ENCLOSURE 4

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.
Upton, New York 11973

Department of Nuclear Energy
(516) 345- 2144

January 31, 1980

Mr. Robert L. Ferguson
Plant Systems Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Bob:

Attached is the Brookhaven National Laboratory (BNL) input* to the Ginna Nuclear Power Plant Design Review and Supplement Items:

Design Review	Supplement
3.1.2*	3.2.1 Tim Lee's Item
3.1.11*	3.2.2*
3.1.21*	3.2.3 not scheduled
3.1.24*	3.2.4*
3.1.25*	3.2.5*
3.1.39*	3.2.6 submitted 1/23/80
3.1.43*	3.2.7*
3.1.46*	3.2.8*
3.1.48*	3.2.9 submitted 1/23/80

Items 3.1.24, 3.1.25, and 3.1.43 remain open due to the lack of information from the licensee. We had requested this information from the staff in a letter dated May 25, 1979.

Respectfully yours,

Robert E. Hall, Group Leader
Reactor Engineering Analysis

REH:EAM:sd
attachment
cc.: R. Cerbone wo/att.
W. Kato "
T. Lee
E. MacDougall
V. Panciera wo/att.

A006 S11

dupe

P 8002080594 591

R.E. GINNA UNIT 1

Fire Protection Review

3.1.2 Water Suppression Systems & Equipment

SER Section 3.1.2 indicates that the licensee will provide additional fixed water suppression system coverage for the following areas:

- Basement cable tray area of the auxiliary building,
- Cable tunnel entrance in the auxiliary building,
- Charcoal filters in the auxiliary building,
- Cable trays on elevation 256' 6" of the intermediate building,
- The cable area in the northwest corner of the mechanical equipment room of the control complex,
- Basement cable trays directly below the switchgear in the screen house,
- Service water pumps area of the screen house,
- Fire barrier between the turbine building and the control room.

All of the water suppression systems except the system for cable trays in the intermediate building will be automatically actuated. The existing manually actuated cable tunnel water suppression system will be converted to automatic operation. The deluge system covering the turbine-driven auxiliary feedwater pump oil tank will be extended to cover the pump area. All isolation valves not supervised will be either chained and locked or electrically supervised. Additional sectionalizing valves will be installed.

By letter dated September 28, 1979 the licensee indicated that:

- Hydraulically designed deluge systems will be installed in the following areas:

  The auxiliary building basement and intermediate floors for areas of heavy cable tray concentration, the intermediate building in areas of heavy cable tray concentration and the turbine-driven auxiliary feedwater pump area, the control building mechanical equipment room heavy cable tray concentration area and the screen house basement heavy cable tray concentration area.

- The above systems would be designed, installed, and tested based on NFPA 15 and will generally have a water discharge density of 0.5 gpm/sq. ft. of floor area.

- The factory installed deluge system in the charcoal filter on the intermediate floor of the auxiliary building will be connected up and arranged to operate automatically.

- A standard, hydraulically designed sprinkler system will be installed over the service water pumps in the screen house. The system will meet the requirements of NFPA 13 for design, installation and testing.

- All fixed water suppression systems will be fed from a source that can be or is separated from the supply to the hoses in the same area. Where necessary, a secondary feed will be installed to the existing hoses, and isolation valves installed so that all hoses in a given building cannot be out-of-service from one break or other event.

The licensee has described many of the proposed suppression systems as deluge systems but has also stated that they will conform to the provisions of NFPA 15. This standard applies only to water spray systems, while NFPA 13 applies to deluge systems. We recommend that the licensee clarify the terminology used in describing the fixed water suppression systems to be installed.

We recommend that the staff require that the licensee verify the following:

- All newly-installed suppression systems will be automaticaly actuated in accordance with NFPA 13 and/or 15.

- The existing manually actuated cable tunnel water suppression system will be converted to automatic operation.

- Isolation valves not currently supervised will be either chained and locked open, or electrically supervised with alarm and annunciation in a constantly attended location such as the control room.

The licensee should also show that the proposed water discharge density of 0.5 gpm/sq. ft. of floor area for systems protecting cable tray concentrations is equivalent to the NFPA 15 requirement of 0.15 gpm/sq. ft. on horizontal or vertical plane containing the cable tray.

We recommend that the staff accept the licensee's submittal subject to their approval of the above listed items.

3.1.11 Battery Room Ventilation

SER Section 3.1.11 states the following:

- The battery room ventilation system will be modified to minimize the potential for flow of smoke and hot gases into the battery rooms from adjacent areas and between battery rooms.

- An air flow monitor will be provided for each battery room to alarm and annunciate, in the control room, the loss of ventilation air flow to either room.

- Make-up to the system from the outside will be increased to provide a safety margin by at least a factor of 5 against hydrogen buildup in these rooms.

By letter dated May 25, 1979, the licensee provided the details of the manner in which the damper in the outside makeup air duct would be kept in position. Information submitted by the licensee on May 25 is acceptable with regard to maintaining damper position for makeup air. We recommend that the licensee be required to install air flow monitors in each battery room and provide the results of an analysis which demonstrated that makeup air would be supplied at a rate sufficient to prevent a hydrogen buildup in these rooms, with a safety margin of at least a factor of 5.

3.1.21 Control Room Separation

SER Section 3.1.21 indicates that the licensee will install a double-feed water curtain system over the steel diaphram wall, currently under construction, which separates the control room from the operating floor of the turbine building.

By letter dated Septemper 22, 1978, the licensee provided the design basis and summary heat transfer calculations for the impinging water curtain protecting the turbine room-control room wall.

By letter dated September 28, 1979, the licensee provided additional information regarding the design of the water curtain.

In the September 22, 1978 submittal the water curtain design discharge density over the entire surface area of the wall was reported equal to 0.36 gpm per square foot. In the September 28, 1979 submittal the discharge density of the water curtain was changed to 0.25 gpm per square foot. We recommend that the licensee restore the previous design discharge density or to provide the basis for the change.

In addition, the licensee proposes to provide heat detectors for actuation of this water curtain along the top of the steel diaphragm wall only. This could result in a long delay between the start of a fire and actuation of the water curtain (unless the fire was impinging on the wall) because little or no convected heat will reach the detectors due to their location well below the ceiling of the turbine building. The diaphragm wall will, in this case, be subject only to radiant heat transfer. However, the licensee's calculations estimate that over half of the fire energy is released as radiant energy. Further, the analysis does not indicate that radiant energy alone will not cause unacceptable conditions in the control room in the absence of the water curtain. We recommend that the staff require the licensee to provide a means of detection which will actuate the water curtain when there is a threat to the control room even if the fire is not adjacent to the wall.

In addition, we had previously requested in a conference call that the licensee verify that operation of 2 hose streams connected to piping supplying the water curtain would not degrade the protection of the diaphragm wall, and to verify that the water system can actually supply the 860 gpm specified in the licensee's September 22, 1978 letter. We recommend that the staff require the licensee to provide this information.

3.1.24 Piping and Duct Penetrations

SER Section 3.1.24 indicates that the piping and duct penetrations of fire barriers will be upgraded to a fire resistance rating commensurate with the hazards on both sides of the barrier.

On April 30, 1979, the licensee confirmed the above commitment and indicated that fire test reports for comparable penetrations would be on file to verify seal adequacy.

We recommend that the staff require the licensee to submit a copy of each fire test report for staff review.

3.1.25 Construction Joints

SER Section 3.1.25 indicates that construction joints of the containment with the surrounding building will be modified to provide a fire resistance rating commensurate with the fire hazard in the area.

By letter dated April 30, 1979, the licensee indicated that the existing construction joint filler material will be covered on both sides with a flame retardant coating, or replaced with silicone foam or silicone rubber strips.

The licensee did not provide any details regarding the dimensions or properties of the materials to be used to modify the construction joints. We recommend that the staff request the licensee to provide for review a copy of the fire test reports which substantiate the fire resistance rating of the modified construction joints.

3.1.39 Reactor Coolant Pump Lube Oil Collection System

SER Section 3.1.39 indicates that the licensee will install an oil collection system for each reactor coolant pump to contain lube oil leakage and drain the leaked oil to a safe place, or will provide a suppression system.

By letter dated March 19, 1979, the licensee indicated that the requested design information would be provided by December, 1979.

This information has not yet been received. We recommend that the licensee be required to install a lube oil collection system which meets the following criteria:

- The proposed system provides a complete enclosure for all potential leakage points, including lift pump and piping, external oil cooler, flanged connections, drain plugs, fill points, upper and lower reservoirs, sight glasses, and overflow lines.

- During a safe shutdown earthquake, the effects of the seismic event on the system will not adversely affect plant safety.

- Strainers or other means of preventing clogging of drain piping are provided.

3.1.43 Detector Testing

SER Section 3.1.43 indicates that the licensee will be performing a study and/or testing to verify that proper consideration has been given to such factors as ceiling height and configuration, ventilation air flow pattern, location and arrangement of plant equipment and combustibles, etc., in determining the type, number, and location of fire detectors for existing as well as proposed detector systems.

By letter dated April 30, 1979, the licensee indicated that the proposed fire detection systems would be designed using the NFPA 72 series fire codes as a guide and that the adequacy of prospective detector locations would be determined using portable detectors and a smoke generator. The adequacy of detector locations would be determined utilizing an acceptable time differential between smoke generation and detection.

The licensee's submittal did not provide sufficient information for the staff to determine the acceptability of the test method, much less the results. Such information should include the basis for:

- Using a smoke generator (character and rate of heat and smoke production relative to postulated fires)
- The time differential prescribed for determining acceptable detector response time.
- Using a smoke generator to locate heat detectors. Although smoke detectors will respond to the smoke from a smoke generator, heat detectors will not.

Recent studies have indicated that the type of test requested by NRC is probably beyond the present state-of-the-art. NRC is in the process of developing alternate acceptance criteria for fire detector installations. We will address this issue when such criteria become available.

3.1.46 Auxiliary Boiler

SER Section 3.1.46 indicates that the licensee will verify that the auxiliary boiler conforms to all of the applicable provisions of the current edition of NFPA 85, or will identify and justify deviations.

By letter dated September 28, 1979, licensee discussed the deviations of the auxiliary boiler from the current edition of NFPA 85, and also indicated that the boiler meets the requirements of both American Nuclear Insurers and the Hartford Steam Boiler Inspection and Insurance Company. The boiler was purchased to conform to the ASME Boiler Code, and the requirements of FM and UL.

We have reviewed the deviations and conclude that the present arrangement of the auxiliary boiler is acceptable. We recommend that the staff include consideration of the auxiliary boiler in their evaluation of the safe shutdown capability of the plant.

3.1.48 Hydrogen Pipe

SER Section 3.1.48 indicates that the licensee will modify the hydrogen piping supplying the volume control tank to provide protection against hazards from hydrogen leakage.

By letter dated June 8, 1978, the licensee described the routing, use and protection of a hydrogen line in the auxiliary building.

By letter dated September 28, 1979, the licensee described proposed modifications to storage of hydrogen cylinders and routing of hydrogen lines to the volume control tank and hydrogen recombiner in the auxiliary building. The new hydrogen line to the volume control tank will not cross any cable trays.

The licensee's submittals, however, did not provide an analysis to show that leakage of hydrogen from the pipe would not adversely affect the safe shutdown capability of the plant. We recommend that the staff require the licensee to provide additional information to demonstrate that fire or explosion originating from enrouted hydrogen piping will not adversely affect the safe shutdown capability of the plant.

3.2.2 Cable Separation

SER Section 3.2.2 indicates that the licensee will perform a study to determine the adequacy of separation between redundant cables in preserving the safe shutdown capability in the event of a fire. The study will include consideration of:

- The effects on the safe shutdown equipment due to damage to cables electrically connected to safe shutdown equipment but classified and routed as nonsafety related.
- Simultaneous damage to redundant divisions of electrical cables separated by sheet metal barriers within the same cable tray.
- Loss of cables in conduits.
- Simultaneous damage to redundant divisions of the electrical cables within the same penetration.

By letter dated December 28, 1979, in response to SER Section 3.2.1 and 3.2.2, the licensee provided the results of a study of the ability to safely shutdown the reactor following a postulated fire. The licensee stated that since the analysis assumes all equipment and cables within a fire area fail as a result of the fire a separate cable separation analysis is not required.

However, the licensee's analysis also states that separation between fire areas is sometimes maintained by space alone, and pages VI-2 and 3 indicate that circuits in adjacent areas are assumed not to fail. Also, page VI-3 states that the separation requirements of IEEE 384 will be imposed within certain fire areas in which acceptable modifications to prevent unacceptable equipment failures cannot be made.

We recommend that the staff require the licensee to justify their assumption that cables and equipment in adjacent fire areas separated only by distance will not be damaged by a fire originating in one of the fire areas, and to clarify the apparently conflicting assumptions on page I-1 (all equipment and cables within a fire area fail as a result of the fire) and on page VI-3 (cables in a fire area will not fail if the separation requirements of IEEE 384 are imposed).

3.2.3 Relay Room Halon System

Future schedule.

3.2.4 Electrical Cable Insulation

SER Section 3.2.4 indicates that the licensee is investigating the fire characteristics, including fire resistance, of the cable insulation used in the plant.

By letter dated April 30, 1979, the licensee provided a list of cable insulation types and quantities used in the plant.

The assumptions on page I-1 of the licensee's study performed in response to SER Section 3.23.1 obviate the need for a separate staff analysis of the fire characteristics of electrical cable insulation.

We recommend that this item be accepted.

3.2.5 Electrical Cable Penetrations

SER Section 3.2.5 indicates that the licensee is reviewing the applicability to this plant to the results of electrical cable penetration fire resistance tests which have been performed on materials and construction similar to those being used in this plant. Specifically, it will be demonstrated that these test results can properly be extrapolated to penetrations of larger sizes and/or different configurations.

By letter dated December 21, 1979, the licensee provided four cable penetration fire test reports pertinent to the electrical cable penetrations in the plant. The licensee's response also indicated that the floor penetration seal in the northwest corner in the relay room is not within the size range of the tested configurations, and that the cable tunnel entryways are not within the scope of the submitted reports, and that these penetrations would be separately reviewed and evaluated.

Some of the penetrations in test reports submitted did not pass the fire and/or hose stream tests. We recommend that the staff require the licensee to:

- Verify that all of the penetrations in the plant (with the exceptions noted previously) conform to tested designs which passed both fire and hose stream tests,
- Provide the review and evaluation of the two penetrations which are outside the scope of the test reports submitted.

In addition, many of the penetration seal designs tested appeared to be non-symmetrical. We recommend that the staff require the licensee to verify that these designs are not used in the plant, or to provide reports of tests in which these penetrations were tested in both directions.

Further, none of the test reports indicate that the fire tests were conducted with a pressure differential across the penetration seals (higher pressure on the exposed side). We recommend that the staff require the licensee to verify that the maximum pressure differential which may exist across the penetration seal during a fire will have no affect on its performance, or to provide the results of fire tests conducted with such pressure differential. We recommend that until an acceptable pressure differential requirement is developed that the pressure differential to be considered is the actual maximum pressure differential found in the plant during normal operations plus 2" of water based on our present conservative evaluations. When the specific values are known they should be utilized to replace this interum generic approach.

We recommend further, that the staff review the penetration requirements again in the future when present research is completed in regard to establishing pressure differential requirements for penetrations testing.

3.2.7 Fire Pump Performance

SER Section 3.2.7 indicates that the licensee will evaluate the operating condition of the fire pumps to determine if repair or replacement is necessary.

By letter dated June 29, 1979, the licensee reported that fire pump performance tests were run on May 16, 1979. The test results indicated that:

- The diesel-driven fire pump had an excessive pressure loss at the overload point on the pump curve (150 percent of rated output),
- The electric-driven fire pump had a pressure drop consistently higher than the diesel-driven pump.

The licensee is reviewing the test method and instrumentation, and will run additional tests if errors are found. Although both pumps meet technical specification requirements, they will be pulled, one at a time, and cleaned, inspected, repaired as necessary and reset, if no test errors are found.

We recommend that the staff require the licensee to submit the results of its analysis of the May, 1979 test methods and equipment, along with the schedule for fire pump inspection and overhaul, if this proves necessary.

3.2.8 Exposed Structural Steel

SER Section 3.2.8 indicates that the licensee will conduct a study to determine what active and passive systems should be installed to control fires in high fire load areas to prevent structural failures that could jeopardize safe shutdown of the plant. This study will interface with the safe shutdown study and will be completed in December, 1979.

The licensee's response was due to be submitted in December, 1979. We will complete our evaluation when the response is received.