July 16, 2001

Mr. J. Sorensen
Site Vice-President
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT
NRC INSPECTION REPORT NO. 50-282/01-05(DRS);
50-306/01-05(DRS)

Dear Mr.Sorensen:

On May 11, 2001, the NRC discussed with you and members of your staff the preliminary results of a fire protection triennial baseline inspection at the Prairie Island Nuclear Generating Plant. The inspection was completed when the final results were subsequently discussed by telephone with members of your staff on June 7, 2001. The enclosed report presents the results of that inspection.

The inspection examined the effectiveness of activities conducted under your license as they related to implementation of your NRC approved Fire Protection Program. The inspection consisted of a selected examination of design drawings, calculations, analyses, procedures, audits, field walkdowns, and interviews with personnel.

The inspectors identified an issue that involves two unresolved items. This issue is discussed in the enclosed report and requires additional information to support your position that a specific fire protection feature is functional. The specific issue requiring additional response is identified in Enclosure 2. Please provide a written response to the issue identified in Enclosure 2 within 120 days of receipt of this letter.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your responses will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

John A. Grobe, Director
Division of Reactor Safety

Docket No. 50-282; 50-306
License No. DPR-42, DPR-60

Enclosures:
1. Inspection Report 50-282/01-05; 50-306/01-05
2. Request for Additional Information to Support Resolution of Unresolved Item

cc w/encls:
Plant Manager, Prairie Island
R. Anderson, Executive Vice President and Chief Nuclear Officer
Site Licensing Manager
Nuclear Asset Manager
J. Malcolm, Commissioner, Minnesota Department of Health
State Liaison Officer, State of Wisconsin
Tribal Council, Prairie Island Indian Community
J. Silberg, Esquire
Shawn, Pittman, Potts, and Trowbridge
A. Neblett, Assistant Attorney General
Office of the Attorney General
S. Bloom, Administrator
Goodhue County Courthouse
Commissioner, Minnesota Department of Commerce

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U.S. NUCLEAR REGULATORY COMMISSION
REGION III

Docket Nos:	50-282; 50-306
License Nos:	DPR-42, DPR-60
Report No:	50-282/01-05; 50-306/01-05
Licensee:	Nuclear Management Company, LLC
Facility:	Prairie Island Nuclear Generating Plant
Location:	1717 Wakonade Drive East Welch, MN 55089
Dates:	April 23 through May 11, 2001
Lead Inspector:	R. Langstaff, Senior Reactor Inspector Mechanical Engineering Branch
Inspectors:	D. Chyu, Reactor Inspector Z. Falevits, Senior Reactor Inspector
Accompanying Personnel:	K. O'Brien, Senior Reactor Inspector
Approved By:	Ronald N. Gardner, Chief Electrical Engineering Branch Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000282-01-05, IR 05000306-01-05, on 4/23-5/7/2001, Nuclear Management Company, LLC, Prairie Island Nuclear Generating Plant, Units 1 & 2. Fire Protection.

The inspection was conducted by a team of four Region III inspectors. There were no findings of significance identified during this inspection. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process" (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://www.nrc.gov/NRR/OVERSIGHT/index.html.

A. Inspector-Identified Findings

Cornerstone: Mitigating Systems

No findings of significance were identified.

Report Details

Summary of Plant Status: Unit 1 was operated at or near full power throughout the inspection period. Unit 2 was initially operated at or near full power, then was shutdown during the inspection period (for reasons unrelated to this inspection).

1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

1R05 Fire Protection (71111.05)

The purpose of this inspection was to review the Prairie Island Nuclear Generating Plant fire protection program for selected risk-significant fire areas. Emphasis was placed on verifying that the post-fire safe shutdown capability and the fire protection features were maintained free of fire damage to ensure that at least one post-fire safe shutdown success path was available. The inspection was performed in accordance with the NRC regulatory oversight process using a risk-informed approach for selecting the fire areas and attributes to be inspected. The lead inspector and a Region III senior reactor analyst used the Prairie Island Individual Plant Examination for External Events (IPEEE) to choose several risk-significant areas for detailed inspection and review. The fire areas chosen for review during this inspection were:

- Fire Area 18 Relay and Cable Spreading Room, Unit 1 & Unit 2
- Fire Area 20 Unit 1 4kV Safeguards Switchgear (Bus 16)
- Fire Area 32 “B” Train Hot S/D Panel & Air Compressor/AFW Room

For each of these fire areas, the inspection was focused on the fire protection features, the systems and equipment necessary to achieve and maintain safe shutdown conditions, determination of license commitments, and changes to the fire protection program.

.1 Systems Required to Achieve and Maintain Post-Fire Safe Shutdown

10 CFR Part 50, Appendix R, Section III.G.1, required the licensee to provide fire protection features that were capable of limiting fire damage to structures, systems, and components important to safe shutdown. The structures, systems, and components that were necessary to achieve and maintain post-fire safe shutdown were required to be protected by fire protection features that were capable of limiting fire damage to the structures, systems, and components so that:

- One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) was free of fire damage; and
- Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) could be repaired within 72 hours.

Specific design features for ensuring this capability were specified by 10 CFR Part 50, Appendix R, Section III.G.2.

a. Inspection Scope

The inspectors reviewed the plant systems required to achieve and maintain post-fire safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for each fire zone selected for review. Specifically, the review was performed to determine the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring, and support system functions. This review included the fire protection safe shutdown analysis.

The inspectors also reviewed the operators' ability to perform the necessary manual actions for achieving safe shutdown including a review of procedures, accessibility of safe shutdown equipment, and the available time for performing the actions.

The inspectors reviewed the updated final safety analysis report and the licensee's engineering and/or licensing justifications (e.g., NRC guidance documents, license amendments, technical specifications, safety evaluation reports, exemptions, and deviations) to determine the licensing basis.

b. Findings

No findings of significance were identified.

.2 Fire Protection of Safe Shutdown Capability

10 CFR Part 50, Appendix R, Sections III.G.2, required separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a three hour rating. If the requirements cannot be met, then alternative of dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided (Section III. G.3).

a. Inspection Scope

For each of the selected fire areas, the inspectors reviewed the licensee's safe shutdown analysis to ensure that at least one post-fire safe shutdown success path was available in the event of a fire. This included a review of manual actions required to achieve and maintain hot shutdown conditions and make the necessary repairs to reach cold shutdown within 72 hours. The inspectors also reviewed procedures to verify that adequate direction was provided to operators to perform these manual actions. Factors, such as timing, access to the equipment, and the availability of procedures, were considered in the review.

The inspectors also evaluated the adequacy of fire suppression and detection systems, fire area barriers, penetration seals, and fire doors to ensure that at least one train of safe shutdown equipment was free of fire damage. To do this, the inspectors observed the material condition and configuration of the installed fire detection and suppression systems, fire barriers, and construction details and supporting fire tests for the installed fire barriers. In addition, the inspectors reviewed license documentation, such as deviations, detector placement drawings, fire hose station drawings, carbon dioxide pre-

operational test reports, smoke removal plans, fire hazard analysis reports, safe shutdown analysis, and National Fire Protection Association (NFPA) codes to verify that the fire barrier installations met license commitments.

b. Findings

No findings of significance were identified.

.3 Post-fire Safe Shutdown Circuit Analysis

10 CFR Part 50, Appendix R, Section III.G.1, required that structures, systems, and components important to safe shutdown be provided with fire protection features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Options for providing this level of fire protection were delineated in 10 CFR Part 50, Appendix R, Section III.G.2. Where the protection of systems whose function was required for hot shutdown did not satisfy 10 CFR Part 50, Appendix R, Section III.G.2, an alternative or dedicated shutdown capability and its associated circuits, was required to be provided that was independent of the cables, systems, and components in the area. For such areas, 10 CFR Part 50, Appendix R, Section III.L.3, specifically required the alternative or dedicated shutdown capability to be physically and electrically independent of the specific fire areas and capable of accommodating post-fire conditions where offsite power was available and where offsite power was not available for 72 hours.

a. Inspection Scope

On a sample basis, the inspectors investigated the adequacy of separation provided for the power and control cabling of redundant trains of shutdown equipment. This investigation focused on the cabling of selected components in systems important for safe shutdown. The inspectors' review also included a sampling of components whose inadvertent operation due to fire may adversely affect post-fire safe shutdown capability. The purpose of this review was to determine if a single exposure fire, in one of the fire areas selected for this inspection, could prevent the proper operation of both safe shutdown trains. The inspectors performed this review for the following components:

Circuit Loop 1L-487	MV-32168
Circuit Loop 1L-488	MV-32238
Circuit Loop 1P-709	MV-32239
CV[Control Valve]-31154	MV-32333
MV[Motor Valve]-32065	MV-32335
MV-32163	MV-32381

b. Findings

No findings of significance were identified.

.4 Alternative Safe Shutdown Capability

10 CFR Part 50, Appendix R, Section III.G.1, required that structures, systems, and components important to safe shutdown be provided with fire protection features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions remained free of fire damage. Options for providing this level of fire protection were delineated in 10 CFR Part 50, Appendix R, Section III.G.2. Where the protection of systems whose function was required for hot shutdown did not satisfy 10 CFR Part 50, Appendix R, Section III.G.2, an alternative or dedicated shutdown capability independent of the area under consideration was required to be provided. Additionally, alternative or dedicated shutdown capability must be able to achieve and maintain hot standby conditions and achieve cold shutdown conditions within 72 hours and maintain cold shutdown conditions thereafter. During the post-fire safe shutdown, the reactor coolant process variables must remain within those predicted for a loss of normal AC power, and the fission product boundary integrity must not be affected (i.e., no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary).

a. Inspection Scope

The inspectors reviewed the licensee's systems required to achieve alternative safe shutdown to determine if the licensee had properly identified the components and systems necessary to achieve and maintain safe shutdown conditions. The inspectors also focused on the adequacy of the systems to perform reactor pressure control, reactivity control, reactor coolant makeup, decay heat removal, process monitoring, and support system functions.

b. Findings

No findings of significance were identified.

.5 Operational Implementation of Alternative Shutdown Capability

10 CFR Part 50, Appendix R, Section III.L.2.d, required that the process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the functions necessary to achieve reactivity control, reactor coolant makeup, and decay heat removal.

a. Inspection Scope

The inspectors performed a walkdown of a sample of the actions defined in Procedure F5 Appendix B, "Control Room Evacuation (Fire)," which was the procedure for performing a plant alternative shutdown from outside the control room. The inspectors verified that operators could reasonably be expected to perform the procedure actions within the identified applicable plant shutdown time requirements and that equipment labeling was consistent with the procedure.

The inspectors' reviews of the adequacy of communications and emergency lighting associated with these procedures are documented in Sections 1R05.6 and 1R05.7 of this report.

b. Findings

No findings of significance were identified.

.6 Communications

For a fire in an alternative shutdown fire area, control room evacuation is required and a dual unit shutdown is performed from outside the control room. Radio communications are relied upon to coordinate the shutdown of both units and for fire fighting and security operations. 10 CFR Part 50, Appendix R, Section III.H., required that equipment provided for the fire brigade include emergency communications equipment.

a. Inspection Scope

The inspectors reviewed the adequacy of the communication system to support plant personnel in the performance of alternative safe shutdown functions and fire brigade duties.

b. Findings

No findings of significance were identified.

.7 Emergency Lighting

10 CFR Part 50, Appendix R, Section III.J., required that emergency lighting units with at least an eight hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

a. Inspection Scope

The inspectors performed a walkdown of a sample of the actions defined in Procedure F5 Appendix B, "Control Room Evacuation (Fire)." As part of the walkdowns, the inspectors verified that sufficient emergency lighting existed for access and egress to areas and for performing necessary equipment operations. The inspectors verified that testing of emergency lighting for the remote shutdown panel areas (Fire Areas 31 and 32) ensured a minimum of eight hours of emergency lighting.

b. Findings

No findings of significance were identified.

.8 Cold Shutdown Repairs

10 CFR Part 50, Appendix R, Section III.L.5, required that equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs.

a. Inspection Scope

The inspectors reviewed the licensee's procedures to determine if any repairs were required to achieve cold shutdown. The inspectors determined that the licensee did require repair of some equipment to reach cold shutdown based on the safe shutdown methods used. The inspectors reviewed the procedures for adequacy.

b. Findings

No findings of significance were identified.

.9 Fire Barriers and Fire Zone/Room Penetration Seals

10 CFR Part 50, Appendix R, Section III.M, required that penetration seal designs be qualified by tests that are comparable to tests used to rate fire barriers.

a. Inspection Scope

The inspectors reviewed the test reports for 3-hour rated barriers installed in the plant and performed visual inspections of selected barriers to ensure that the barrier installations were consistent with tested configuration.

b. Findings

No findings were identified.

.10 Fire Protection Systems, Features and Equipment

a. Inspection Scope

The inspectors reviewed the material condition, operations lineup, operational effectiveness, and design of fire detection systems, fire suppression systems, manual fire fighting equipment, fire brigade capability, and passive fire protection features. The inspectors reviewed deviations, detector placement drawings, fire hose station drawings, carbon dioxide pre-operational test reports, and fire hazard analysis reports to ensure that selected fire detection systems, carbon dioxide systems, portable fire extinguishers, and hose stations were installed in accordance with their design, and that their design was adequate given the current equipment layout and plant configuration.

b. Findings

The inspectors determined that the relay and cable spreading room (Fire Area 18) carbon dioxide (CO_2) system had not been satisfactorily tested to demonstrate its ability to extinguish deep-seated electrical fires. To be considered acceptable, the CO_2 system must be capable of producing a CO_2 concentration of greater than 50 percent that would be maintained for a substantial period of time (15 minutes). The safety significance of this finding involving the relay and cable spreading room CO_2 system was not evaluated because the functionality of the system had not been adequately demonstrated. In addition, the inspectors determined that inaccurate information had been provided to the NRC in 1976 which is of regulatory concern.

b.1 Background and CO_2 Pre-operational Test

The inspectors reviewed the design specifications and pre-operational test for the CO_2 system for the relay and cable spreading room. The room was located directly below the control room. There were two fire doors to the room, one on the Unit 1 (east) side and the other on Unit 2 (west) side. In the center of room, there was a fully enclosed computer room which also was considered part of Fire Area 18. The hazards in the relay and cable spreading room were mostly electrical panels and cables in the overhead (i.e., hazards associated with deep-seated fires); the computer room had minimal hazards. The CO_2 system for the relay and cable spreading room was an automatically actuated system.

On October 2, 1974, the licensee performed a pre-operational test for the CO_2 system in the relay and cable spreading room. The results were as follows:

Locations where concentrations were taken	Peak Concentration reached after injection	Time from peak to 50% concentration	Concentration at 15 minutes after injection	Concentration at 20 minutes after injection
Computer room	68%	19 minutes	53%	45%
Near floor in relay and cable spreading room	54%	3 minutes	40%	25%
15 feet above floor in relay and cable spreading room	49%	N/A	28%	14%

During the pre-operational test, it was noted that the east fire door blew open and remained open approximately 1.5 feet; and that CO_2 leaked into the control room. In addition, not all sampling points met the acceptance criteria of 50 percent CO_2 concentration. The CO_2 measurements were not taken at the ceiling where fire hazards were mostly concentrated (15 to 19 feet from the floor). The test results were accepted by insurance personnel whom the licensee considered as the authority having jurisdiction at that time.

b.2 Analysis to Demonstrate System Operability

The licensee recognized that the pre-operational test was indeterminate for demonstrating the CO_2 suppression system could completely extinguish a deep-seated fire. In September 1998, the licensee performed Calculation M-4163-001, "CO_2 Concentration in the Relay Room and Cable Spreading/Computer Room." Some assumptions and results from the calculation are listed below:

- The 12-ton CO_2 tank was assumed to be 60 percent full (minimum required by procedure) which equated to 7517.6 pounds of CO_2 available.
- Perfect mixing of CO_2 and air was assumed for room leakage.
- Room leakage was varied to correspond to the phases of CO_2 discharge and holdup in the room. The minimum room leakage was 479 cubic feet per minute which was derived from a tracer gas test performed in 1998.
- From 10 to 242 seconds, the doors were assumed to be forced open by the differential pressure.
- During this period, the volume being displaced from the room (perfect mixing of CO_2 and air) was equal to the volume of CO_2 being discharged into the room, equating to 0 inches water column.
- From 242 seconds on, the doors were assumed to be closed, holding the CO_2 in the enclosure.
- The calculation showed that CO_2 concentration reached 50 percent and stayed above it from 200 to 1100 seconds (15 minutes). At 1101 seconds, a second injection (which had to be done manually) for 35 seconds was assumed.

NFPA 12-1972 required testing of the systems and did not provide a provision for performing an analysis in lieu of testing the system. In addition, the analysis assumed perfect mixing of CO_2 and air. However, CO_2 is heavier than air and would concentrate at the floor level. In addition, the over-pressure vent path for the CO_2 was the fire doors, located at the floor level (see Section 1R05.10.b.3 below). Consequently, a higher concentration of CO_2 could be vented from the room during the CO_2 discharge than that assumed by the analysis. The inspectors questioned whether the analysis adequately demonstrated that the CO_2 concentration in the overhead, where most of the cables were located, would be high enough to extinguish a deep-seated fire. The inspectors considered the tracer gas test and subsequent CO_2 system analysis to be an alternate approach for demonstrating system operability. This approach had been neither reviewed nor approved by the NRC, the authority having jurisdiction.

b.3 Over-pressurization Protection and Oxygen Concentration Outside of Relay Room

The over-pressurization protection was provided by the two fire doors to this area. The Unit 1 (east) fire door latch was designed to be released about 50 seconds after the timer started. At 60 seconds, when the CO_2 discharged into the room, the door was

designed to open due to the differential pressure created by the CO_2. The Unit 2 (west) fire door latch was designed to be released when the room pressure reached 14 inches water column. The system design was that upon CO_2 system actuation, the pressure inside the relay and cable spreading room would cause the doors to open. After the CO_2 discharge had ended, the doors would be closed by the door closer mechanisms. However, the fire door interaction with the CO_2 system timer and room pressure were not validated in the 1974 pre-operational test. The east door stayed open for an unspecified period of time and the west door did not open. In addition, the licensee closed the dampers between the relay and cable spreading room and the control room permanently in the 1990's. Therefore, the room may undergo a greater pressure transient than that experienced during the 1974 pre-operational test.

The inspectors were concerned that the use of fire doors to unlatch for over-pressurization protection could lead to CO_2, smoke, and combustion product propagation to areas of the plant where the operators would have to pass through in order to take manual actions. Specifically, during walkthroughs of procedure F5 Appendix B (the procedure to be used if the plant could not be controlled from the control room due to a fire in the relay room), operators consistently showed inspectors that the path they would take upon exiting the control room would be the east stairs near the control room in the turbine building. The path would take the operators directly past the east door to the relay and cable spreading room.

During the pre-operational test, oxygen concentration was measures at several locations where the operators would travel to go to hot shutdown panel. The oxygen measurement results were as follows:

- 715 elevation near east relay and cable spreading room door, 12 percent
- 695 elevation near CO_2 tank, 18 percent
- 695 elevation in AFW pump room (hot shutdown panel), 20 percent

The inspectors were concerned that the operators, after evacuating the control room, have to travel through a potentially oxygen-deprived and smoke-filled environment to go to the hot shutdown panel. Procedure F1, “Confined Space Entry,” and Occupational Safety and Health Administration required oxygen concentration between 19.5 percent and 23 percent for normal working conditions. The procedure specified that when the oxygen concentrations fall below 19.5 percent, workers are required to either evacuate the areas of concern or wear personal protective gears such as self-contained breathing apparatus. The inspectors were concerned that procedure F5 Appendix B did not require the operators to don self-contained breathing apparatus nor did the procedure caution the operators about the potentially oxygen-deprived environment.

The same issue was identified during a 1998 internal audit by contractors. Licensee personnel stated that, during 1998, a calculation had been performed which showed the oxygen concentration was not of concern due to dispersion of CO_2 gas within the turbine building. However, that calculation had not been entered into the licensee’s calculation data base and could not be located during this inspection. The licensee initiated CR 20014148 and planned to either find the old calculation or perform another calculation to show that the operators would not be subjected to an oxygen-deprived environment.

b.4 Regulatory Requirements for the CO_2 System

The inspectors determined that the pre-operational test did not fulfil the requirements to demonstrate that the CO_2 suppression system for the relay and cable spreading room was capable of extinguishing a deep-seated fire. 10 CFR Part 50, Appendix R, Section III.G.3 required, in part, that fire detection and a fixed suppression system be installed in the area under consideration requiring an alternative shutdown capability. Generic Letter 86-10, "Implementation of Fire Protection Requirements," provided the following guidelines:

Section 3.8.1 The fire protection features required by 10 CFR Part 50, Appendix R, Section III.G should conform to the NFPA codes. If deviations were made from the code, they should be identified in the Final Safety Analysis Report (FSAR) or the fire hazards analysis (FHA).

Section 8.9 Deviation from the codes should be identified and justified in the FSAR or FHA. Although an exemption is not required for NFPA codes, NRC guidelines reference certain NFPA codes as guidelines to the systems acceptable to the NRC, and therefore such codes may be accorded the same status as Regulatory Guides. In addition, when the licensee stated that its design "meets the NFPA codes" or "meets the intent of the NFPA codes" and does not identify any deviations from such codes, the NRC expects that the design conforms to the code and the design is subject to inspection against the NFPA codes.

NFPA 12-1972 required, in part, the following:

Section 2 This standard contains minimum requirements for carbon dioxide fire extinguishing systems.

Section 213 Total flooding systems shall be designed, installed, tested, and maintained in accordance with the applicable requirements.

Section 241 The quantity of carbon dioxide for deep-seated type fires is based on fairly tight enclosures because the concentration must be maintained for a substantial period of time to assure complete extinguishment.

Section 2421 Design concentration for dry electrical, wiring insulation hazards in general should be 50 percent.

Although the license had performed additional testing on the tightness of the enclosure and an analysis to show that the system would be able to deliver 50 percent CO_2 concentration for 15 minutes, this alternative approach was not delineated in NFPA-12 and deviated from the requirements of the NFPA code. The inspectors determined that this issue had potential safety significance because the CO_2 system had not been demonstrated to be capable of extinguishing a deep-seated electrical fire. Failure to extinguish a deep-seated electrical fire could result in damage to equipment important to safety. The safety significance of this issue has not been determined because the licensee has not satisfactorily demonstrated the functionality of the relay room CO_2

system. The licensee was performing hourly fire watches for this area as a compensatory measure.

10 CFR Part 50, Appendix R, Section III.G.3, requires, in part, that a fixed fire suppression system be installed in the area, room, or zone under consideration requiring alternative of dedicated shutdown capability. Fire Area 18 was an area requiring alternative of dedicated shutdown capability. The inspectors determined that the CO_2 system in Fire Area 18 did not meet the requirements of 10 CFR Part 50, Appendix R, Section III.G.3 because the system had not been satisfactorily demonstrated to be able suppress a deep seated fire in accordance with NFPA 12. The inspectors considered this issue to be an unresolved item (URI) pending review of additional information to be provided by the licensee (URI 50-282/01-05-01; 50-306/01-05-01).

b.5 Licensee Submittals and Licensing Basis Concerning the CO_2 System

On May 11, 1976, the NRC requested the licensee to perform an examination of the fire protection program against the guidelines of Standard Review Plan 9.5.1, "Fire Protection." Within this examination, the licensee was requested to:

- Identify which guidelines were met and discuss how compliance was achieved,
- Identify necessary changes such that the guidelines would be met, and
- Indicate which guidelines would not be met or did not intend to be met in the future.

The guideline for carbon dioxide suppression systems (Section IV.C.5 of Branch Technical Position (BTP) 9.5-1) stated that the system should, as a minimum, comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems." NFPA 12-1972, which would be applicable to the licensee's CO_2 system, required 50 percent CO_2 concentration for deep-seated fire. The code did not specify the amount of time that the 50 percent CO_2 concentration was required to be maintained but required that the time a "substantial period of time to ensure complete extinguishment" (Section 2.4.1 in NFPA 12-1972). Later versions of NFPA 12 required the 50 percent CO_2 concentration be held for 20 minutes.

On December 8, 1976, the licensee submitted a preliminary comparison of the existing fire protection program to the guidelines contained in Standard Review Plan 9.5.1. In that letter, the licensee did not state whether the CO_2 system met the NRC guidelines or NFPA 12. The licensee stated that the relay and cable spreading room CO_2 system design was for 50 percent concentration to be held for 15 minutes. The licensee further stated that the system was tested and the 50 percent criteria for 15 minutes was met at all sampling points. The licensee did not identify any actions needed to comply with the requirements of NFPA 12.

On April 18, 1979, the licensee submitted additional information concerning the fire protection program. The licensee stated that the CO_2 system installed during the plants construction period met existing NFPA codes.

Based on the licensee's assessment of the CO_2 system, the NRC on September 6, 1979 issued a SER which discussed the CO_2 system design for the relay room as follows:

Section 4.3.2 The system is designed for total flooding application with a 50 percent concentration for 15 minutes and double shot capacity. The storage tank capacity is adequate for two shots.

Section 5.2.5 The CO_2 system may not be effective in suppressing a deep-seated fire and the spatial separation between redundant divisions of safe shutdown systems may not be sufficient to prevent an exposure fire from damaging both divisions.

Section 5.2.6 Discussions of modifications the licensee has committed to do. One of which was to provide an alternate shutdown capability.

b.6 Inaccurate Information Provided to NRC

As discussed above, the licensee provided information to the NRC regarding the CO_2 system in a letter dated December 8, 1976. However, some of the information provided in the letter was inaccurate. Paragraph (a) of item 131 in the table titled "Review of Guidelines Contained in Standard Review Plan 9.5.1," provided as part of the letter, the licensee stated:

> The relay and cable spreading room CO_2 system design is for 50 percent concentration to be held for 15 minutes. Storage tank capacity provides for two shots. The system was tested under the direction of Cardox, NELPIA, insurance, and plant personnel. 50 percent criteria for 15 minutes was met at all sampling points.

The inspectors noted the following with respect to the above information provided to the NRC:

- The 50 percent concentration criteria was not met at the 15 foot sample location above the floor in the relay and cable spreading room.

- The 50 percent concentration was not held for 15 minutes at the 15 foot sample location above the floor in the relay and cable spreading room nor at the near floor in the relay and cable spreading room sampling points.

During this inspection, the licensee initiated Condition Report (CR) 20014015 and evaluated the information provided. The licensee determined that no report per 10 CFR 50.9(b) was required. The inspectors did not identify any issues regarding the licensee's evaluation with respect to 10 CFR 50.9(b). This apparent inaccurate information in the 1976 submittal appears to be a violation of Section 186 of the Atomic Energy Act. However, this is an unresolved item (URI 50-282/01-05-02; 50-306/01-05-02) pending a determination of the functionality of the Fire Area 18 CO_2 system.

.11 Compensatory Measures

a. Inspection Scope

The inspectors conducted a review to verify that adequate compensatory measures were put in place by the licensee for out-of-service, degraded or inoperable fire protection and post-fire safe shutdown equipment, systems, or features. The inspectors also verified that short term compensatory measures were adequate to compensate for a degraded function or feature until appropriate corrective actions were taken.

b. Findings

No findings of significance were identified.

.12 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed the corrective action program procedures and samples of corrective action documents to verify that the licensee was identifying issues related to fire protection at an appropriate threshold and entering them in the corrective action program. The inspectors reviewed selected samples of condition reports, work orders, design packages and fire protection system nonconformance documents.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

b. Inspection Scope

The inspectors reviewed a selected sample of condition reports associated with Prairie Island's fire protection program to verify that the licensee had an appropriate threshold for identifying issues and to verify the effectiveness of corrective actions for the identified issues. Licensee assessments and audits in this area were also reviewed to verify and evaluate licensee problem identification.

4OA6 Management Meetings

Exit Meeting Summary

On May 11, 2001, at the conclusion of the on-site inspection activities, the inspectors presented their initial findings to Mr. J. Sorensen, and other members of licensee management at Prairie Island Nuclear Generating Plant. On June 7, 2001, NRC the lead inspector presented final inspection results to Mr. M. Warner and other members of

licensee management during an exit meeting held by telephone. Licensee representatives acknowledged the findings presented.

The licensee was asked whether any materials examined during this inspection should be considered proprietary. No proprietary information was identified.

KEY POINTS OF CONTACT

Licensee

J. Kivi, Licensing Engineer
T. Lillehei, Electrical Design Engineer
R. Parazin, Instrumentation & Controls Engineer
R. Sitek, Fire Protection Engineer
J. Sorensen, Site Vice-President
M. Warner, Plant Manager

NRC

R. Caniano, Deputy Director, Division of Reactor Safety
R. Gardner, Chief, Electrical Engineering Branch

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

050-282/01-05-01; 050-306/01-05-01	URI	Relay and Cable Spreading Room Carbon Dioxide System Acceptability
050-282/01-05-02; 050-306/01-05-02	URI	Potential Violation of Section 186 Atomic Energy Act for Inaccurate Information

LIST OF ACRONYMS USED

%	Percent
AFW	Auxiliary Feedwater
BTP	Branch Technical Position
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
CR	Condition Report
CV	Control Valve
DPR	Demonstration Power Reactor
DRS	Division of Reactor Safety
EEI	Escalated Enforcement Item
FHA	Fire Hazards Analysis
FSAR	Final Safety Analysis Report
GL	Generic Letter
IMC	Inspection Manual Chapter
IPEEE	Individual Plant Examination of External Events
IR	Inspection Report
kV	kiloVolt
LLC	Limited Liability Company
MV	Motor Valve
NFPA	National Fire Protection Association
NRC	U.S. Nuclear Regulatory Commission
URI	Unresolved Item

LIST OF DOCUMENTS REVIEWED

The following is a list of licensee documents reviewed during the inspection, including documents prepared by others for the licensee. Inclusion on this list does not imply that NRC inspectors reviewed the documents in their entirety, but, rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort.

Analyses

Doyen Report, "Independent Review of Relay and Cable Spreading/Computer Room Cardox System," dated September 24, 1998

Hydraulic Calculation, Contract No. 30-762SH

Lagus Applied Technology Report, "Leakage Calculations for the Relay Room," dated June 27, 1998

Prairie Island IPEEE, Appendix B , Attacehment 5, "ERIN Engineering Calculation 130-98-01, Fire Area Scenario for FA 32," dated July 29, 1998

Safe Shutdown Analysis for Compliance with 10 CFR Part 50, Appendix R, Functional Discussions-Process Monitoring, Revision 2

Safe Shutdown Analysis for Compliance with 10 CFR Part 50, Appendix R and C, Fire Areas 13, 18, 20 and 32, Revision 2

Sargent & Lundy SL-5091, "Safe Shutdown Separation Analysis Cable Wrap Extent," dated September 30, 1996

Sargent & Lundy Report SLPR-0399, "Fire Area 32 Technical Evaluation," dated May 4, 2001

Calculations and Evaluations

FPP-5	NFPA Code Compliance Review, Revision 1
GEN-PI-026	Safe Shutdown Analysis, dated June 17, 1998
M-4163-001	CO_2 Concentrations in the Relay and Cable Spreading/Computer Room, Revision 1

Safe Shutdown Circuit Analyses

CKT-BKR 16-7	MTR 16-7, 12 SI Pump, dated April 16, 1998
CKT-BKR 111E-4	MV-32333, 11 TD AFW Pmp Suct From CST MV, dated January 29, 1998
CKT-BKR 111E-17	MV-32238, 11 AFW to 11 SG MV, dated January 29, 1998
CKT-BKR 111E-18	MV-32239, 11AFW To 12 SG MV, dated January 29, 1998
CKT-BKR 121B-27	MV-32163, 12 SI Pmp Suct MV, dated November 19, 1997
CKT-BKR 121E-8	MV-32335, 12 MD AFW Pmp Suct From CST MV, dated January 29, 1998

CKT-BKR 121E-17	MV-32381, 12 MD AFW Pmp Disch To 11 SG MV, dated January 15, 1998
CKT-BKR 122L-25	MV-32065, 1 Reac Vsl Inj Isol MV B, dated December 11, 1997
CKT-BKR 222L-25	MV-32168, RHR to 2 Rx Vessel Inj Isol Trn B MV, dated December 11, 1997
CKT-LOOP 1L-487	11 SG Wide Range Lvl, dated February 5, 1998
CKT-LOOP 1L-488	12 SG Wide Range Lvl, dated February 5, 1998
CKT-LOOP 1P-709	U1 Loop A RCS Wide Range Press, dated February 1, 1998
CKT-PNL-12-1-A	CV-31154, 12 MD AFW Pmp Recirc/L-O Clg CV, dated December 13, 1998

Calculations

E-385-EA-9	4.16kV and 480V System Protective Device Settings and Coordination, Revision 2
E-385-EA-21	480V Switchgear Branch Breaker Settings, Revision 2
194401-2.3-009	125Vdc System Coordination Study, dated November 24, 1992

Condition Reports

19980482	Relay room cardox system analysis does not meet licensing commitment in USAR 10.3.1.2.1 and 12/8/76 NSP/NRC Letter
19981154	Plant Emergency Communication Outside Design Bases As Described in USAR
19990187	Review of Doyen engineering report of relay room cardox system
20006073	SP 1194 Rev 10 Cardox system test had incorrect acceptance criteria

Condition Reports Initiated as a Result of Inspection

20013735	C31 section 5.16 “Cardox system actuation” does not provide adequate detail on timing of actions for system operation
20013818	SE 584 was not approved prior to issuance of a revision of F5 Appendix B incorporating the evaluated changes
20013819	Review F5 Appendix D to verify ‘required’ actions are identified as such
20013830	5AWI 8.5.1 add criteria and procedure for approval of control board chemicals
20014072	Compliance with existing Exemptions not adequately addressed in design change 00FP01 Part 1 Project Documentation
20014015	Review of licensing correspondence reveals two statements for which no supporting documentation can be found
20014148	Evaluation cannot be located which addresses CO2 migration following a Relay Room Cardox system Actuation

Procedures

5AWI 3.13.0	Fire Protection Program, Revision 7
5AWI 3.13.2	Fire Preventive Practices, Revision 3
C31	Fire Protection & Detection Systems,” Revision 29
F1	Confined Space Entry, Revision 13
F5 Appendix A	Fire Detection Zone 2, 11 , 12 and 14
F5 Appendix B	Control Room Evacuation (Fire), Revision 22

F5 Appendix D	Impact of Fire Outside Control/Relay Room, Revision 5
F5 Appendix E	Fire Protection Safe Shutdown Analysis, Revision 7
F5 Appendix F	Fire Hazard Analysis, Revision 14
PM 3122-3	Shield Building Category 1 Vent, Zone, Fire and Security Door Mechanical Inspection, Revision 15
SP 1188	Fire Protection Carbon Dioxide Tank Weekly Test, Revision 8
SP 1194	CARDOX 18 Month System Test," Revision 10
SP 1196	Fire Protection Safety Related Sprinkler System, Revision 12
SP 1200	Fire Protection System Supply to Safety Related Areas Valve Check, Revision 24
SP 1203	Fire Hose Hydrostatic Test, Revision 12
SP 1206	Carbon Dioxide System Puff Test, Revision 6
SP 1266	Fire Damper - 18 Month Inspection, Revision 8
SP 1785	Safe Shutdown Emergency Lighting Monthly Test, Revision 4
TP 1826	Outplant Safe Shutdown Equipment Check, Revision 6

Drawings, Diagrams, and Figures

FHA-002-1	Cable Tray System - Grd. Fl. Plan, AFW Pump Room - Class I Area, Fire Area 31 and 32, Revision 0
FHA-002-2	Cable Tray System - Grd. Fl. Plan, AFW Pump Room - Class I Area, Fire Area 31 and 32, Revision 0
FHA-004-1	Cable Tray System - Mezz. Floor Plan - Turbine Room, Fire Area 20, 22, 80, 81 & 69, Revision 0
FHA-004-2	Cable Tray System - Mezz. Floor Plan - Turbine Room, Fire Area 20, 22, 80, 81 & 69, Revision 0
FHA-008-1	Cable Tray System-Mezz. Floor Plan, Auxiliary Building - Unit 1, Fire Area 15, 18, 19, 59, 74 and 84, Revision 0
FHA-008-2	Cable Tray System-Mezz. Floor Plan, Auxiliary Building - Unit 2, Fire Area 15, 18, 19, 59, 74 and 84, Revision 0

Work Orders

0009557	Fire Damper - 18 Month Inspection
0004604	Safe Shutdown Emergency Lighting Monthly Test
0011031	Install Interam on Conduits/Tray in Fire Area 32

Correspondence

NRC letter to Northern States Power, dated May 11, 1976

Northern States Power letter to NRC, "Comparison of Existing Fire Protection Provisions to the Guidelines Contained in Standard Review Plan 9.5.1," dated December 8, 1976

NRC letter to Northern States Power, dated November 21, 1978

Northern States Power letter to NRC, "NRC Staff Evaluation of Fire Protection Program," dated March 9, 1979

NRC letter to Northern States Power, “Fire Protection Safety Evaluation Report,” dated September 6, 1979

Norther States Power letter to NRC, “Fire Protection Safe Shutdown Analysis and Compliance with Section III.G of 10 CFR Part 50, Appendix R, Including Requests for Relief,” dated June 30, 1982

Northern States Power letter to NRC, “Clarification of Equivalent Protection,” dated September 2, 1982
Northern States Power letter to NRC, “Clarification of Information Provided in Support of Request for Exemption from the Requirements of 10 CFR Part 50, Appendix R, Section III.G,” dated October 22, 1982

NRC letter to Northern States Power, “Draft SER on Appendix R Exemption Request,” dated January 4, 1983

NRC letter to Northern States Power, ”Request for Exemption from a Requirement of Appendix R to 10 CFR Part 50, Section III.G,” dated February 3, 1983

Northern States Power letter to NRC, “Review of Draft Safety Evaluation on Appendix R Exemption Requests,” dated February 17, 1983

Northern States Power letter to NRC, “Request for Relief from the Requirements of 10 CFR Part 50,. Section 50.48(b) for Fire Areas No. 58, 59, 73, and 74,” dated March 11, 1983

NRC letter to Northern States Power, “Exemption to Certain Requirements of 10 CFR Part 50 Appendix R Subsection III.G.2,” dated May 4, 1983

Northern States Power letter to NRC, “Clarifying Information in Support of Exemption Requests for Fire Areas 58, 59, 73, and 74,” dated May 16, 1983

NRC letter to Northern States Power, “Exemption to Certain Requirements of 10 CFR Part 50 Appendix R Subsection III.G.2,” dated January 9, 1984

NRC letter to Northern States Power, “Exemption to Certain Requirements of 10 CFR Part 50 Appendix R Subsections III.G.2 and III.O,” dated July 31, 1994

NRC letter to Northern States Power, “Issuance of Exemption RE: Certain Technical Requirements of Appendix R to 10 CFR Part 50,” dated February 21, 1995

NRC letter to Northern States Power, “Exemption Request of January 23, 1994 - Fire Protection Schedular Requirements of 10 CFR 50.48(c),” dated April 26, 1984

NRC letter to Northern States Power, “Request for Additional Information Concerning the Prairie Island Nuclear Generating Plant Request for Exemption from 10 CFR Part 50, Appendix R, Section III.G.2,” dated September 17, 1998

NRC letter to Northern States Power, “Request for Additional Information Concerning the Prairie Island Nuclear Generating Plant Request for Exemption from 10 CFR Part 50, Appendix R, Section III.G.2,” dated August 12, 1999

Miscellaneous Documents

Northern States Power Prairie Island Station Fire Protection Program Assessment Final Report, Proto-Power Corporation, dated June 5, 1998

Over-Current Protective Relay Cards for 4.16kV and 480V Breakers 15-1, 15-3, 15-7, 16-2, 16-5, 16-7, 16-8, 111M and 122M.

Engineering Design Standard for 125Vdc Fuse Selection Criteria Section 3.3.1.7, December 20, 1996

Material Safety Data Sheet for MS-966/CO_2 EN-STAT Static Eliminator, May 9, 2001

Design Change Package 00FP01, “Kaowool Removal Project,” Revision 1.

ENCLOSURE 2

REQUEST FOR ADDITIONAL INFORMATION
TO SUPPORT RESOLUTION OF UNRESOLVED ITEM

Provide an evaluation which demonstrates functionality of the Fire Area 18 carbon dioxide (CO_2) system, i.e., the ability to suppress a deep-seated fire by providing a CO_2 concentration of at least 50 percent for at least 15 minutes. The evaluation should specifically address the CO_2 concentrations in the overhead area (15 to 19 feet above the floor). In addition, the evaluation should specifically address the potential effects of the method for venting over-pressure using the fire doors. Specifically, the effect upon operations personnel due to smoke propagation and CO_2 leakage out of the room should be addressed. If the evaluation does not rely upon the testing methodology specified by NFPA 12 (i.e., satisfactory full discharge test), provide a justification for the alternative testing methodology employed. If the evaluation has not yet been performed, provide a plan and a schedule for performing such an evaluation and testing required to support such an evaluation.

The information provided from the above request would be necessary to resolve the Unresolved Items 50-282/01-05-01; 50-306/01-05-01 and 50-282/01-05-02; 50-306/01-05-02.