

50-282
NRC FDR



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 21, 1978

Docket Nos. 50-282
and 50-306

Northern States Power Company
ATTN: Mr. L. O. Mayer, Manager
Nuclear Support Services
414 Nicollet Mall - 8th Floor
Minneapolis, Minnesota 55401

Gentlemen:

In our letter to you dated January 31, 1978, we requested information and presented five staff positions that resulted from our initial review of your fire protection program on the Prairie Island Nuclear Generating Plant, Unit No. 1 and 2. You provided the information requested and your responses to the staff positions in a letter dated April 18, 1978. Additional review resulted in the development of requests for additional information which were telecopied to you September 13 and September 19, 1978 in preparation for the site visit. These requests are included as Enclosure 1 to this letter. During the site visit your staff provided the review team with informal responses to the items listed in Enclosure 1 and agreed to confirm these informal responses by letter.

During the period of October 16 through October 20, 1978, the NRC fire protection review team visited the Prairie Island Plant. On October 20, an exit meeting was held with your staff to discuss staff concerns and positions. The list of attendees at the exit meeting is provided in Enclosure 2. A summary of the items that your staff agreed to complete in response to the concerns raised by the staff is provided as Enclosure 3. The staff concerns and positions which were discussed with your staff at the exit meeting and remain as open items are listed in Enclosure 4.

Our review of your letter dated April 18, 1978 resulted in modified staff positions which were discussed with your staff at the exit meeting. These modified staff positions are listed in Enclosure 5.

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November 21, 1978

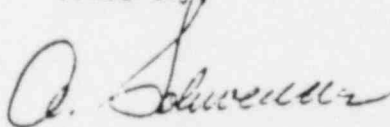
As indicated above, during the site visit you provided informal responses to the additional information requested by the staff. A review of these responses together with a review of the notes taken by the review team during the site visit have resulted in certain additional staff concerns and positions which have not been discussed with your staff. These concerns and positions, which remain as open items, are identified in Enclosure 6. Enclosure 6 was telecopied to you on November 9 and 17, 1978.

In order to obtain a timely resolution of the concerns identified in Enclosures 4 and 6, you should address each of these concerns as follows:

1. Commit to implement the staff position;
2. Propose an alternative method to resolve the staff's concern; or
3. Provide the basis by which the present fire protection program addresses the concern without further action.

It is our understanding that you will respond to the items identified in Enclosures 4 and 6 in about two weeks following the date of this letter or provide a schedule for the response in the case of items with longer lead time involved. About one week after your response is received by the staff you should plan to meet with us to achieve a final resolution.

Sincerely,



A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:
As Stated

cc: w/enclosures
See next page

November 21, 1978

cc: Gerald Charnoff, Esquire
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ENCLOSURE I

Request for Additional Information

8. Provide a revised list of equipment required for achieving hot shutdown considering the following shutdown functions:
 1. Placing the reactor in a subcritical condition and maintaining the reactor subcritical indefinitely.
 2. Bringing the reactor to hot shutdown conditions and maintaining it at hot shutdown for an extended period of time (i.e. longer than 72 hours) using only normal sources of cooling water.
 3. Maintaining the reactor coolant system inventory indefinitely using only normal sources of makeup water.
 4. Bringing the reactor to cold shutdown conditions within 72 hours.

Primary system makeup and boration capability should be considered when developing the list of equipment required for hot shutdown.

9. Discuss the role of the charging pumps in achieving hot shutdown.
10. Discuss the role of the component cooling water system and the cooling water system in achieving hot shutdown.
11. Discuss any limitations for cooling the main coolant pump seals and thermal barriers that exist during hot shutdown conditions.
12. Discuss the function of the startup neutron channel in achieving hot shutdown.
13. Discuss the role of the boric acid pumps and associated valves and tanks in maintaining hot shutdown conditions for an extended period of time.
14. Discuss the need for pressurizer heaters in achieving hot shutdown.
15. Describe any manual valve operations needed to achieve hot shutdown, considering a loss of offsite power.
16. Discuss the source and capacity of makeup feed water during extended hot shutdown operations when using the atmospheric steam dump valve.
17. Provide drawings which show actual separation distance of redundant cables required for safe shutdown that are located in the same fire zone.

18. Fire Induced Spurious Equipment Operation

Identify any equipment required for safe shutdown that is subject to spurious operation as a result of a fire. Particular attention is directed to valves and valve position indicators. Discuss the effects on safe shutdown of such spurious operation.

19. Instrument and Station Air System

Describe the function of the instrument and station air system in achieving and maintaining both hot shutdown and cold shutdown conditions. Identify any fire areas which contain components or piping of the air system and air operated valves whose position must change for shutdown. Verify that the loss of the air system will not prevent shutdown operations.

20. Safe Shutdown Systems-Valves

Provide a list of remotely-operated valves, with their fail positions, in safe shutdown systems.

21. Failure Analysis

Provide a failure analysis which verifies that a single failure does not impair the primary and backup fire suppression capabilities. The analysis should include consideration of failures in the suppression system, the fire detection system or the power sources for such systems.

22. Lightning Effects

Describe the means provided to prevent lightning from initiating fires which could damage safety-related equipment. Describe the means provided to prevent lightning from damaging the fire protection system.

23. Safety-Related Systems Interlocked with Fire Fighting Systems

Identify any safety-related systems or their auxiliaries which are interlocked to and could be disabled by operation of a fire fighting system.

24. Drains

Identify the areas containing combustible liquids that are not provided with floor drains. Describe the drainage path and provisions for containing or diverting the combustible liquid in those areas without drains. In those areas with drains, state the capacity and location of the drain reservoirs and describe the provisions to prevent the spread of flammable liquid fires via the drain system to areas which may jeopardize safety-related equipment.

25. Pipe and Ventilation Duct Penetrations

Provide the results of an analysis which shows that the fire barrier penetration seals for pipe penetrations and ventilation ducts are adequate to prevent the spread of smoke or fire through the barrier considering the combustible loading and possible air pressure differential.

26. Curbed Areas

Provide the results of an analysis that shows that curbed area surrounding combustible liquid tanks will contain the contents of the tanks plus the quantity of water required for extinguishment of a fire involving the combustible liquid.

27. Piping Containing Combustibles

Identify all piping containing flammable gas or combustible liquid which is routed through areas containing safety-related equipment, safety-related cables or through which personnel must pass to reach safety-related equipment for local operation. Provide an analysis to show that a fire involving the liquid or gas will not prevent safe shutdown or result in the loss of function of a safety-related system.

28. Diesel Fuel Transfer Shut-off

Describe the means provided to automatically and/or manually stop the transfer of diesel oil from the bunker tanks to all diesel fuel day tanks in the event of a fire in the area housing the day tank, or through which the fuel oil transfer piping is routed.

29. Method of Heat and Smoke Venting

In all the areas where manual fire fighting is proposed as either primary or backup means of suppression, describe the methods which would be used for heat and smoke removal using either fixed or portable air handling equipment. If the plant HVAC systems are proposed for such service, provide design data to show that these systems are rated for the conditions (temperature and capacity) required when used for this service.

30. Prevention of Fire and Smoke Spread

Describe the manner in which fire and smoke are prevented from spreading from area to area via the normal and emergency ventilation systems in all parts of the plant areas. Describe the location, actuation method and fire rating of dampers used for fire and smoke control in both air supply and return air systems. Describe the details of interlocks for ventilation system shutdown or mode change that can be utilized for fire smoke control.

31. Ventilation System Power and Control

Identify the areas where ventilation systems power supply or controls are located within the area they serve. Provide the basis for leaving ventilation systems power and control cables within the area they serve.

32. Preventing Recirculation of Ventilation Air

Describe the separation between the air intakes and exhausts for normal and emergency ventilation systems and the provisions which prevent smoke being drawn back into the plant.

33. Fire Detection System Design

Provide design data for the automatic fire detection system in each fire area, including such items as type, number and location of the detectors; and signaling, power supply and supervision of the system. Identify any deviation(s) from NFPA 720.

34. Fire Suppression System Design

Provide the design data for all automatic suppression systems (both existing and proposed) including such items as design densities, soak times, power supplies, and associated alarms. Identify areas of non-compliance with appropriate NFPA Standards.

35. Remote Shutdown Panels

Identify the location of all remote shutdown panels and provide the results of analysis to demonstrate that no fire which could impair the control room could also prevent the control from these areas.

ENCLOSURE 2
LIST OF PARTICIPANTS

NRC

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M. Grotenhuis
V. Panciera
M. Riden
E. Sylvester

Flour Pioneer

C. Agan
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NRC Consultants

I. Asp
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G. Bart
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L. Mayer
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J. Ruether
F. P. Tierney

ENCLOSURE 3
PROPOSED FIRE PROTECTION POSITIONS AND
MODIFICATIONS ACCEPTED BY LICENSEE
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

1. Post Indicator Valve Barricades
(PF-6)*

The following barricade posts will be extended in height so that the valve height of the post is approximately 6 inches above its height of the valve operating assembly.

- (1) FP 35-2
- (2) FP 35-3

All other post indicator valve barricade posts will be evaluated to assure that they are not vulnerable to damage from vehicular traffic.

2. Exterior Fire Hydrant Inspections

(PF-7) A periodic inspection schedule will be established to:

- (1) verify that each valve barrel is drained preceding the winter freezing season;
- (2) conduct a hydrostatic test of each valve barrel to verify its pressure integrity following the winter freezing season.

3. Hydrant Hose House Equipment
(PF-9)

The following equipment will be provided in each of the eight hydrant hose houses that are in the vicinity of the turbine building, auxiliary building and containment building complex (Hydrant Hose Houses 19, 20, 21, 22, 23, 24, 25, 26)

- (1) Two hose gaskets for each hose size used;
- (2) One 2 1/2" x 1 1/2" x 1 1/2" gated wye; and
- (3) One additional 100-ft length of 1 1/2" hose.

4. Water Screen House - Diesel and Electric Driven Fire Pumps
(PF-10)

The electric-driven fire pumps will be protected from diesel oil fires originating in the diesel driven fire pumps or their fuel systems, including their day tanks.

5. Water Screen House - Battery Racks for Diesel Driven Fire Pumps
(PF-11)

The wooden covers on the battery racks will be replaced with covers composed of a noncombustible material or pressure-treated fire retardant wood.

(*) Previously numbered position.

6. Water Screen House - Electric Motor-Driven Fire Pump Cables
(PF-12)
Verification will be provided that no power or control cables for the electric motor driven fire pumps are routed over the area of influence of a diesel fuel fire.
7. Water Screen House - Diesel Driven Cooling Water Pumps - Floor Drains
(PF-13)
Verification will be provided that fuel leakage from the diesel driven cooling water pumps or their fuel systems cannot spread to other areas of the water screen house via the floor drainage systems.
8. Auxiliary Building, Fire Zone 61 - Storage of Wooden Boxes
(PF-17)
The wooden equipment boxes stored on the platform above the entrance to containment will be coated with an acceptable fire retardant coating.
9. Trash Containers
(PF-18)
Trash containers in all safety-related areas will be replaced with metal containers which are provided with metal swing top lids.
10. Diesel Generator Rooms - Curbs
(PF-21)
Curbs or ramps will be provided at the fire door between the two diesel generator rooms and at the door between generator room No. 1 and Fire Zone 27.
11. Polyurethane Foam Insulation
(PF-24)
All polyurethane foam insulation used in safety-related areas will be painted with an intumescent coating.
12. Records Storage Room, Fire Zone 12 - Electric Range Hood and Ducts
(PF-26)
The hood and ducts above the electric range will be provided with a grease filter.

A periodic cleaning program will be instituted for this filter.
A 5-lb dry chemical extinguisher will be provided next to the range.
13. Smoke Detector Locations Markers
(PF-27)
Smoke detectors located in areas that are blocked from view will be provided with remote indicating lamp in the room or locator markings on the floor.
14. Control Room - Control of Combustibles
(PF-28)

Verification will be provided that the wall and ceiling covering in the control room has a flame spread rating of 25 or less. All wooden furniture and lumber will be removed from the control room.

15. Instrument Room, Fire Zone 83 - Fire Door
(PF-29)

The door between the control room and the instrument room will be adjusted to assure it remains in the closed position when not in use for entry and exit purposes.

16. Auxiliary Feed Water Pump Rooms, Fire Zones 31 & 32 Pipe Trench
(PF-33)

A concrete fire barrier will be placed in the pipe trench that passes through the AFW pump rooms at the boundary between the two rooms. Metal covers consisting of 5/16" thick steel plates will be placed over the portion of the pipe trench which runs through each room and will be fastened to the concrete floors to prevent movement and warpage of the plates due to a postulated fire.

17. Auxiliary Feedwater Pump Rooms - Water Damage
(PF-34)

Verification will be provided that operation of the wet pipe sprinkler system in the AFW pump rooms will not damage equipment needed for safe hot shutdown of the plant.

18. Auxiliary Feedwater Pump Rooms - Hot Shutdown Panels
(PF-35)

Verification will be provided that in the event of fire damage to a hot shutdown panel, safe shutdown can be accomplished using systems and equipment located outside the room.

19. Turbine Lube Oil Drains
(PF-36)

Verification will be provided that drainage from the lube oil storage tank and lube oil reservoir floor drains cannot backup into other safety-related areas of the plant or areas that pose a hazard to safety-related areas.

20. Fire Detection System - Emergency Power and Supervision
(PF-37)

Verification will be provided that all circuits of the detection system are supplied by the emergency bus and are electrically supervised.

21. Combustible Gas Cylinders - Fire Protection
(PF-40)

All cylinders, which contain combustible fluids and are connected to piping systems will be provided with excess flow valves.

22. Fire Water Systems - Valve Supervision
(PF-41)
Valves controlling the flow of fire water will be provided with electrical supervision or chains and locks or tamper-proof seals, with administrative procedures which assure inspection of valves per NFPA26.
23. Fire Hose
(PF-42)
All interior unlined linen hose will be replaced with 100% polyester synthetic tube fire hose (300 psi test pressure) (F.M. or U.L. listed) suitable for use with pin racks by June 1981.
24. Fire Brigade Practice Sessions
(PF-44)
Practice sessions will be held for fire brigade members on the proper method of fighting various types of fires that could occur in a nuclear power plant considering such factors as the magnitude of the fire, and the complexity and difficulty of fire fighting. These sessions will be designed to provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous working conditions. The sessions will be in addition to the scheduled fire brigade training sessions and fire drills and will include fire fighting strategies, (i.e., simple plans showing fire fighting equipment locations, entry and egress points, ventilation, communications and emergency lighting locations and controls). These practice sessions will be provided at regular intervals, but not exceeding a one year interval for each fire brigade member.
25. Fire Protection Program - QA Audits
(PF-45)
In order to provide an overall assessment of conformance to fire protection program requirements an audit will be performed annually until results show that a biennial audit is sufficient.
26. Screening of Fire Brigade Members for Heart and Respiratory Disorders
(PF-46)
All fire brigade members will be periodically screened for heart and respiratory disorders. This program will be developed by a medical doctor and administered by the plant nurse. Fire brigade members who fail this screening test will be given a physical examination by a medical doctor to determine their physical qualifications for continued assignments as fire brigade members.
27. Emergency Breathing Equipment
(PF-27)
The air breathing apparatus needed by the fire brigade and emergency control personnel (i.e. the complement of air breathing apparatus, spare bottles and recharge capability) will be provided sufficient

to meet the needs of ten persons for a period of six hours
at a usage rate of three 30 minute air bottles per hour per
person.

ENCLOSURE 4
STATEMENT OF STAFF POSITIONS
MEETING DISCUSSION ITEMS
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
UNITS 1 AND 2

PF-6 FIRE BRIGADE TRAINING *

(48)** Staff Concern

The fire brigade will not maintain a high level of fire fighting expertise unless:

1. Classroom instructions and fire drills are provided on a more frequent schedule than the proposed 6 month interval for classroom instructions and the semi annual fire drills;
2. Fire brigade members are each evaluated during fire drills to assure their proficiency in fire fighting techniques;
3. Periodic critiques of the fire brigade are performed by qualified individuals independent of the plant staff to update and correct the existing fire fighting techniques.

Staff Position

- a. Regularly planned meetings should be held every 3 months to repeat the initial classroom instruction programs over a two year interval.
- b. During fire drills, an evaluation should be made of each fire brigade member's proficiency in the use of fire fighting procedures.
- c. Fire drills should be critiqued at three year intervals by individuals independent of the plant's staff.
- d. Fire drills should be performed at regular intervals but not to exceed 3 months for each fire brigade.

(*) Change from position previously presented to licensee
(**) Previously numbered position

PF-7 FIRE BRIGADE*

(49) Staff Concern

The three man brigade may not provide an adequate response force to control and suppress fires in safety-related areas.

Fires in critical areas of the plant may require the use of systems, components or auxiliaries normally not used for plant shutdown. A Shift Supervisor who is not a member of the fire brigade, may be needed to direct the intergrated operation of these systems, components or auxiliaries during a fire.

Staff Position

A fire brigade of not less than five trained members should be maintained onsite at all times. This five man brigade should be organized with responsibilities assigned responsive to the plant's fire fighting plants. The assigned responsibilities should include advancing support supplies to the fire scene, command control of the brigade, communication with the control room, fire hose laying, applying the extinguisher to the fire, set up and operation of portable ventilation and smoke removal equipment, relieving fatigued or injured fire fighter, rescue operation, and coordination with offsite fire department personnel.

A Shift Supervisor who is not a member of the fire brigade should be present in the control room or other areas if fires occur in certain critical areas of the plant.

PF-8 CENTRALIZED FIRE EQUIPMENT STORAGE LOCATION

(43) Staff Concern

In order to be prepared to effectively fight a fire of the type that could occur at the plant, the fire brigade should have readily available at a central location certain types and quantities of equipment.

Staff Position

Provide a suitable storage area for fire brigade equipment, at a central location, containing the following equipment:

- 10 sets of fire fighting protective clothing consisting of turnout coats with removable liners, thigh length boots, gloves and fire fighter style helmets.
- six (6) complete self-contained breathing units with two spare cylinders for each unit and with the spare cylinders for all

other units (or at other strategic locations)

- one (1) 1 1/2" metering type nozzle with wide & narrow stream options
- one (1) 2 1/2" x 1 1/2" x 1 1/2" gated wye
- one (1) 2 1/2" gate valve
- two (2) forcible entry tools (halligan type)
- two (2) 2 1/2" double female adapters
- two (2) each, 2 1/2" and 1 1/2" universal hose spanners
- two (2) portable radios
- two (2) battery powered portable handlights (7 1/2 volt)
- spare lengths of 2 1/2" and 1 1/2" hose
- spare gaskets for 2 1/2" and 1 1/2" hose couplings
- spare 2 1/2" and 1 1/2" fog nozzles

PF-9 FIRE HOSE TESTING*

(50) Staff Concern

Fire hose deteriorates with time and use and may fail when needed during a fire.

Staff Position

Fire hose should be hydrostatically tested periodically at a pressure 50 psi above the maximum service pressure of the fire water system. Exterior hoses should be so tested annually; interior hose should be so tested every three years.

PF-10 FIRE RETARDANT WOOD*

(15) Staff Concern

A number of safety-related areas contain lumber used for scaffolding, work operations and packaging. This lumber presents a fire hazard unless properly treated.

Staff Position

All lumber and wooden items in safety-related areas should be replaced

with pressure-treated fire retardant lumber or coated with a penetrating fire retardant that has good abrasion resistance.

PF-11 ELECTRICAL AND MECHANICAL PENETRATION QUALIFICATION

(19) Staff Concern

The NRC staff has taken the position that all electrical and mechanical penetrations in fire barriers surrounding safety-related areas should be sealed by methods demonstrated effective by testing.

The licensee has identified typical electrical (cable and trays and conduits) and mechanical (pipes and ventilation ducts) penetration seals that exist at the plant. The licensee has provided some information concerning the adequacy of seals during the site visit and has stated that test results which demonstrated the effectiveness of the fire stops are not presently available.

Staff Position

Demonstrate by test that the penetration seals presently installed in the plant have a rating equivalent to the fire severity present on either side of the seal using the test criteria and guidance as discussed in PF-1. Any new penetration seals that are installed in the plant in the future or existing seals which must be replaced should be qualified to the test guidance and criteria of PF-1.

PF-12 SAFE SHUTDOWN REQUIREMENTS

(23) Staff Concern

The licensee has submitted a preliminary shutdown analysis. This shutdown analysis did not consider such items as the capability for makeup to the primary system during hot shutdown and the provisions for boration in achieving and maintaining hot shutdown. The licensee has not developed fully the list of minimum systems needed for achieving and maintaining hot and cold shutdown. This list is particularly important since a number of fire zones appear to contain redundant systems which may be needed to achieve and maintain the plant in a safe hot shutdown and cold shutdown condition. The licensee is continuing to refine the list of minimum systems and equipment needed for achieving and maintaining both hot shutdown and cold shutdown conditions. Further, the licensee is continuing the effort to determine the exact location of electrical raceways for those systems and auxiliaries required to safely shutdown and cooldown the plant. Finally, the licensee has not demonstrated that the plant can be safely shutdown in the event of a fire in any fire area.

Staff Position***

Provide a list of minimum systems and equipment needed for achieving and maintaining safe hot shutdown and safe cold shutdown following a severe fire in the plant considering the following shutdown functions:

1. Placing the reactor in a subcritical condition and maintaining the reactor subcritical.
2. Bringing the reactor to safe hot shutdown conditions and maintaining it at hot shutdown for an extended period of time (i.e., longer than 72 hours) using only onsite power sources and onsite water supplies.
3. Maintaining the reactor coolant system inventory using only onsite sources of makeup water.
4. Bringing the reactor to safe cold shutdown conditions within 72 hours using either onsite or offsite power sources.

Hot shutdown should be achievable from the control room or the remote shutdown panels. Where a fire in a given fire zone causes inoperability of hot shutdown equipment from the control room or remote shutdown panels, remote manual operation of valves and breakers is permissible provided it can be shown that there is sufficient time and manpower to accomplish these manual operations. Manual operation of valves and breakers and replacing of cables for achieving and maintaining safe cold shutdown is permissible provided it can be shown that these operations can be done within 72 hours.

Demonstrate that the plant can be safely shutdown using any one or combination of the following in the event of a fire in any fire zone:

1. Redundant systems and equipment are located in separate fire areas. (Fire areas are defined as areas bounded on all sides by three-hour fire rated boundaries).
2. If redundant systems are located in the same fire area, there is reasonable assurance that redundant systems will not be damaged considering potential exposure fires, flame spread characteristics and fire protection features within the zone. (Note: Sole reliance should not be placed on active, automatic fire suppression systems).
3. An alternate shutdown system will be provided which is independent of the influence of the fire within the fire zone by rerouting cables and relocating equipment.

(***) Supersedes item 8 of Enclosure 1.

PF-13 CABLE SPREADING AND RELAY ROOM ALTERNATE SHUTDOWN REQUIREMENT

(30) Staff Concern

The cable spreading and relay room contains cables, in close proximity, of redundant systems of both Units 1 and 2 that are required for safe shutdown. The room is protected by a double shot CO₂ system actuated by thermal detectors. Portable extinguishers are available in the room and hose stations are nearby near vicinity. However, there is a heavy concentration of combustible cables, especially in the ceiling area of the room and access to this area is limited to the extent that manual suppression of the fire would be difficult. It is the staff's concern that (1) the CO₂ system may not be effective in suppressing a deep seated fire, (2) the spatial separation between redundant divisions of safe shutdown systems may not be sufficient to prevent an exposure fire from damaging both divisions.

Staff Position

An alternate shutdown capability should be provided independent of the cable spreading and relay room such that the conditions specified for safe shutdown in PF-12 are met.

PF-14 BOOSTER HOSE SERVICE FOR ELECTRICAL EQUIPMENT AREAS

(25 &
31) Staff Concern

The following fire zones contain electrical cabinets and panels that are susceptible to hose stream water damage: Fire Zones 10; 11; 13; 16; 17; 18; 18A; 79; and 82.

Hose stations are provided adjacent to these fire zones to permit manual suppression of fires originating in these zones. However, use of a 1 1/2" hose and nozzle may damage nearby safety-related equipment and circuits in cabinets not involved in the fire.

Staff Position

A one-inch booster hose with variable gallonage nozzle with shutoff should be provided adjacent to existing hose stations 21, 23, 24, 64, 69, and 70. In addition, a cabinet should be provided outside the cable spreading and relay room with waterproof tarpaulins to be used to protect the relay cabinets from water damage.

PF-15 CONTAINMENT FIRE HOSE STANDPIPE

(16) Staff Concern

During normal operation the containment hose stations are dry.

Following detection of a fire in containment it is necessary to remove containment fire hose standpipe system flanges attached at the inner and outer containment boundaries and to install spool pieces in the fire water system. The licensee's description of his procedure to reestablish fire water to containment indicates that fire suppression water would not be available for a period of 6 to 8 hours following detection of a fire in containment because of containment integrity considerations prior to cooldown to 200°F.

A more timely method for providing fire water to containment hose stations is needed to assure prompt extinguishment of a fire within containment.

Staff Position

The containment fire hose standpipe system should be solidly piped to the fire water supply header outside containment. A valve may be provided on the outside of containment to maintain the fire water piping inside containment dry until needed to suppress a containment fire.

PF-16 AUXILIARY BUILDING, FIRE ZONE 74 - CONTROL OF COMBUSTIBLES

(20) Staff Concern

Fire Zone 74 contains cables of redundant systems needed for safe shutdown of the plant. At the present time, approximately 1000 pounds of clothing and other combustibles are stored along the north wall of the zone. The licensee proposes installation of a preaction sprinkler system in the area to promptly extinguish an exposure fire. However, failure of the preaction sprinkler system to actuate in the event of a fire could jeopardize safe shutdown of the plant.

Staff Position

The storage of combustible materials along the north wall of Fire Zone 74 should be discontinued. No combustible materials should be stored in this fire zone.

PF-17 DIESEL GENERATOR ROOMS - PENETRATION SEALS

(22) Staff Concern

Each diesel generator room contains approximately 700 gallons of combustible liquids. The diesel generator rooms are located adjacent to each other at the 695' elevation and are contiguous to the east boundary of the Auxiliary Building in the vicinity of Fire Zone 58. Fire Zone 58 contains redundant systems required for safe shutdown. The walls surrounding the diesel generator

rooms have a 3 hour fire resistance. However, the licensee is not certain that the penetration seals in these walls have a 3 hour fire resistance.

Staff Position

All penetration seals between the diesel generator rooms and the auxiliary building should have 3 hour fire resistance.

PF-18 TURBINE BUILDING, FIRE ZONE 69 and 70 - HYDROGEN SEAL OIL UNITS
CURBS

(38) Staff Concern

The hydrogen seal oil units are located at the east and west ends of the turbine building at the 695' elevation. Each unit contains a significant quantity of lube oil and rupture of either unit may permit the spread of oil such that in the event of a lube oil fire the structural integrity of portions of the turbine building and the adjacent auxiliary building could have an adverse affect on safety-related and safe shutdown systems.

Staff Position

A curb should be provided around each hydrogen seal oil unit of sufficient height to contain the entire contents of the unit plus a margin for fire suppression water.

PF-19 TURBINE BUILDING, FIRE ZONES 69 and 70 - LUBE OIL RESERVOIRS

(39) Staff Concern

The turbine lube oil reservoirs are located at the west and east ends of Fire Zones 69 and 70 respectively. Each reservoir contains a large quantity of lube oil. A fire at either reservoir could result in the loss of structural integrity of the turbine building. Such a loss of turbine building structural integrity could have an adverse affect on safety-related and safe shutdown systems and components in adjacent areas.

Staff Position

- A. Verify that the design density, coverage and nozzle locations of the Reservoir Fire Suppression Systems are adequate to suppress a fire involving rupture of the turbine lube oil reservoirs.
- B. Apply a U. L. listed fire retardant coating, suitable for protection of structural members, to the turbine building columns adjacent to the lube oil reservoirs.

ENCLOSURE 5
STAFF EVALUATION OF LICENSEES RESPONSE
TO PF-1 THRU PF-5

PF-1 CABLE PENETRATION FIRE BARRIER TEST

See new staff position PF-11 which was developed in response to licensee's response of April 18, 1978.

PF-2 SMOKE DETECTION SYSTEM TESTS

Based on the licensee's response of April 18, 1978 and information gathered during the staff's site visit, we find that the number and placement of detectors are adequate. However, the licensee should provide bench test data to verify that the detectors are sensitive to the products of combustion from each fire area.

PF-3 SUPERVISION OF FIRE DOORS

We find the present system of fire door inspection and supervision to be unacceptable because the licensees' controls are not effective; for example, during our site visit we noted that:

1. The door between the control room and the records storage room did not close sufficiently to provide a positive latch.
2. The door between the control room and the instrument shop was propped open with a wooden stool.

The licensee should reconsider his response to positions PF 3.1 and PF 3.2. The licensee's response to PF 3.3 is acceptable.

PF-4 AIR FLOW SUPERVISION OF BATTERY ROOM EXHAUST

The licensee's response is acceptable.

PF-5 SMOKE DETECTION - CONTROL ROOM AIR SUPPLY

The licensee's response is acceptable.

ENCLOSURE 6
STATEMENT OF ADDITIONAL STAFF POSITIONS
PRAIRIE ISLAND NUCLEAR GENERATING PLANT
UNITS 1 and 2

PF-21 EQUIPMENT NEEDED TO SUPPRESS COMBUSTIBLE LIQUID FIRES

Staff Concern

There are a number of areas in the plant where there is a heavy concentration of combustible liquids. Fire fighting actions necessary to suppress combustible liquid fires may require special equipment and supplies in order to be effective.

Staff Position

Suitable equipment consisting of foam concentrate and foam applicator nozzles with pick-up tubes for use with 1 1/2 inch hose lines should be provided at a centralized location to facilitate the suppression of combustible liquid fires.

PF-22 CABLE SPREADING AND RELAY ROOM - SAFE SHUTDOWN REQUIREMENT

Staff Concern

The cable spreading and relay room contains control and power circuits for systems normally used to shutdown the plant. Notwithstanding the provision for an alternate shutdown capability independent of the cable spreading and relay room, a fire in the room may cause sufficient damage to cabling to cause spurious actuation of equipment resulting in adverse effects on the safe shutdown capability of the plant.

Staff Position

Verify that a fire in the cable spreading and relay room would not cause the types of spurious movements of components that would adversely affect the ability to safely shutdown the plant.

PF-23 FLAMMABLE LIQUIFIED GAS TANKS

Staff Concern

Flammable liquified gas tanks and attached piping to these tanks are not rigidly supported. The piping to these tanks could easily be ruptured due to impacts from work operations in the vicinity of the tanks.

Staff Position

Provide rigid supports for flammable liquified gas tanks and better physical protection for the attached flammable gas piping.

Post a warning sign near each flammable gas tank reading:
"Danger Flammable Gas"

PF-24 HOSE STATION PRESSURE

Staff Concern

The highest hose station is about 140 feet above the fire pumps which are designed to operate at about 120 psi. There may not be sufficient pressure available at this highest hose station to properly operate with the 1 1/2" nozzle (Elkhart All-Spray, Model L-E).

Staff Position

Demonstrate that there is sufficient pressure at the highest hose station to properly operate with the installed 1 1/2" nozzle, or provide a nozzle designed to operate at the lower pressure tested.

PF-25 HYDRANT HOSE HOUSE - HOSE ATTACHMENT

Staff Concern

It is current practice at the plant to attach a 1 1/2 inch hose to the 2 1/2" hose gate valve in the hydrant hose house by use of an adaptor. This hose arrangement may cause an unacceptable reduction in fire water pressure available at the scene of the fire, particularly if the available pressure at the hydrant is limited to 120 psi.

Staff Position

The practice of connecting a 1 1/2 inch hose directly to the hydrant should be discontinued. A 2 1/2 inch hose should be connected to a hydrant outlet gate valve.

PF-26 HOT WORK PERMITS

Staff Concern

The licensee does not utilize a hot work permit system for the control of welding, burning and grinding operations but instead specifies any hot work precautions on the work permit. This practice may result in the omission of important precautions that should be taken during such operations.

Staff Position

The licensee should adopt a hot work permit system in accordance with NFPA 51B for work operations involving welding, burning or grinding.

PF-27 PIPING CONTAINING FLAMMABLE GASES

Staff Concern

One oxygen line (3/4") and one hydrogen line (1") pass from the gas house through the east end of the turbine building into fire zones 58 and 73 in the Auxiliary building. The hydrogen line is fitted with a high flow shutoff and the oxygen line which provides low volume, low pressure supply to the recombiner, has a manual emergency shutoff. Fire Zones 58 and 73 contain safety related systems and equipment that may be required for shutdown in the event of a fire and a fire or explosion in these zones could damage systems needed for shutdown of the plant.

Staff Position

Provide an analysis to demonstrate that the quantity of hydrogen or oxygen that could be leaked before detection and isolation of either gas line is not sufficient to jeopardize safety related systems and equipment needed to shutdown.

PF-28 DIESEL FUEL OIL TRANSFER SYSTEMS

Staff Concern

There are a number of areas in the plant in which are located diesel driven auxiliaries and their associated day tanks. Diesel oil is transferred to these day tanks from storage tanks located underground outside the main plant.

The areas where these diesel driven auxiliaries are located are:

1. The screen house (Fire Zone 41) contains two diesel driven cooling water pumps and a diesel driven fire pump.
2. Fire Zones 25 and 26 each contains an emergency diesel generator.

The transfer piping for the diesel driven auxiliaries in the screen house enters the east wall of the building and runs along the ceiling across the area in which the electric driven fire pump is located. In the vicinity of the diesel driven fire pump two of the lines which provide diesel oil for the diesel driven cooling water pumps enter the upper level of the screen house and are piped to their respective day tanks. The remaining line is piped directly to the diesel driven fire pump day tank. Diesel oil transfer piping for the emergency diesel generators is buried until it reaches the rooms in which the day tanks are located.

A fire fed by the day tank fuel supply could have serious consequences if provisions are not adequate to automatically or manually stop the transfer of diesel oil from the storage tank to the day tank in the event of a rupture of one of the fuel transfer lines or a fire at the day tank. This is especially serious in the case of the fire pumps since the day tank for the diesel driven fire pump is located approximately 17 feet from the electric driven fire pump, and diesel oil transfer piping passes directly over this pump. Notwithstanding the provisions for protection of the electric driven fire pump outlined in Item 4 of Enclosure 3, failure to cut-off the supply of diesel oil could result in an aggravated exposure fire.

Staff Position

1. All diesel oil transfer piping that enters the screen house should be replaced with double jacketed pipe along its full length from its point of entry to the building to its termination at each day tank.
2. A fusible link actuated shutoff valve should be provided in the diesel driven fire pump fuel transfer line at a point as close as possible to where the line enters the diesel driven fire pump day tank.

3. Pre-fire plan strategies should be developed for all diesel fuel day tank areas to provide for tripping the diesel oil transfer pumps and/or isolating the fuel supply lines to the day tank in the event of a fire or a piping rupture.

PF-29 ELECTRICAL CABLE TRAY PENETRATIONS

Staff Concern

On Pages 2-3 of the Prairie Island Fire Hazards Analysis the licensee states that cable tray penetrations through walls, floors and ceilings are provided with a fire stop if the wall, floor or ceiling is a fire rated barrier. From this statement, it is not clear which walls, ceilings and floors are considered to be fire rated barriers in which rated fire stop are installed in cable tray penetrations.

Staff Position

Provide a list (or mark-up drawings) of all walls, ceiling and floors between fire zones which are not fire rated barriers.

Provide justifications where cable tray penetrations passing through fire zone boundary walls, ceiling and floors do not have fire rated seals installed.

PF-30 MECHANICAL PENETRATION SEALS AND FIRE DAMPERS

Staff Concern

A number of mechanical (piping, ventilation ducts and cable conduit) penetrations between fire zones are unsealed. Dampers are not provided in most vent ducts where the ducts penetrate fire barriers.

These unsealed penetrations and open ducts could provide a path for the spread of fire, smoke, and hot gases from one fire zone to another. The consequences of fire damage in two or more fire zones, has not been determine. In addition, the spread of fire to other zones would increase the difficulty in manually fighting a fire. The potential for spread of fire, smoke and hot gases could result in additional requirements for fire brigade personnel above that recommended in staff position PF-7.

Staff Position

The mechanical penetration seals and ventilation dampers in fire barriers should be upgraded as indicated below:

1. Fire Zones 8, 9, 14, 69 and 70 at the boundaries of these zones and the auxiliary building - Fire dampers and mechanical penetration seals having a three hour rating.

2. Fire Zones 12, 15, and 83 - Fire dampers and mechanical penetration seals of a rating equivalent to the combustible loading in each zone.
3. Fire Zones 13, 18, 18A, 19, 31, 32, 61 and 66 - Fire dampers and mechanical penetration seals having a three hour fire rating.
4. Fire Zones 33, 34, 35, 36, 80 and 81 - Fire dampers and mechanical penetration seals having a three hour fire rating at the zone boundaries contiguous with the turbine building.
5. Fire Zones 37 and 38 - Fire dampers and mechanical penetration seals having a three hour fire rating at the zone boundaries contiguous with the turbine building and with Fire Zone 24.
6. Fire Zones 58 and 73 - Mechanical penetration seals between charging pump cubicles of a rating equivalent to the combustible loading in each cubicle.
7. Fire Zone 68 and 72 - Mechanical penetration seals having a fire rating of three hours at the boundaries between each zone and the auxiliary building.