50.63 was not viewed as requiring a reanalysis and/or modification of the design criteria of the existing facility. Thus, no changes were made to the original plant design basis with respect to applying the single failure criteria to mitigating external events.

Further distinctions in the PINGP's commitment to design standards are made in the cover letter transmitting the SBO/ESU Design Report. These distinctions clearly limit the PINGP's commitment to any given standard to the areas of design, procurement, fabrication and construction activities. Any modification of the operating licenses was outside the scope of the SBO/ESU Design Report.

3. The SBO/ESU Project Design Report, when modifying the design bases from the current criteria of the plant, specifically stated that a change was taking place. For example, section 4.3.1.7 states: "*These tornado, wind and missile loads represent current NRC guidance and were used in place of those from the USAR.*" Thus, since the SBO/ESU Project Design Report does not specifically note Unit 2 will have a different design basis than Unit 1 with respect to applying the single failure criteria to mitigating external events, D5 and D6 have the same requirements as D1 and D2.
4. Even though the SBO/ESU Design Report does not create or modify operating or licensing bases for Unit 2, none of the IEEE standards referenced in the SBO/ESU Design Report require that emergency AC systems designed to these standards must mitigate an external event concurrent with a single failure.

Thus, it was not the intent of the PINGP to modify the design bases of the entire facility to accommodate a single failure coincident with an external event. Neither the regulation, nor the SBO/ESU Design Report modified or created such criteria. Further, none of the docketed correspondence established a new design basis for Unit 2 emergency AC with respect to accommodating a single failure coincident with an external event.

Therefore, the Prairie Island staff believe the answer to the question of TIA 2001-10 is that Unit 2 emergency AC is not required to mitigate the effects of an external event concurrent with a single failure.