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May 21, 1981

SNRC-572

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Shoreham Nuclear Power Station - Unit 1
Docket No. 50-322

Dear Mr. Denton:

Enclosed are six (6) copies of LILCO's position addressing Safety Evaluation Report (SER) Outstanding Issue 45, Fire Protection. Based on our review of the issue, we have concluded that the Shoreham design compares very favorably with Appendix R and the fire protection guidelines applicable to Shoreham.

If you have any questions, please contact us.

Very truly yours,

J. P. Novarro

J. P. Novarro
Project Manager

RAH/pd
Enclosures

cc: J. Higgins

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APPENDIX R - FIRE PROTECTION PROGRAM

FOR NUCLEAR POWER FACILITIES

SHOREHAM EVALUATION

II. General Requirements

II.A Fire Protection Program

The Shoreham Protection Program as required by Appendix R has been established under station procedure SP39.001.0. This procedure defines the levels of responsibility for the formulation, implementation, and assessment of the Fire Protection Program. In addition, it provides an overview of the administrative procedures which constitute the basis of the program.

The Plant Manager has the direct responsibility for formulating, implementing, administrating, and periodically assessing the effectiveness of the Fire Protection Program including fire drills and fire training of the fire brigade and plant personnel. He is also directly responsible for the effective coordination of the fire protection program with the station emergency plan to assure that a single point of control and contact will exist for all fire contingencies.

The Shoreham Fire Protection Program is designed to ensure the capability to shutdown the reactor, maintain it in a safe shutdown condition, and minimize radioactive releases to the environment in the event of a fire.

The overall fire protection, detection, and suppression systems for the plant were reviewed based upon an evaluation of potential fire hazards and their effect on structures, systems, and components important to safety.

Total reliance for suppressing a fire is not placed on a single fire suppression system. Appropriate backup suppression capability is also provided.

Evaluations of fire loadings affecting all safety-related areas have been performed to ensure that walls, floors, ceiling/floor assemblies, and doors are adequate to 1) prevent external fires from spreading into these areas and 2) prevent any internal fire from spreading to adjacent safety-related areas. This evaluation was also performed for all areas containing a significant inventory of radioactive materials.

II.B Fire Hazards Analysis

The Fire Hazard Analysis Report (FHAR) documents a comprehensive evaluation of potential fire hazards throughout the plant. Therein, the ability to safely shut down the plant considering fire hazards was analyzed. As concluded by this analysis, Shoreham Nuclear Power Station is adequately protected against postulated fires which could challenge the ability to perform a safe shutdown of the plant.

In addition to assessing the impact on safe shutdown capability, fire hazards throughout the plant were reviewed with regard to the potential for a fire to cause an unacceptable radioactive release. The review determined that there is no single postulated fire within the plant which could cause an unacceptable release of radioactivity. No release identified would exceed a small fraction of the guidelines set forth in 10CFR100.

It should also be noted that through the use of fire retardant materials, strict limits on combustibles, and a comprehensive fire plan, the overall plant design presents a very low fire hazard.

In addition to the analysis reported in the FHAR, a study was conducted with respect to the Reactor Building which conservatively considered the effects of fire. The study demonstrated that sufficient separation exists between redundant systems and components such that,even if all cables and raceways in very large segments of the reactor building are destroyed due to fire, the capability remains to safely shut down the plant. The methodology and results of this study are reported in the Cable Separation Analysis Report submitted by letter SNRC-532 dated February 10, 1981.

II.C Fire Prevention Features

Fire protection features are provided for all fire areas that contain or present a fire hazard to structures, systems, or components important to safety in accordance with the general requirements of this paragraph. The Shoreham design features for fire protection are described in FSAR Section 9.5.

The requirements with respect to transient fire hazards will be covered by SNPS Station Procedure SP12.013.02 - "Fire Prevention Watches, Patrols and Permits" which will provide instructions on inspections, the use of fire prevention permits, the composition, function and deployment of fire equipment watches and patrols.

Station Procedure SP39.001.02 - "Fire Brigade Organization, Response and Drills" defines the composition and function of the station fire brigade, and its reponse in a fire emergency. It also addresses the fire drills which shall assess the brigade's performance as a team, the status of associated emergency equipment, and the station performance, including outside assistance. This procedure is consistant with the detailed requirements of Appendix R.

SNPS Fire Suppression Systems are designed in conformance with National Fire Protection Association (NFPA) standards and meet the requirements of the American Nuclear Insurers (ANI).

Personnel who maintain and test fire detection and suppression systems shall be properly qualified by training or experience, or both as appropriate.

Procedures are being established to ensure that fire barriers and fire suppression systems and components are operable in accordance with Appendix R.

II.D Alternative or Dedicated Shutdown Capability

The Shoreham position with respect to alternative or dedicated shutdown capability is discussed in paragraph III.L.

III. Specific Requirements

III.A Water Supplies for Fire Suppression Systems

The Shoreham design is in full compliance with the requirements of this paragraph. The water supply system is discussed in FSAR Section 9.5.1.2.

III.B Section Isolation Valves

The Shoreham design is in full compliance with the requirements of this paragraph. Refer to FSAR Section 9.5.1.2.

III.C Hydrant Isolation Valves

The Shoreham design is in full compliance with the requirements of this paragraph. Refer to FSAR Section 9.5.1.2.

III.D Manual Fire Suppression

The Shoreham design is in full compliance with the requirements of this paragraph. Refer to FSAR Section 9.5.1.2.

A maintainability study is being performed at Shoreham to insure walkway access is provided for all floors and elevations of the station where systems or components are important to safety.

III.E Hydrostatic Hose Tests

The Shoreham hydrostatic hose tests will comply with the requirements of this paragraph.

III.F Automatic Fire Detection

The Shoreham design is in full compliance with the requirements of this paragraph. Refer to FSAR Section 9.5.1.2.

III.G Fire Protection of Safe Shutdown Capability

Fire protection of safe shutdown capability is provided by maintaining free of fire damage, one train of systems necessary to achieve and maintain shutdown conditions. This is accomplished from either the Main Control Room or the Remote Shutdown Panel. There is no single fire that can affect both the Main Control Room and the Remote Shutdown Panel. See paragraph III.L for a discussion of the independence of the Remote Shutdown Panel.

In addition, there are numerous plant features which assure fire protection of safe shutdown capability. In that regard, some of the more important areas of the plant are discussed below.

The electrical separation criteria for the Relay Room and cable spreading area are also described in Section 2 of the FHAR. It is recognized that a sustained fire must be precluded in this area. Therefore, this room is equipped with highly sensitive smoke and temperature detectors and a total flooding CO_2 system as described in the FHAR. In addition to the use of low combustible materials, strict controls are maintained on the introduction and use of transient combustibles. In the unlikely event of a fire in the Relay Room, it will be quickly detected and automatically extinguished by the CO_2 system, thus limiting the spread of fire from reaching significant levels. Therefore, any damage sustained would be quite local due to the quick response of the fire suppression system and the fire retardent nature of the materials. Under these conditions, sufficient capability will be available in the Main Control Room to safely shut the plant down should it be desirable or necessary to do so. Furthermore, control of sufficient shutdown systems is provided on the Remote Shutdown Panel located in the Reactor Building. The Remote Shutdown Panel is protected by a 3 hr rated concrete wall and steel door which completely enclose the panel. Within the enclosure, the panel is further protected by smoke detectors and an automatic halon fire suppression system. The controls and instrumentation located in this panel are provided with transfer capability such that they are isolated from the Relay Room and Main Control Room equipment when they are in service. Transfer/control capability is also provided in the Diesel Generator and

Emergency Switchgear Rooms to enable the emergency diesel generators to be started, connected to the emergency buses, and connected to emergency loads, independent of the control room. The plant is designed for orderly shutdown of the reactor from outside the Main Control room.

For the Control Room, ionization detectors are installed in the supply and return air ducts and all safety-related panels and consoles. All safety-related (Class 1E) panels in the Control and Relay Rooms will be equipped with ionization type smoke detectors. Most non-Class 1E panels in thse areas also have the ionization smoke detectors installed. These detectors alarm on the station security consoles in the Security Building and the Main Control Room. There is one detector located in each enclosed section of the panel. For large panels, multiple detectors are located to provide effective coverage.

Fire detectors will sound an alarm in the event of a fire. Fire protection for the Control Room consists primarily of portable hand extinguishers located both inside and outside the area with CO_2 hose reels as backup. One CO_2 hose reel is located in the north stairwell and one CO_2 hose reel in the HVAC Equipment Room. Both areas are immediately adjacent to the Main Control Room. Minimal quantitites of combustible materials within panels prevent the occurrence of a fire of sufficient severity to cause propagation to adjacent panels or adjacent sections of the same panel. Wires are flame retardant and self-extinguishing.

In those areas of Class 1E panels where adjacent controls/ instruments from two redundant safety divisions cannot be located in separate panels, separation is maintained by distance, by steel barrier or by enclosing one of the devices in a steel enclosure and by running the associated wiring in conduit to terminal blocks in the appropriate divisional area of the panel. Consequently, safe shutdown capability is not lost.

In areas of the plant, such as Emergency Switchgear Rooms, Battery Rooms, Diesel Generator Rooms, 3 hr rated walls exist between equipment and cable of each train. The Remote Shutdown Panel Room including 3 hr fire barrier walls and door is protected by smoke detectors and automatic halon fire suppression system.

For the Reactor Building a study was performed to consider the effects of fire. Conservatively sized plant segments were selected and all the safety related cables and components located in the segment were assumed lost due to fire. The segments are overlapping 45 degree areas in the secondary containment and overlapping 60 degree areas in the primary containment. The study concluded that sufficient separation exists between redundant systems and components that even if all the cables and raceways and components in these segments

were lost due to fire, the capability remains to safely shut down the plant. Furthermore, the primary containment will be inerted.

III.H Fire Brigade

The Shoreham fire brigade will comply with the requirments of this paragraph.

III.I Fire Brigade Training

The Shoreham fire brigade training will comply with the requirements of this paragraph.

III.J Emergency Lighting

Areas needed for operation of safe shutdown equipment and in access and egress routes thereto will be identified and 8 hr battery powered units installed to meet this requirement.

III.K Administrative Controls

The Shoreham administrative controls will comply with the requirements of this paragraph.

III.L Alternative or Dedicated Shutdown Capability

Alternative or dedicated shutdown capability is required only where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G, (Fire Protection of Safe Shutdown Capability). It is our position as discussed in paragraph G above, that the Shoreham design provides adequate fire protection of safe shutdown capability. Therefore, special consideration for an alternative or dedicated shutdown capability is not required by Appendix R. Nevertheless, the Shoreham design provides for an independent shutdown capability at the Remote Shutdown Panel.

The Remote Shutdown Panel (RSP) provides remote control for the essential reactor systems needed to carry out the shutdown function from outside the Main Control Room to bring the reactor to cold shutdown in an orderly fashion. It is in an alternate location from the normal control system used in the Main Control Room. Shutdown of the Reactor can be accomplished from the RSP if feedwater is not available and the normal heat sinks, i.e., turbine and condenser, are lost.

Transfer switches are provided in the RSP for the purpose of transferring control from the Main Control Room to the RSP for all the functions on the RSP. When the transfer is completed the RSP functions independent of the Control Room and the Relay Room. Therefore, one train of equipment necessary to achieve shutdown is maintained free of damage from an exposure fire in either the Relay Room or Control Room.

III.M Fire Barrier Cable Penetration Seal Qualification

The Shoreham design is in full compliance with the requirements of this paragraph. Refer to FSAR Section 9.5.1.2.

III.N Fire Doors

The Shoreham design is in full compliance with the requirements of this paragraph. Refer to FSAR Section 9.5.1.2.

Inspection requirements will be covered through Station Procedures SP12.016.01 - "Surveillance Program" and SP12.015.01. "Preventive Maintenance Program".

Access to keys will be provided to the Shoreham Fire Brigade Chief through Station Procedure SP91.005.01 - "Lock and Key Control System".

An oil collection System for Reactor Coolant Pump

An oil collection system for the recirculation pump is not required since the primary containment is inerted during normal operation. When the plant is not operating, normal fire protection is available in accordance with BTP 9.5-1.

NRC FHAR FOLLOW-UP QUESTIONS TO
OUR DECEMBER 1978 RESPONSES

Question No. 2

It is our position that an oil collection system be provided for the HPCI turbine pump and RCIC turbine pump. This would resolve our concerns for questions Nos. 2, 12, and 13.

Response

HPCI and RCIC turbine pumps located at el 8 ft-0 in. of the Reactor Building are provided with a forced pressure lubrication system. The HPCI and RCIC pumps are not normally operative; therefore, the lubrication system is not under pressure. Any leakage is contained in the immediate vicinity of the respective pump due to the partial wall between the pumps and the curbs provided for this purpose. Each curbed area is drained by the floor drain system to respective underground sumps.

Moreover, due to the complexity of the lubrication system piping of the HPIC and RCIC turbines, it is impracticable to design and install a seismically supported and effective oil collection system around the pipes. Also, as mentioned in the last paragraph of response to this question: loss of both HPCI and RCIC does not impair the safe shutdown capability of the plant. Therefore, the system design as provided, including early warning detection, fire suppression, and the installed oil collection system is adequate.

We state below our revised position on a previous response to question No. 12, where provision for 3-hr fire barrier is found not to be compatible with the as-built conditions.

A review of as-built conditions, with respect to incorporating a 3-hr rated fire barrier between vertical cable tray risers (at 138° and 223° azimuth) and adjacent pumps (HPCI and RCIC), has been completed. Various interferences such as seismic pipe supports, cable trays, cable tray supports, conduits, and electrical junction boxes, limit the ability to provide a 3-hr fire barrier from el 8 ft-0 in. to el 40 ft-0 in. A partial height barrier of 3-hr rated construction extending 9 ft high is being installed between the vertical cable trays and the adjacent RCIC pump. The barrier will not encompass the trays entirely. However, the fire loading at el 8 ft-0 in. of the Reactor Building as provided in Table 1 of the FHAR is less than one hour.

Each individual riser in the banks contain only Red, Orange or Blue division cables. The distance between the two cable tray risers is 85 ft. The HPCI turbine-pump set is located approximately 30 ft. away due northwest from the vertical cable tray risers (138°), thus providing physical separation and the RCIC turbine-pump set is located 25 ft southeast of the HPCI pump set.

The distance between the two cable tray risers is 85 ft. The HPCI turbine-pump set is located approximately 30 ft. away due northwest from the vertical cable tray risers (138°), thus providing physical separation and the RCIC turbine-pump set is located 25 ft southeast of the HPCI pump set.

Fixed manual spray fire suppression system, together with an early warning fire detection system and lube oil leakage detection system are provided for both HPCI and RCIC pump areas. In addition, portable and fire hose stations are provided as backup fire suppression systems.

The above features ensure that fire cannot spread to adjacent areas. Loss of any one of the vertical cable tray risers will not impair both divisions of safety systems. Also, we have demonstrated, by analysis, that loss of all electrical cables (including HPCI and RCIC) in the designated 45° zones of the Reactor Building does not impair the safe shutdown capabilities of the plant.

Question No. 3

The licensee should provide the penetration seal test reports or ANI approval sheets for all seals.

It is our position that all dampers, including motorized dampers, be UL listed.

Response

Penetration seal test reports and ANI (American Nuclear Insureres) acceptance sheets will be available for all seals utilized at Shoreham. These are required to be furnished by the fire stop and seals contractor as part of the Specification SH1-459.

Fire dampers without motors are UL listed with fusible links and are labeled.

Fire dampers with motors are certified UL construction with fusible links but are not labeled. At the time these motorized fire dampers were purchased, UL listing for the motorized dampers as a unit was not available, therefore, the unit was not labeled. The motor does not affect the closure during a fire. Melting of the UL listed fusible link allows the damper to close on high temperature.

Question No. 5

It is our position that fire stops be installed in the vertical runs of the Reactor Building.

Response

All vertical cable tray runs in the Reactor Building are provided with approved fire stops where they penetrate any floor level. Fire stops are also provided in cable trays at their midpoints when the distance between Reactor Building floor levels exceeds 25 ft. This is in accordance with Specification SH1-459.

Question No. 9

It is our position that the fire detection system be separated from the rest of the relay room by a 2-hr fire barrier so that a fire in the relay room will not cause the loss of entire fire detection system.

It is our position that fire detection system wiring be Class "A" from the fire control panels within the relay room to the control room.

We would like to discuss the fire detection system during site visit to resolve concerns.

Response

The arrangement of the fire detection system wiring conforms to NFPA 72D for Class "A" circuits from the local detectors to the switching panel located within the relay room. Class "A" circuits consist of 2 pairs of wires with switching capability to utilize either pair if a problem occurs. From the switching panel to the fire zone modules and the console, each located in the control room, the circuits are continuously electronically supervised so that a loss of any circuit is alarmed. Power supply equipment, such as the inverter, fire detection panels, and distribution panel are located in various parts of the relay room. It is not practicable to incorporate a 2-hr fire barrier within the relay room to achieve separation. This would also impose additional requirements of ventilation, fire detection, and protection of the areas thus created. All cabling must run through the relay room to reach the control room. The relay room is equipped with fire detection devices and fire suppression equipment for fire protection. Automatic total flooding CO_2 fire suppression system provided for the relay room is adequate.

Question No. 11

It is our position that a permanent second feed be provided for the Reactor Building fire water systems.

Verify that in the event of an SSE, water is still available for fire suppression use in the Reactor Building.

Response

A permanent second feed will be provided for the Reactor Building fire water system from the yard fire loop and will be connected into the Reactor Building seismically supported fire protection system.

The fire protection system was not designed to Seismic Category I criteria and, therefore, may not be available for fire suppression use in the Reactor Building in the event of a SSE.

However, the portions of the system located in safety-related areas are supported such that failure during a seismic event cannot significantly impair the capability of any safety-related equipment. However, a seismic Category I safety-related service water line inside the Reactor Building has been provided with a spare connection available for manual hook-up to the fire suppression system. This alternate connection ensures that fire suppression system is available following a SSE.

Question No. 14

It is our position that a fixed automatic water sprinkler system be provided in the cable spreading room (relay room).

Response

The relay room is protected by a low pressure total flooding CO2 fire suppression system. This system is actuated automatically by heat detectors or it can be actuated manually. The area and panels are also monitored by early warning ionization smoke detectors which in combination with heat detectors, for the actuation circuit of the CO2 system, provide constant and sensitive surveillance for detection of any fire in its incipient stages. The CO_2 system is designed to provide two successive total flooding CO_2 discharges. In addition, a manual water suppression system (standpipe hose stations) has been provided for the cable spreading room (relay room) in the event that a deep-seated fire in a fully loaded cable tray is not permanently suppressed by the CO_2 system. The manual capability is preferred because it provides for selective application of water in the relay room and would limit the consequences of water damage.

Prompt fire detection and actuation of the fixed CO_2 system will prevent a fire from becoming established. Backup suppression capability is provided with standpipe water hose station, CO_2 hose reels, and portable extinguishers.

Provisions to protect the relay room as described above are compatible with the components within the room and are adequate.

Question No. 16

It is our position that a hose station be provided in the screenwell pump house.

Response

Each of the redundant safety-related service water pump rooms in the screenwell pump house has a low fire loading of 30,000 Btu/ft , less than the equivalent fire severity of 1/2 hr.

Previous response to question No. 16, indicated two yard fire hydrants are provided with hoses for double stream coverage in addition to portable fire extinguishers.

The 3-hr rated fire door between the pump rooms is monitored for closure and alarmed in the control room. In addition, each of the rooms is provided with two area detectors and the duct detector for early warning.

Provisions as described above for protection of each of the redundant screenwell pump rooms are adequate. A hose station for each room is not required.

Question No. 19

Provide justification for use of 1 1/2 hr dampers.

Response

The 1 1/2 hr fire dampers provided are equal to or better than the fire loading of the adjacent areas. The structural design requirements of the walls results in the fire rating of the barrier exceeding the requirement of the fire dampers.

Question No. 26

Appendix R - 8-hr battery packs.

Response

Areas needed for operation of safe shutdown equipment and for access and egress routes thereto will be identified and 8-hr battery powered units installed.