



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

NRC PDR

November 15, 1978

Docket No. 50-409

Dairyland Power Cooperative  
ATTN: Mr. John P. Madgett  
General Manager  
2615 East Avenue, South  
La Crosse, Wisconsin 54601

Gentlemen:

On October 31 through November 2, 1978, members of the NRC staff and their consultants visited the LACBWR facility. The purpose of the visit was to observe the plant features pertinent to the plant's fire protection program. An exit meeting was held at your corporate offices in La Crosse on November 3 to discuss the staff's findings. A list of participants is provided in Enclosure 1.

During the course of the visit we also discussed NRC's request for additional information, that was sent to you on April 13. At the exit meeting the staff stated a number of concerns and positions and requested Dairyland's commitment to adopt them. The list of concerns and positions is provided in Enclosure 2. The status of the resolution of each concern is provided in Enclosure 3.

We request that within 30 days you provide your schedule for: (1) implementing the staff positions that you have agreed to adopt (i.e., P.4 through P.9, P.11, P.12, P.14 through P.16, and P.23) and (2) completing the studies and/or providing further documentation for positions P.2, P.10, P.13, P.17 through P.20, and P.22.

If you have any questions, or care to discuss the positions further, please contact us.

Sincerely,

*J. V. Wambach*

Dennis L. Ziemann, Chief  
Operating Reactors Branch #2  
Division of Operating Reactors

Enclosures:  
As stated

cc w/enclosures:  
See next page

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Dairyland Power Cooperative

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November 15, 1978

cc w/enclosures:

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ENCLOSURE 1

LACROSSE BOILING WATER REACTOR (LACBWR)

DOCKET NO. 50-409

List of Participants In Exit Meeting 11/3/78

NRC STAFF

T. M. Lee (PSB, DOR)  
M. J. Virgilio (PSB, DOR)  
J. Wetmore (Project Manager, ORB #2, DOR)  
D. Ziemann (Chief, ORB #2, DOR)

NRC CONSULTANTS

J. B. Klevan (Rolf Jensen & Associates)  
E. MacDougall (Brookhaven National Laboratory)  
J. H. Riopelle (Consultant to BNL)

DAIRYLAND POWER COOPERATIVE (DPC)

J. W. Taylor (Assistant General Manager)  
R. E. Shimshak (Superintendent LACBWR)  
J. D. Parkyn (Assistant Sup., LACBWR)  
S. J. Raffetey (Reactor Engineer)  
M. L. Hoefert (Mechanical Engineer, LACBWR)  
J. Gallaher (Supt., Fire and Security Protection)  
L. Papworth (Operational Engineer, LACBWR)

PDC's CONSULTANT

E. Kettler (NES)

ENCLOSURE 2  
LACROSSE BOILING WATER REACTOR  
DOCKET NO. 50-409

Staff Concern and Positions

\*P.1 Cable Penetration Fire Carrier Test

Staff Concern

The electrical cable penetration for fire barriers have not been tested to demonstrate that their fire resistance rating is adequate.

Staff Position

The cable penetration fire barriers should be tested to demonstrate a fire rating equivalent to the rating required for the barrier in which the penetrations are used. The tests should be performed or witnessed by a representative of a qualified independent testing laboratory. The tests should be performed in accordance with ASTM E-119 and the following conditions.

- (1) The cables used in the test should include the cable insulation materials used in the facility.
- (2) The test sample should be representative of the worst case configuration of cable loading, cable tray arrangement, anchoring and penetration fire barrier size and design. The test sample should also be representative of the cable sizes in the facility. Testing of the penetration fire barrier in the floor configuration will qualify the fire stop for use in the wall configuration also.
- (3) Cable penetrating the fire barrier should extend at least three feet on the unexposed side and at least one foot on the exposed side.
- (4) The fire barrier should be tested in both directions unless the fire barrier is symmetrical.
- (5) The fire barrier should be tested with a pressure differential across it that is equivalent to the maximum pressure differential a fire barrier in the plant is expected to experience.
- (6) Temperature levels of the cable insulation, cable conductor, cable tray or conduit, and fire stop material should be recorded for the unexposed side of the fire barrier.

\*These positions were forwarded to the licensee by the letter of April 13, 1978

(7) Acceptance Criteria - the test is successful if:

- a. The cable penetration fire barrier has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period equal to the required fire rating, and
- b. The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperatures are sufficiently below the cable insulation ignition temperature, and
- c. The fire barrier remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

If the previous tests can be shown to meet the above position, the licensee should provide the results of the tests to show that the above position is met.

\*P.2 Smoke Detection Systems Tests

Staff Concern

The type and location of ionization smoke detectors may not provide prompt detection of fires in areas when they are used. Ventilation air flow patterns or detector sensitivity may prevent effective fire detection.

Staff Position

In situ tests should be conducted with a suitable smoke generation device to verify that the products of combustion from a fire would be promptly detected by installed smoke detectors and that ventilation air flow patterns in the area do not significantly reduce or prevent detection response. Bench tests should be conducted to verify that all detectors will provide prompt response and have adequate sensitivity to the products of combustion for the combustibles in the area where smoke detectors are installed. If any fire detection systems are found to be inadequate, appropriate modifications should be made to provide adequate detection system performance.

\*P.3 Supervision of Fire Doors

Staff Concern

Fire doors have to be closed to provide an effective barrier against the spread of fires between different areas as well as to contain suppression agents for total flooding suppression systems.

Staff Position

Fire doors to safety-related areas or areas posing a fire hazard to safety-related areas should be normally closed. They should be locked or electrically supervised with delayed alarm and annunciation in the control room.

P.4 Fire Hazards Analysis

Staff Concern

The fire hazards analysis, submitted February 14, 1977, does not include sufficient information to support a staff conclusion that safety related systems are protected from fires in all fire areas. It has been concluded that following certain postulated fires safe shutdown can be achieved based on the assumption that only equipment and cables within close proximity to fire locations suffer damage. It has not been shown that adequate design consideration was given to preserving the operability of equipment and systems require to achieve and maintain cold shutdown conditions given an exposure fire at any location in each fire area.

Staff Position

An analysis should be performed for each fire area containing safety related cables or components to demonstrate safe shutdown capability exists independent of cabling and equipment in the area or to verify the effectiveness of the barriers, spatial separation, tray covers and/or fire stops in preventing simultaneous damage to redundant safety systems required for safe shutdown from a possible exposure fire involving the fixed combustibles in the area and a reasonable amount of transient combustible materials, which may be in the area for routine plant operations and maintenance. In addition to damage resulting from elevated temperatures in the vicinity of the fire, the analysis should consider the effects of:

- (1) Smoke and heat propagation via open stairways and hatches, and unrated penetrations in barriers.
- (2) Water spray damage from fire hose streams.
- (3) Simultaneous fire and loss of offsite power.

P.5 Interior Hose Stations

Staff Concern

Interior hose stations have been installed in most sections of the Turbine Building, Diesel Generator Building, Containment, and

Waste Disposal Building.

It is the staff's concern that: (1) the hose station locations may not provide sufficient hose reach for effective application of water for suppressing a fire, (2) system design, with the lengths of hose provided, may cause friction losses such that sufficient pressure will not be available at the nozzle, (3) access to some interior hose stations in the plant are blocked by storage areas, and (4) linen hose, which is not suitable for industrial fire fighting, has been provided to protect safety related areas of the plant.

Staff Position

- (1) Hose reach tests should be performed and additional hose stations provided as necessary to assure that all points in safety related areas (including those areas protected by automatic suppression systems) and other plant areas which contain major fire hazards, can be effectively reached by at least one hose stream.
- (2) Tests and/or calculations should be performed that will confirm that the (flowing) pressure at each fire hose station outlet is greater than or equal to 65 psig at 100 gpm flow rate.
- (3) Administrative controls should be established to prevent access to manual fire fighting equipment from being restricted by temporary storage of materials within the plant.
- (4) Provide 100% polyester, single jacketed, lined, FM or UL listed fire hose factory test rated at not less than 300 psig, for those hose stations which are provided to protect safety related systems and components.

P.6 Emergency Lighting

Staff Concern

It is the staff's concern that a fire could damage emergency and normal lighting circuits in several plant areas.

Staff Position

Provide fixed, sealed beam, 8-hour rated battery powered emergency lights in all safety related areas, to support plant operations and fire fighting. In particular, access and egress paths and stations from which remote shutdown will be accomplished should be so provided.

P.7 Cable Coatings

Staff Concern

During the site visit tour, it was observed that the flame retardant coating on the cables has been applied in an uneven manner and was less than the specified thickness in several places. In many cases, it appeared that not all the cables contained in individual trays were coated.

Staff Position

Coating thickness should be verified and compared to the manufacturer's recommended thickness. Coating materials should be reapplied where the thickness is determined to be less than the recommended minimum.

P.8 Exterior Hose Houses

Staff Concern

The equipment provided for fighting fires utilizing the exterior hydrants, and the administrative controls ensuring the availability of such equipment, may not be sufficient to provide an effective fire fighting capability.

Staff Position

- (1) Two additional exterior hose houses should be provided on the yard fire loop, one accessible to the "B" diesel generator area and one accessible to the northwest entrance to the Turbine Building. Each exterior hose house should include the following equipment:
  - (a) sufficient lengths of 2 1/2" hose to reach from the hydrant location to the building entrance,
  - (b) 200' - 1 1/2" hose,
  - (c) 2 - 1 1/2" fog nozzles with ball type shutoff valves,
  - (d) 2 - 2 1/2" gate valves,
  - (e) 1 - 2 1/2" x 1 1/2" x 1 1/2" gated wye,
  - (f) 1 - universal type hydrant wrench,
  - (g) 2 - 2 1/2" hose spanners, universal type,
  - (h) 2 - 1 1/2" hose spanners, universal type,
  - (i) 2 - 1 1/2" coupling gaskets, and
  - (j) 2 - 2 1/2" coupling gaskets.



- (6) Administrative control procedures should be established to prohibit the use of exterior fire hose equipment and hydrants for non-emergency purposes.

P.9 Manual Fire Fighting Equipment

Staff Concern

The existing manual fire fighting equipment is insufficient to ensure the effective fire suppression capability of the fire brigade.

Staff Position

The equipment listed below should be added to the existing inventory of manual fire fighting equipment. This equipment should be stored in a central location and be readily accessible to the brigade at all times.

- (1) One fire fighting type, explosion proof, smoke ejector rated for 5000 CFM.
- (2) Protective clothing (coats, boots, gloves and fire fighters helmet) for a minimum of eight men.
- (3) Two double female adaptors - 2 1/2".
- (4) Six automatic sprinkler stopper wedges.
- (5) Six spare sprinkler heads.
- (6) One sprinkler had wrench.
- (7) Spare hose gaskets.
- (8) One spare hose nozzle 1 1/2".

P.10 Fire Detection in the Control Room

Staff Concern

Control room cabinets and consoles are among a few areas where safety-related cabling and wiring are concentrated. Fire damage to the functions of safety-related system could spread quickly. Due to the arrangement of the ventilation flow pattern in the room, a fire in the bench board consoles may not be readily detectable to the operators in the room, allowing unnecessary extent of damage. The control room should also be capable of being isolated from a fire in the nearby areas.

Staff Position

Smoke detectors should be provided in the bench board consoles and at the makeup air intake to the control room ventilation system. Means to shut off makeup air damper to the control room ventilation system should be provided.

P.11 Supervision of Heat Detectors in "B" Diesel Room

Staff Concern

Heat detectors actuating the CO<sub>2</sub> suppression system protecting the "B" diesel generator room is presently not supervised, compromising the reliability of the CO<sub>2</sub> system.

Staff Position

Heat detectors in the "B" diesel room should be supervised for power failure, grounds and circuit breaks.

P.12 Filler Cap to the Diesel HPSW Pump Fuel Storage Tank

Staff Concern

Filler cap to the diesel-driven HPSW pump fuel oil storage tank is not presently provided protection against tampering.

Staff Position

The filler pipe to the above mentioned tank should be provided with locking filler cap.

P.13 Protection Against Fire Hazard at Recirculation Pumps

Staff Concern

Each reactor coolant forced recirculation pump contain 90 gallons of flammable oil in the proximity of hot surfaces. Leakage in the oil system could result in a fire involving a large quantity of oil and polyethylene neutron shields generating tens of million BTU inside containment as a result.

Staff Position

- (1) An oil shield and collection system should be provided to collect possible oil leakage and drain the leaked oil to a safe place. Alternately, an automatic water suppression in the area is acceptable.
- (2) Polyethylene neutron shields should be replaced with noncombustible materials.

P.14 Automatic Fire Suppression for "A" Diesel Room

Staff Concern

The emergency diesel generator with its day tank constitute a major fire hazard. Automatic suppression is not provided presently to the "A" diesel room as required by Appendix A to RTP9.5-1. The only valve which could shut off transfer of oil from the bunker tank to the day tank is located inside the diesel room. There is no means of shutting off the oil flow to the room in the event of a fire in the "A" diesel room.

Staff Position

- (1) Automatic fire suppression should be provided to the "A" diesel generator room.
- (2) Capability to shut off oil transfer to "A" diesel day tank from outside the room should be provided.

P.15 Fixed Water Suppression System at Containment Penetration

Staff Concern

Exterior cable penetration of the containment is shielded with fiber glass panels obstructing the access for manually fighting a fire at the penetration.

Staff Position

Fixed dry pipe sprinkler suppression system, capable of quick connection to a manual hose should be provided to facilitate fire fighting at the penetration.

P.16 Protection of Service Water Piping in the Oil Storage Room

Staff Concern

High pressure and low pressure service water pipings are routed through the oil storage room. An oil fire in the room has a potential of damaging these pipings compromising safety of the plant.

Staff Position

HPSW and LPSW pipings (including pipe supports) in the oil storage room should be protected from a fire in this room.

P.17 Protection for Structural Steel in Turbine Building

Staff Concern

Structural steel in the turbine building is not protected presently against damage by a fire in the area. Although an automatic water

suppression is provided over the turbine oil reservoir area, a major damage to such structure resulting from a failure to the suppression system cannot be discounted.

Staff Position

Exposed structural steel in the turbine building should be protected against fire damage unless it can be demonstrated that failure of such steel will not preclude safe shutdown and will not result in excessive radioactivity release.

P.18 Separation of Redundant Fire Water Supplies

Staff Concern

Your calculations indicate that the fire suppression water requirement for the largest sprinkler system plus 500 gpm for hose streams will exceed the capacity of any one of the three existing fire pumps.

Staff Position

Arrangements should be made to assure a sufficient number of pumps available at all times to meet the fire suppression system requirements for water. This may be arranged by:

- (1) Providing one of the diesel engine driven fire pumps with a separate connection to the yard fire main loop independent of the existing 6" pipe from the crib house, and providing an appropriate fire barrier to separate the diesel engine driven fire pumps from each other, or;
- (2) Providing a permanent connection between the LACBWR yard fire main loop and the Unit No. 1 (fossil plant) yard fire main loop, and assuring that a reliable automatic fire pump with a rated capacity of at least 750 gpm @ 125 psig is available at all times from Unit No. 1.

P.19 Fire Pump Performance

Staff Concern

Adequate water for fire suppression may not be available if fire pumps do not meet the manufacturer's performance specifications.

Staff Position

Provide the results of a full-range fire pump flow tests for the electric water driven fire (HPSW) pump and each diesel engine driven fire (HPSW) pump. Each test report should cover the range of pump discharge from shut off to 150% of rated capacity, with the associated discharge pressure.

P.20 Sectional Valves

Staff Concern

Lack of sufficient sectional valves will require isolation of major portions of the fire protection water piping system should maintenance or repair become necessary as a result of single failure in the piping system. Such isolation would degrade the fire suppression capabilities of the plant.

Staff Position

Additional visually indicating sectional valves should be provided to assure availability of at least two sources of supply to the fire protection water system, and preclude the loss of primary (automatic) and backup (manual) water suppression capability to areas so protected.

P.21 Low Temperature Alarms

Staff Concern

Loss of power to, or malfunction of, block heaters in the diesel engines of the fire pumps in the crib house could result in the loss of availability of one or both pumps in freezing weather.

Staff Position

Low temperature alarm and annunciation in the control room should be provided for cooling system of each of the diesel engines for the fire pumps in the crib house. The alarm circuit should be supervised for loss of power, line breaks and ground faults in accordance with NFPA 72D.

P.22 Fire Door Assemblies-Security Modifications

Staff Concern

The modifications to the fire door assemblies for security purposes may reduce the fire resistance of these door assemblies.

Staff Position

Demonstrate that the original fire rating has not been reduced by the security modifications to the fire door assemblies.

P.23 Emergency Breathing Air

Staff Concern

There is insufficient emergency breathing air capability to support a long lasting fire fighting requiring the use of breathing apparatus.

Staff Position

Provide a six hour onsite breathing air reserve for each of the existing 3 breathing units based on 20 minutes of air per bottles. Two spare bottles should be provided for each unit.

ENCLOSURE 3  
LACROSSE BOILING WATER REACTOR

DOCKET NO. 50-409

STATUS OF  
RESOLUTION OF STAFF CONCERNS AND POSITIONS

P.1 Cable Penetration

Cable penetrations in LACBWR are sealed by a method provided in Section 5.6 of the report titled "International Guidelines for the Fire Protection for Nuclear Power Plants." Similar sealing arrangements have been tested by Fire Research Laboratory, University of Ghent in Belgium. Test procedure and sketches of typical arrangements were provided. The staff is evaluating this information.

P.2 Smoke Detection Systems Tests

In-situ tests were conducted using a "canned" smoke source. The licensee will provide more detailed information concerning the test procedures and the acceptance criteria of such test.

P.3 Fire Door Supervision

The licensee proposed a plan which includes a few fire doors that are unlocked and non-supervised. The staff is evaluating the proposal.

P.4 Fire Hazard Analysis

The licensee adopted the staff position.

P.5 Interior Hose Stations

The licensee adopted the staff position.

P.6 Emergency Lighting

The licensee adopted the staff position.

P.7 Cable Coating

The licensee adopted the staff position.

P.8 Exterior Hose Houses

The licensee adopted the staff position.

P.9 Manual Fire Fighting Equipment

The licensee adopted the staff position.

P.10 Fire Detection in the Control Room

The licensee indicated the capability exists already. The licensee will be requested to amend the facility description to so indicate.

P.11 Supervision of Heat Detectors in "B" Diesel Room

The licensee adopted the staff position.

P.12 Filler Cap to the Diesel(HPSW) Pump Fuel Storage Tank

The licensee adopted the staff position.

P.13 Protection Against Fire Hazard at Recirculation Pumps

The licensee will conduct a study and propose a protection for the area.

P.14 Automatic Fire Suppression for "A" Diesel Room

The licensee adopted the staff position.

P.15 Fixed Water Suppression System at Containment Penetration

The licensee adopted the staff position.

P.16 Protection of Service Water Piping in the Oil Storage Room

The licensee adopted the staff position.

P.17 Protection for Structural Steel in Turbine Building

The licensee deferred the commitment pending further study.

P.18 Separation of Redundant Fire Water Supplies

P.19 Fire Pump Performance

P.20 Sectional Valves

The licensee will review the LACBWR fire water supply and address P18-P20 simultaneously.

P.21 Low Temperature Alarm

The licensee indicated that the crib house is heated and requested the NRC staff to reconsider the position. The staff will reevaluate this position.

P.22 Fire Door Assemblies-Security Modification

The licensee will provide necessary documents to demonstrate that the fire resistance of the door assemblies is not reduced by the security modification.



P.23 Emergency Breathing Air

The licensee adopted the staff position.