

INTERIM REPORT

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Office of Nuclear Reactor Reg.
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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INTERIM REPORT

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September 6, 1978

Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Robert L. Ferguson
Plant Systems Branch

Dear Bob:

SUBJECT: Fire Protection in Operating Nuclear Power Stations - Kewaunee
Safety Evaluation Report Review

The Safety Evaluation Report, as developed jointly by the NRC staff and Brookhaven National Laboratory (BNL), adequately reflects the concerns and recommendations of the consultants. Throughout the reevaluation of Kewaunee, there has been general agreement between the NRC staff and the BNL consultants. Based on present data, the proposed fire protection, as set forth in the SER, will provide significant enhancement of the fire protection program at the Kewaunee Plant, and thus, represents significant progress towards a comprehensive fire protection program. The following exceptions represent a differing engineering point of view that should be evaluated by the NRC staff.

1. Turbine Building

SER Item 5-16 concludes that fire protection in the turbine building is acceptable. However, Mr. L.P. Herman, consultant to BNL, concludes that the licensee's fire hazard analysis does not adequately address the consequences of an un-suppressed lube oil fire in the turbine building. (See October 24, 1977 letter from L.P. Herman to R.E. Hall on this subject).

2. Control Valves

SER Item 4.3.1.3 indicates that the position of fire protection system valves will be controlled by locks or seals with periodic inspection. Locking or sealing programs depend upon ongoing administrative controls that are subject to human failure. Locks can also prevent prompt water shutoff if piping ruptures. It is recommended that electrical supervision be required on all control valves for fire protection systems protecting areas containing or exposing safety-related equipment.

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3. Smoke Removal

SER Item 4.4.1 indicates that portable fans and ducts will be accepted as a means for removing smoke from many plant areas. Fires in electrical insulation can generate copious amounts of dense smoke which can hamper manual fire control efforts by rendering the atmosphere toxic and reducing visibility in the area. Properly used, self-contained breathing apparatus can minimize the problem of toxic atmosphere, but little can be done to improve visibility except to remove the smoke from the building.

At this time, BNL and the majority of its fire protection consultants agree that in those areas without engineered fixed smoke removal systems, the optimum generic recommendation is to have available portable fans and ducts. This will allow for diversified applications in numerous fire situations. The uncertainties introduced by this approach of ventilation to respond to all fire scenarios also exists in an engineered fixed system. Mr. L.P. Herman concludes that massive changes will be required in most areas of this plant if effective permanent smoke removal systems are required, the design of which would also have to include consideration of radioactivity releases. While portable fans and ducts may be effective for smoke control in many instances, there is concern that they will not be sufficient for a major fire in some areas of the plant.

It is therefore recommended, based on Mr. L.P. Herman's concern, that this item be held open until better guidelines are developed for the evaluation of smoke generation potential and smoke removal system design.

4. Air Compressor and Pump Rooms

The air compressor and pump rooms described in Section 5.10 of the SER draft contain in one fire area (TU-95) the redundant emergency 480 V AC power supplies, the two electric motor driven auxiliary feed water pump. This fire area is not protected by any automatic fire suppression systems. When proposed modifications are completed, the room containing the steam driven pump will be acceptably cut off by fire barriers from the rest of the area. However, it will still be necessary to pass through TU-95 to enter the steam driven pump room.

It is my understanding that if all of the electrical equipment in TU-95 were damaged by fire, the steam driven auxiliary feed water pump would be needed to shut the plant down safely, and that it would be necessary to manually operate valves at the steam driven pump to place it in service.

I am in basic agreement with the NRC evaluation that the fire loading from electrical cables and lubricants in TU-95 is relatively light. However, the TU-95 area communicates through fire doors with the turbine room lube oil area on one side and a diesel generator room on the other, each of which are potentially severe fire exposures. There is also the remote possibility that transient combustibles could be brought into the TU-95 area.

In my opinion, the critical relationships between the safe shut-down systems involved requires a highly conservative approach to protecting this area. Therefore, I recommend that a fire barrier be installed above the steam driven pump room so that the two entrances to the room are located in separate fire areas. This will provide access to the steam driven pump even if a significant fire should occur in TU-95. An alternative to this recommendation would be to provide safe shut-down capability which is totally independent of the TU-95 area.

5. Screen House Hallway

The hallway between the screen house and the diesel generator rooms described in Section 5.15 of the SER draft contains power cables in overhead electrical trays for the four service water pumps. At least one service water pump is required for safe shutdown.

The cable trays are well separated into two redundant divisions and are lightly loaded; there appears to be little potential that a fire in the combustibles present could cause loss of all four pumps.

Nevertheless, consideration should be given to the exposure presented by the diesel generator rooms which communicate with this hallway through 1-1/2 hour fire doors and dampers. The diesel generator rooms are protected by a carbon dioxide fire suppression system which could be rendered ineffective if one of the hallway doors or dampers were not closed properly at the time of discharge. Such an open door or damper would also expose the service water pump electrical cables to fire damage.

In my judgment, it is prudent to install automatic sprinklers in this hallway to protect the service water pump electrical cables from such a fire exposure.

6. Portable Smoke Removal Equipment - SER 3.1.11

No acceptable minimum requirement is observed. Suggest since Kewaunee has two fans, a minimum of 2 smoke ejectors of about 5000 cfm with portable ducting be required. Rationale: Two units of the same size can be used in series with one size duct to achieve better directional control of exhaust.

7. Hose Cart - SER 3.1.13

In addition to the 1-1/2" and 2-1/2" fire hose the cart should be equipped with 1 - 1-1/2" adjustable hose nozzle, 1 - 2-1/2" adjustable hose nozzle, 1 - 1-1/2" electric spray nozzle, 1 - 2-1/2" x 1-1/2" x 1-1/2" gated wye.

8. Breathing Equipment - SER 4.4.3

The BNL consultant (James H. Riopelle) recommended 10 additional 2200 psi air mask bottles be provided, (See par. 9.a JHR Report); and that KNPP acquire a system to recharge emergency breathing air bottles for Plant personnel. (See par. 9.b JHR Report)

Rationale: The local serving (contract) off-site fire department (KFD) does not have a sufficient breathing air capability for a long fire: the KFD obtains its air from a local vendor in Sturgeon Bay, Wisconsin, a great distance from the KNPP site. (See par. 4, page 7 of JHR Report).

The preceding statements are based on a detailed reevaluation of the fire protection program as implemented by the Wisconsin Public Service Corp. (WPSC), at the Kewaunee Nuclear Power Station. The analysis covered a review of the fire prevention, detection and suppression capabilities of this unit as interfaced with the nuclear systems requirements. This was accomplished by utilizing a review team concept with members from BNL and the Nuclear Regulatory Commission Division of Operating Reactors staff.

The fire protection evaluation for Kewaunee is based on an analysis of documents submitted by WPSC to the Nuclear Regulatory Commission and a site visit. The site visit was conducted by Mr. J.E. Knight and Mr. H.J. George of the NRC; Mr. L. Paul Herman of Rolf Jensen and Associates, Inc., under contract to BNL; and Mr. J. Riopelle, consultant to BNL. Mr. Riopelle was under contract to BNL to review the manual fire fighting capabilities of the station along with administrative controls.

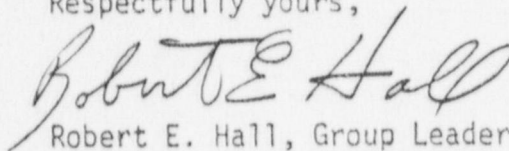
The Kewaunee review has been conducted under the direction of Mr. E. MacDougall and myself of the Reactor Engineering Analysis Group at BNL, and has had the following major milestone dates.

1. The WSP "Fire Protection Program Evaluation" was transmitted to NRC on May 2, 1977.
2. On February 21, 1978, NRC transmitted Staff Positions and Requests for Additional Information based on an initial review of the WPS submittal.
3. The site visit was conducted on March 28-31, 1978. The primary Review Team consisted of James E. Knight and Henry J. George of the NRC staff, James H. Riopelle, private consultant, and L. Paul Herman of Rolf Jensen and Associates, Inc. Mr. Knight served as team leader and spokesman.

4. On April 10, 1978, NRC transmitted further Staff Positions and Requests for Additional Information based on the site visit.
5. On May 3, 1978, a site visit inside containment was conducted by Mr. Herman of the Review Team.
6. On May 19, 1978, NRC transmitted, one further Staff Position.
7. On May 26, 1978, WPS transmitted response to a portion of the Staff Positions and Requests for Additional Information.
8. On June 26, 1978, NRC transmitted further Staff Positions and Requests for Additional Information.
9. On July 28, 1978, WPS transmitted response to a portion of the Staff Positions and Requests for Additional Information.
10. The SER draft associated with this report is attached to an NRC memo from G.C. Lainas to A. Schwencer dated August 1, 1978, and revised on August 10, 1978 by Henry George at NRC.

We have reviewed the Kewaunee Nuclear Power Plant (the licensee) analyses and have visited the facility to examine the relationship of safety-related components, systems and structures with both combustibles and the associated fire detection and suppression systems. Our review has been limited to the aspects of fire protection related to the protection of the public from the standpoint of radiological health and safety. We have not considered aspects of fire protection associated with life safety of onsite personnel and with property protection, unless they impact the health and safety of the public due to the release of radioactive material. The proposed modifications represent a significant increase in the level of protection against serious fire associated hazards.

Respectfully yours,



Robert E. Hall, Group Leader
Reactor Engineering Analysis

EAM:sd

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