BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.
Upton, New York 11973
Department of Nuclear Energy (516) 345- 2144

December 27, 1979

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

Dear Bob:

Enclosed are the Brookhaven National Laboratory design review and supplement recommendations for the Pilgrim Nuclear Plant as listed below.* The recommendations represent a review conducted by Mr. E. MacDougall and Mr. J. Klevan.

Design Review	Supplement
3.1.14*	3.2.1 Tim Lee's Item
3.1.16*	3.2.2**
3.1.17*	3.2.3*
3.1.18 Tim Lee's Item	3.2.4**
3.1.19*	3.2.5*
	3.2.6 Previously sent
	3.2.7*
	3.2.8**

*Licensee final input due March 1, 1980.

Respectfully yours,

R. E. Hall

Robert E. Hall, Group Leader
Reactor Engineering Analysis

REH:EAM:sd
enclosure
cc.: R. Cerbone wo/enc.
W. Kato wo/enc.
V. Panciera wo/enc.
T. Lee
E. MacDougall

1678 027

A006
S
1/0 1
ADD:
R. FERGUSON

8001030631

Pilgrim Nuclear Power Station

Fire Protection Review

3.1.14 Exposed Steel Protection

SER Section 3.1.14 indicates that exposed structural steel will be protected by coatings to provide three hour fire protection in those plant areas where the failure of the steel might affect safe plant shutdown.

By letter dated March 14, 1979 the licensee proposed to provide three hour rated fire protection for exposed structural steel in various areas of the plant. These areas include the recirculating pump motor-generator set room on elevation 51 feet, the cable spreading room, switchgear rooms A and B, and major parts of the reactor building open areas on elevation 23 feet. The licensee proposed to apply a chloride, sulfide and asbestos-free fireproofing material in accordance with basic designs shown by UL tests to provide three hour rated fire resistance for beams and columns.

The staff determined from its review of the design information provided by the licensee that:

- The licensee had not proposed to fireproof steel rods and other attachments to beams, which could conduct heat to the otherwise protected beams.
- The proposed fireproofing designs were not applicable to certain small beams and columns in several plant areas. Therefore, the thickness of the fireproofing compound might not be sufficient to provide a three hour fire resistance rating for these structural members.
- The licensee had proposed to leave structural steel in part of the reactor building open area without fireproofing.

By a letter dated July 6, 1979, the licensee provided additional design details on the proposed fireproofing, and indicated that fireproofing of additional parts of the reactor building open area was being considered.

By conference call of October 12, 1979, the licensee also indicated that two different fireproofing compounds would be applied to columns in the following manner:

- A material with a surface which could be easily decontaminated would be provided on the lower ten feet of columns.
- A material which could be easily installed in hard-to-reach areas would be provided elsewhere.
- A Marinite separator would be installed at the interface between the two materials.

By conference call of October 16, 1979 the licensee responded to previous staff comments by agreeing to the following:

- o Clamps on beams would be covered entirely with the proposed fireproofing compound and rods and other attachments covered to a distance of several inches from the beam.

- o All exposed structural steel in the designated areas would be protected, and an analysis would be performed to show that the loss of certain small beams and columns to which the proposed fireproofing designs were not applicable would have no adverse consequences on plant safety.

- o All exposed structural steel in the reactor building open area on elevation 23 feet would be protected.

- o The Marinite interface would not be used.

The staff has not yet received a docketed response confirming these agreements. Subject to written confirmation of these items, we accept the licensee's proposal for protecting exposed structural steel.

3.1.16 Self-Contained Breathing Apparatus

SER Section 3.1.16 indicates that the licensee will provide sufficient additional compressed air bottles, a cascade filling system and a compressor to assure emergency breathing air capability to sustain ten men for six hours.

By letters dated January 16, 1979, February 5, 1979, and March 30, 1979, the licensee described the arrangement and procurement of self-contained breathing apparatus for the control room only.

By conference call on May 4, 1979, the staff requested the licensee to provide information pertaining to the commitment in SER Section 3.1.16. By letter dated July 6, 1979, the licensee provided information in response to that conference call request. The licensee's response indicated that a cascade filling system and compressor located in the warehouse were designed to fill 16 air bottles without using the compressor and had unlimited capacity when the compressor was used.

However, the licensee's response did not indicate specifically that the cascade filling system and compressor can refill air bottles, with some number of spare air bottles on hand, at a rate sufficient to concurrently supply ten men for six hours each. We will approve the licensee's proposal, subject to satisfactory confirmation of this information.

Item 3.1.17 of the SER is the design review requirement for the communication system. In order to ensure an effective backup of the two existing communication systems, repeaters or antenae were called for. The information submitted by the licensee on March 13, 1979 described the proposed antenae system.

We find that this antenae system appears to be an adequate backup to the present communication system. Subject to a review of the RADIAX routing plans SR1-SR5 we recommend that this item be accepted.

3.1.19 Penetration Seals

SER Section 3.1.19 indicates that pipe and electrical cable penetration seal designs will be tested to determine their fire resistance ratings. Seals with a rating of less than three hours will be upgraded to a three hour rating, or justification will be provided for the lower rating.

By letter dated March 30, 1979 the licensee indicated that the penetration seal designs would be tested by July 1, 1979 and that the required modifications would be completed by June 1, 1980.

By letter dated July 6, 1979, the licensee indicated that 6 different designs typical of electrical penetration seals at the plant had been subjected to three hour fire tests, including hose stream exposure. The licensee reported that all penetrations met the following criteria:

- No passage of the flame through the seal
- No flaming on the unexposed surface
- No penetration by the hose stream

The licensee also indicated that fire tests of cable tray and process piping penetration seals would be completed by August 1, 1979.

By letter dated October 10, 1979, the licensee provided a preliminary summary of test results and a description of proposed changes in penetration seal designs. A licensee indicated that the final test report would be available by the end of November, 1979. We have not as yet received a copy of this report for our evaluation.

Staff review of the preliminary test report indicates that no pressure differential was applied during the tests. We recommend that the staff request the licensee to justify the lack of such pressure differential, or to provide the results of tests which include a suitable pressure differential. Acceptance of the penetration seals in the plant, and the proposed modifications, is subject to staff evaluation of the complete report.

3.2.2 Testing Fire Detectors

SER Section 3.2.2 indicates that the adequacy of new and existing fire detector systems will be confirmed by testing in plant areas where:

- Ceiling heights are greater than 12 feet,
- Ceiling obstructions, such as joists and beams, are greater than 8 inches deep (4 inches in the case of heat detectors), or

- o Ventilation rates are greater than 8.6 air changes per hour.

The licensee has agreed to provide the necessary information by March, 1980.

3.2.3 Battery Room Ventilation Air Flow Monitor

SER Section 3.2.3 indicates that each battery room will be equipped with a ventilation air flow monitor which alarms and annunciates in the control room on loss of the air flow to either battery room, or the licensee will provide justification that such monitors are not necessary.

By letter dated January 16, 1979, the licensee indicated that calculations had been performed to determine the hydrogen evolution rate and time required to reach a 2 percent concentration of hydrogen in each battey room.

By letter dated February 5, 1979, the licensee provided the assumptions and methodology (but not the details) used in the analysis. By letter dated March 14, 1979 the licensee proposed to install an air flow monitor in the outlet duct of each battery room and provided detailed information on the associated mechanical and electrical systems. The proposed monitors would alarm and annunicate in the control room on:

- o Loss of air flow, or any reduction of air flow greater than 25 percent, or
- o Loss of power to the air flow monitors.

By conference call of May 4, 1979, the staff discussed various concerns regarding details of the proposed design.

By letter dated July 6, 1979, the licensee provided written confirmation of the conference call discussion.

We recommend that the staff accept the licensee's proposal.

3.2.4 Cable Combustibility

SER Section 3.2.4 indicates that the licensee will submit documentation showing that those cables in the plant not covered with a flame retardant coating are capable of passing the IEEE Standard 383 flame test.

The licensee has agreed to provide the necessary information in March, 1980.

Item 3.2.5 Prevention of Spread of Combustible Liquid via Drain Systems

The Safety Evaluation Report (SER) states that the licensee will perform a study to determine the extent to which backflow valves need to be installed in the drain systems for the reactor building quadrants and any other plant areas containing large quantities of combustible liquid.

In a letter dated February 20, 1979 the licensee addressed this problem for three areas: the reactor building quadrants, the recirculation M.G. sets and the hydrogen seal oil system in the turbine building. The reactor building quadrants contain the RCIC turbine which has 20 gallons of lubricating oil with a valve between the turbine and the drain line. This valve is normally closed so that in case of a fire and an oil leak the oil would not go into the drain system. If the valve were left open a 12" water seal assures that the fire would not spread to any other area. The HPCI turbine contains 225 gallons of lubricating oil. This oil if spilled could go into the reactor building equipment sump or the reactor building floor sump. Each of these sumps has a capacity of 879 gallons made up of 468 gallons from high level alarm to overflow and 411 gallons for high capacity. There appears to be no likelihood of a fire spreading from one area to another by way of the drainage systems from either the HPCI or RCIC oil supplies.

The recirculation M.G. sets each has a supply of 700 gallons of oil and have curbs to contain the combustible liquid. There is an oil separator installed in the drainage system, the oil leave the separator and goes to a non-safety related area. The oil free waste from the separator goes to a neutralizing sump. There appears to be no chance for spread of combustible oil to another safety related area.

The hydrogen seal oil system is located in the turbine building and contains 410 gallons of oil. There are curbs installed to collect the oil in case of a spill. The drainage system has an oil separator located out of the fire zone. There appears to be no chance of spread of a fire to a safety related area.

We recommend that this item be accepted.

Item 3.2.7 D.C. Power System Hazard Analysis

The SER states that the licensee will analyze the effects of postulated fire damage and provide modifications as necessary to the 125/250 volt D.C. systems to preserve the plants safe shutdown capability. The analysis will include safe shutdown considerations as further described in Section 3.2.1 of the SER.

In a letter dated February 1, 1979 the licensee responded with a basic description of the 125 volt and 250 volt D.C. systems. They stated that all areas containing D.C. systems had satisfactory separation except for the west CRD area of the reactor building, (Fire area 1.10). In this area the safe shutdown equipment is the D.C. motor control centers D7, D8, and D9 and their associated cables. The licensee assumed the loss of these three MCC in a postulated fire; they also considered a 4 hour loss of power. With this scenario HPCI, RCIC and the shutdown cooling mode of the RHR system will be lost. In addition, the standby booster pumps A and B for the diesel generators will be lost. With an assumed loss of off-site power limited to a maximum of 4 hours, the licensee stated that the plant could still be shutdown by other systems. This will be evaluated in the review of Section 3.2.1 of the SER.

On a joint NRC/BNL conference call on May 23, 1979, we requested that the licensee send us more information of the D.C. equipment and cables in fire area 1.10. We received this information May 30, 1979.

On May 24, 1979 we requested backup information to justify the 4 hour duration of the postulated offsite power loss. To date we have not received this information.

We recommend that the licensee's position not be accepted for the following reasons: there is no justificatin on limiting the assumed off-site power loss to 4 hours; the postulated loss of equipment needed for hot shutdown is not acceptable. In order to better protect the D.C. power system we recommend that the conduit and cable tray in fire area 1.10 be encapsulated with a recognized and tested fire preventative material with 3 hour fire rating to assure that redundant cabling be protected to a temperature of approximately 200°F. This protection to extend to any postulated fire of existing combustibles within the room or any transient combustibles that would reasonably be brought into or through the room.

3.2.8 Carbon Dioxide System Discharge Test

SER Section 3.2.8 indicates that the licensee will perform a full discharge test, or provide calculations and reference prototype testing, to verify that the carbon dioxide system in the cable spreading room can achieve a concentration of 30 percent within 1.5 minutes of actuation and can achieve the design concentration of 50 percent in all parts of the room.

The licensee has agreed to provide this information by March, 1980.

1678 033