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

OCT 2 1 1979

Docket Nos. 50-361 and 50-362

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Gentlemen:

SUBJECT: FIRE PROTECTION QUESTIONS AND POSITIONS (San Onofre Nuclear Generating Station, Units 2 and 3)

As a result of our review of fire protection at the San Onofre Nuclear Generating Station, Units 2 and 3, we find that we need the information listed in the Enclosure. Almost all of these questions have been verbally transmitted to your staff. Please contact us if you have any questions about the information requested.

Sincerely,

obert I. Bass

Robert L. Baer, Chief Light Water Reactors Branch No. 2 Division of Project Management

Enclosure: Request for Additional Information

ccs w/enclosure: See next pages

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OCT 2 9 1979

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Mr. A. S. Carstens 2071 Caminito Circulo Norte Mt. La Jolla, California 92037 015.1 Page I-3, Item A.5.* Transient fire loads should be considered as the source of a possible exposure fire. Revise your fire hazards analysis to consider such exposure fires in all areas containing safety-related equipment or cable. Such a review should not take credit for "oxygen depletion" based on closure of doors or dampers. Also, conduit or coatings do not provide "fire resistance" for cables.

SYSTEMS BRANCH

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SAN ONOFRE NUCLEAR PLANT, UNITS 2 & 3

DOCKET NOS. 50-361/362

- 015.2 Page I-3, Item B. In this item you state that the fuel loading in "power plants" consists "mostly of plastic and oil," yet in your submittal you have not identified any plastics other than battery cases. Identify any areas of the plant where plastics are used, and indicate the amount of plastic used. Also analyze the effect on safe shutdown of fires in these areas considering the combustible loading and effects of the various products of combustion.
- 015.3 Page I-8, Item 7. Your methods used to determine and define non-combustible materials is not in complete agreement with NFPA 220. Revise your definitions to agree with those in NFPA 220 for non-combustible and limited combustible material, and verify that all wrap, insulation, and interior finish material comply (see specifically Sections 2-3 and 2-6 of NFPA 220, 1975 Edition).
- 015.4 Page I-20, Item F and page III-41. Analyze the operating features of the specific fire suppression system deluge valves installed in containment to determine if any adverse effects can be expected due to operation of the release mechanism without static water pressure on the supply side of the valve. Also analyze the effect of the pressure surge on both the valve and piping.

- 015.5 Page I-21, Item G, and page III-22. Verify that your flooding analysis considered combined sprinkler and hose water runoff for the design flows and duration, and also the effects on safety related equipment on other elevations of water runoff through doors and unsealed floor openings.
- 015.6 Page I-21, Item H. Your fire hazards analysis indicates that many of the barriers (walls, floors, ceilings, dampers, doors, etc.) enclosing safety-related rooms and areas are of 1 or 2 hr. construction. Your analysis also indicates that the fire loading permanently located in or exposing some of these areas could produce a fire severity in excess of the fire barrier ratings. It is our position that all rooms and areas containing safe-shutdown related cable or equipment be provided with minimum 3 hr. rated walls, floors, ceilings, and penetration seals. Analyze each such area, and state how you will comply with this position.

015.7 Pages I-23, 24, Item M and pages III-32 through 36.

- a. Where automatic sprinklers or water spray systems are installed, provide the criteria and rationale to determine the density and spacing. Include the largest system flow and pressure to verify that the fire pumps can provide this flow plus 750 gpm for hose streams with the largest pump out of service.
- b. Indicate the rated capacity and pressure of the fire pumps.
- c. Verify that the fire pumps and their controllers are either UL listed or FM approved for fire pump service. Indicate the location of the controllers.

-2-

d. Verify that the fire pumps and their controllers meet the requirements of NFPA 20 for such equipment.

-3-

- e. Explain the procedures used to test the three fire pumps, and provide details of pump acceptance tests, including flows and pressures.
- f. Figure 9.5-1 (sheet 1) indicates a lack of sectional valves on the fire pump sectional discharge headers. Therefore, the pumps cannot be isolated from each other for maintenance. Further, the fire pump header arrangement does not meet our single failure criteria in that the current arragement allows a single break to take out up to 50% fire pumps.
- **015.8** Page III-2, Item A.1. Provide the qualifications of the fire protection engineer referred to as required by Appendix A.
- 015.9 Page III-5, Item A.4 and page III-37. Describe how water will be provided to fight a fire after a Safe Shutdown Earthquake.
- 015.10 Page III-11, and page III-54, Item G.1. Page III-11 states that open flame permits are required only when such operations are performed in the vicinity of flammable materials, while page III-54 implies that a permit will always be required to utilize welding or cutting type equipment. Verify that permits will be required whenever welding or cutting type equipment is used in safety-related areas.

- Ol5.11 Page III-12. You indicated that the fire brigade for each shift consists of 3 persons. It is our position that a minimum of 5 persons on duty be maintained for fire brigade operations. This may require additional fire brigade members to fill in for sick time and vacations so that a minimum of 5 fire brigade members are on duty at all times.
- 015.12 Page III-20. Redundant safe shutdown system cable separation in accordance with Regulatory Guide 1.75 is not considered adequate protection from the effects of exposure fires. It is our position that an automatic water suppression system be installed in all areas where redundant safe shutdown equipment or cable is not separated by 3 -hr. fire rated barriers. In addition, where such equipment or cable is separated by less than 20 feet, both trains of safe shutdown equipment or cable should be enclosed with at least a 30 minute fire rated barrier.
- 015.13 Page III-24. Indicate the location and orientation of the bulk gas storage tanks with regard to the various structures.
- 015.14 Page III-25. Verify that flammable liquids are not stored in rooms or areas containing or exposing safety related equipment or cable.
- 015.15 Page III-23, 25 and 26, and page I-23, Items J and K. Substantiate the fire resistance capability of the following items as they pertain to safety-related areas or areas exposing safety-related areas or high hazard areas by verifying that their construction is in accordance with a particular **designthat** has been fire tested, and identify the design, the test method used and the acceptance criteria:

-4-

- Rated fire barriers, including floor and ceiling construction and their supports;
- (2) Fire dampers/fire doors, as well as how they are installed in the ventilation ducts that penetrate rated fire barriers of safetyrelated areas;
- (3) Fire barrier penetration seals around ducts, pipes, cables, cable trays and in other openings. Verify that all seals are of the thickness specified in the tests, and that cables and cable trays are supported in a marner similar to supporting arrangements used in any tests.
- 015.16 Page III-27, Item 4. Ventilation.
 - a. Describe how areas containing safety-related components are ventilated for manual fire fighting purposes. Consider that control of power or cabling for normal ventilation may not be functional in these areas. Include a discussion regarding control access to the equipment as well as the ability to handle high temperature gases and particulates.
 - b. In each area, verify that products of combustion exhausted from an area will not be exhausted to other safety-related areas of the plant.
 - c. In this item you state "there are no special 'smoke removal systems'" while in Item 3(i) on the same page you state that the "cable spreading room and the cable tunnels are provided with automatic smoke venting." Explain the discrepancy.

015.17 Page III-29. Self-contained breathing unit Indicate the number of breathing units provided for the various functions, and state the locations where these units are stored.

-6-

- 015.18 Page III-30, Item 5(a). It is our position that a fixed emergency lighting system consisting of sealed beam units with individual 8 hr. battery power supplies be installed in all areas required for safe shutdown operations, including access and egress routes.
- Ol5.19 Page III-30, Item 5(c). It is our position that fixed emergency communications using voice powered head sets should be provided at pre-selected stations. Battery powered (PAX) dial telephones are not an acceptable alternate.
- 015.20 Page III-30, Item 5(d). Verify that the fire brigade will be supplied with portable radios for emergency communications.
- 015.21 Page III-31, Item E.1. Fire Detection.
 - a. Provide an analysis, supported where necessary by test data, which substantiates that the sensitivity of fire detection devices and the number and placement of detectors are sufficient to provide detector response in time to prevent loss of safety-related systems or components. The analysis should include both fire detection devices used to notify personnel and those used to activate fire protection systems.

- b. Provide data to show that the complete fire alarm system, including water flow and valve supervision, conforms to applicable guidance in NFPA 72D for Class A systems and in NFPA 70 for Class I circuits. Include a discussion of the primary and secondary power supplies for the alarm system, and indicate how power is transferred to the secondary supply.
- c. You state that the plant public address system is used to announce fires plant wide. Describe how the fire announcement is distinctive and unique so as not to be confused with other announcements.
- d. It is our position that all fire detection and actuation systems
 be connected to the plant emergency power supply.
- 015.22 Page III-35. The lateral to each hydrant on the fire main should be provided with a shutoff valve to eliminate the need to shut off portions of the fire main loop to repair hydrants.
- 015.23 Page III-39, Item 4. Halon Suppression System. Provide the design criteria, including concentration and soaking time, for the total flooding systems installed in the computer rooms.
- 015.24 Page III-42. It is our position that portable fire extingiushers be permanently installed at strategic locations throughout containment.
- 015.25 Pages III-43, 44, Item 2. Control Room.
 - a. It is our position that the walls separating the control room from the cable risers be upgraded to provide a 3 hr. fire rated barrier.
 Describe how you will comply with this position.

- b. It is our position that other rooms in the control room area which are not separated from the control room by 3 hr. fire barriers be separated by walls extending from floor slab to floor slab with a minimum l hr. fire resistance rating, and all such rooms should be provided with an automatic extinguishing system. Describe how you will comply with this position.
- c. It is our position that fire detection capability be provided within the cabinets and consoles in the control rcom.

015.26 Pages III-45 through 47, Item 3. Cable Spreading Room.

- a. It is our position that the 1 and 2 hr. fire barriers (including floor and ceiling) presently enclosing and separating the cable spreading rooms be upgraded to provide at least a 3 hr. fire rated barrier enclosing each cable spreading room. Describe how you will meet this position.
- b. Page III-46; item 3.6.2. Redundant safe shutdown system cable separation in accordance with Regulatory Guide 1.75 is not considered adequate protection from the effects of exposure fires. It is our position that an automatic water suppression system be installed in all areas where redundant safe shutdown equipment or cable is not separated by 3-hr. fire rated barriers. In addition, where such equipment or cable is separated by less than 20 feet, both trains of safe shutdown equipment or cable should be enclosed with at least a 30-minute fire rated barrier.

015.27 Page III-48, Item 5. Switchgear Rooms.

It is our position that switchgear rooms be separated by minimum 3-hr. rated fire barriers. Describe how you will meet this position.

-9-

015.28 Page III-48, Item 7. Station Battery Rooms.

- a. It is our position that station battery rooms be separated by minimum 3-hr. rated fire barriers. Describe how you will meet this position.
- b. It is our position that the battery room ventilation systems be monitored so that a loss of ventilation flow in any battery room is alarmed in the control room.

015.29 Page III-52, Item 12. New Fuel Area.

It is our position that local standpipe hose stations be provided within reach of this area and the Spent Fuel Pool area. Describe where such a hose station will be located.

Fire Hazards Analysis

A. Containment Structure

015.30 Two Steam Generator Rooms - Zone 1

Consider an oil fire from a rupture in the reactor coolant pump oil lines will affect the other reactor coolant pumps or other safety-related equipment. Consider the floor openings. Install curbs at the 9'-0" elevation, and an oil containment and collection system. B., C., & D. Penetration Areas

015.31 Piping Penetration Area - Zones 45, 28 and 10.

- a. In your response to Appendix A you state, on page III-36, that "interior manual hose installations are capable of reaching any location with at least one effective hose stream." In your analysis of these areas, you have not indicated the presence of any standpipe hose stations for Zones 45 and 28 and a single hose station for Zone 10 which is inadequate for the entire area. It is our position that standpipe hose stations be provided in compliance with the requirements of Appendix A and NFPA 14.
- b. Your diagrams indicate inadequate coverage by hand portable fire extinguishers in Zones 45 and 28. It is our position that such extinguishers be installed in accordance with NFPA 10, including travel distance.

L. Auxiliary Building, Radwaste Area

015.32 Low Radioactive Waste Storage Area - Zone 24. It is our position that automatic sprinklers be installed in this area according to Appendix A. This also applies to the High Radioactive Waste Storage Area-Zone 25.

U. Underground Electrical Tunnels

015.33 Describe the oil containment, drainage, and collection systems for the transformers which are located over portions of the electrical tunnels. Consider the seals provided for any cable which enters the tunnels from the transformers, and analyze the consequences of oil from a transformer oil spill or accident entering the cable tunnels.

-10-

General

- 015.34 a. Verify that procedures necessary to bring the reactor(s) to a cold shutdown are available if a fire were to cause evacuation of the control room or were to destroy all cable and equipment in any of the following areas:
 - (1) Control Room
 - (2) Cable spreading room
 - (3) Cable riser galleries
 - (4) Cable tunnels
 - (5) Any other areas containing redundant safe shutdown equipment or cables.

Consider the number of personnel required and available at projected minimum staffing periods to provide needed shutdown operations. Describe the provisions that have been made for emergency lighting at any remote areas required for safe shutdown operations, and how would communications be established between these areas, as well as other vital operations areas (i.e. fire brigade)?

b. Verify that all control functions from the remote shutdown panels are electrically independent of any circuits in the affected areas, including power supplies.

-11-

OCT 2 0 1979

015.35

Pages I+23, 24; Item M and pages III-32 thru 36

Based on our review of Figure 9.5-1, sheet 1 of your FSAR, we find that valves are lacking in both the suction and discharge headers for the fire pumps. Without valves to isolate individual pump connections on the header, a single failure in either the suction of discharger header would require that all three fire pumps be shut down to make repairs. In addition, a crack in the pump suction header between the east tank discharge and fire pump P221 suction connection would require that electric pump P221 and the diesel engine driven pump be also shut down for repairs. This would leave only 1500 gpm electric motor driven pump in service which cannot provide the capacity required, and, therefore, you are not meeting the guidelines of Reg. Guide 1.120.

- 12 -

015.36 In Figure 9.5-1, sheets 2 through 5 of your FSAR you indicate that, for many areas, both the primary and secondary suppression systems

(sprinklers and hose stations) are supplied from the same fire protection header such that a single failure could shut down both sprinklers and hose stations in many areas. It is our position that you modify your system to resolve our concerns. One way to resolve the above conditions is by tying the Unit I firewater supply into the Unit 2 & 3 firewater

system, which will not only enhance overall system reliability, but will also increase the stored water supply sources.

- 13 -

015.37 Pages III-43, 44, Item 2. Control Room

- a. In Fig. 6 you indicate that there are no water type portable extinguishers in the control room or adjoining areas. It is our position that water type portable extinguishers be installed in the control room in addition to the other type extinguishers you are proposing to install.
- b. You have indicated that room 228, the console area of the control room, is not provided with an automatic fire detection system. It is our position that area fire detection be provided in room 228 to comply with the guidelines of BTP 9.5-1, Appendix "A", section F.2.

015.38 Penetration Areas

a. Zone 1 - Containment cable tray areas at levels 30', 45', 63' Identify on drawings where these cable concentrations are located, and differentiate between the A and B train cables. It is our position that an automatic water suppression system be installed in all areas where redundant safe shutdown equipment or cable is not separated by a 3-hour fire rated barrier. Additionally, where such equipment or cable is separated by less than 20 feet of clear space, both trains of safe shutdown equipment/cable must be enclosed with at least a 30-minute fire rated barrier. Modify your design to meet our guidelines.

OCT 2 0 1979

015.39 Piping Penetration Area - Zone 45

It is our position that all 4 doors to the boundary of this zone be Class A doors.

- 14 -

015.40 Auxiliary Building, Control Area (EL 50)

Provide a fire hazards analysis for those rooms in this area for which you have not done so (e.g. rooms 301, 312, 307A, 307B and the corridors). Re-evaluate the fire protection provided for these areas reflecting your analysis.

015.41 Underground Electrical Tunnels

It is our position that standpipe hose stations be provided at strategic locations in the electrical tunnels to facilitate manual fire fighting operations. These hose stations should be supplied so that a single break or other failure in the fire protection system will not incapacitate both the standpipe hose stations and the deluge systems in the electrical tunnels.

015.42 Four Boric Make-up Tank Pump Rooms - Zone 51

Both boric acid make-up pumps are powered from "Train A". There are no "Train B" boric acid pumps. Only manually actuated "Train B" valves are provided to allow gravity flow thru the "Train A" pumps and piping. If a fire were to involve the "Train A" pumps and piping, then this might impair the functional objective of the "Train B" valves. This arrangement does not satisfy redundant equipment separation guidelines. Modify your design to resolve our concern.

015.43 Penetration Area, Elevation 63'

It is our position that you provide an automatic sprinkler system for Zone 3 because of the relatively high fuel loading in the decontamination room.

015.44 General Plant Area

- a. Verify that procedures necessary to bring the reactor(s) to a cold shutdown are available if a fire were to cause evacuation of the control room or were to destroy cable or equipment in any of the following areas:
 - (1) Control Room
 - (2) Cable spreading room
 - (3) Cable riser galleries
 - (4) Cable tunnels
 - (5) Any other areas containing redundant safe shutdown equipment or cables.
 - (6) Evacuation Room (Zone 66)
 - (7) Salt Water Tunnel

Consider the number of personnel required and available at projected minimum staffing periods to provide needed shutdown operations. Describe the provisions that have been made for emergency lighting at any remote areas required for safe shutdown operations, and how would communications be established between these areas, as well as other vital operations areas (i.e. fire brigade)?

- 16 -

- b. Verify that all control functions from the remote shutdown panels are electrically independent of any circuits in the affected areas, including power supplies.
- c. Throughout your fire hazards analysis, you indicated for many areas that there are no fire dampers. Does this statement mean that there are no ducts or openings in the walls, floors, or ceilings? It is our position that any ducts or openings be provided with an appropriate fire damper. Verify that you meet our position.
- d. It is our position that smoke detectors be installed in all areas where there is a potential for a safety-related cable fire. These detectors may be installed in conjunction with or in place of the heat detectors already proposed in some areas.