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SUBJECT: FORWARDS PRELIMINARY FIRE PROTECTION QUESTIONS ON PLANT PRIOR TO SITE VISIT.

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May 2, 1979
File 7917-3

U.S. Nuclear Regulatory Commission
Division of Systems Safety
Washington, D.C. 20555

Attention: P. Hearn

Gentlemen:

Enclosed are the preliminary questions on the WPPSS Nuclear Plant, Unit No. 2, which are being submitted prior to our site visit.

Sincerely,

Robert D. Barnes

Robert D. Barnes, P.E.

Encl.

cc: V. Benaroya
P. Matthews

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ADD: P HEARN W/ENCL

PRELIMINARY

WPPSS 2 Fire Protection Questions

1. Page 3-41, Position D1(a), and page 3-58, Position D3(c).

a. Throughout your fire hazards analysis you indicate that redundant safety related cables are separated in accordance with Reg. Guide 1.75 or are provided with barriers which include a flame retardant coating. Such separation may be adequate for electrically initiated fires in the cables but is not adequate to protect redundant circuits from the effects of exposure fires in permanent or transient combustibles. It is our position that where 3 hr. fire rated barriers cannot be provided to separate redundant circuits or equipment required to bring the plant to a safe cold shutdown, the room or area containing such equipment should be protected by an automatic water suppression system. In addition, where redundant circuits or equipment are within 20 ft. of each other and in other areas where combustible loading is located between redundant trains, both divisions (including those cables in conduit) must be completely enclosed in a ½ hr. fire rated barrier. An acceptable alternate is to provide a dedicated shutdown system completely independent of those areas which contain redundant safe shutdown systems.

b. Describe the procedures necessary to bring the reactor to safe cold shutdown if a fire were to destroy redundant division of cable or equipment in any areas where both divisions are present, including:

(1) Control room
(2) Cable spreading room
(3) Electrical equipment areas
(4) Hallways and other areas where both divisions are present.

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

c. Describe the procedures necessary to transfer control to the respective remote shutdown panels, and verify that all control functions from the remote shutdown panels are electrically independent of any circuits in the affected areas, including power supply.

d. Provide sufficient information to demonstrate that a fire which destroys the hot shutdown panel will have no adverse affect on systems required for safe shutdown.

2. Page 3-17, Position A4, page 3-91, Position E3(a), and Figure 77. You indicate that you are not in compliance with this section of Appendix A. It is our position that you revise the design of your fire suppression system so that it will comply with Appendix A. This also includes installation of sectional valves in the underground loop so that a single break will not interrupt the entire water supply to either the Reactor Building or the Service Building.

3. Page 3-42, Position D.1(b).

Provide drawings showing all safety-related cables and/or conduit required for safe shutdown. Identify their function and show the routing from each piece of equipment to its termination. The drawings should show the minimum physical separation distance

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and/or barriers between redundant associated electrical circuitry and cable routings for each applicable system and/or component. Both control and motive power cable routings should be shown.

4. Page 3-51, Position D.1(j), and page 3-59, Position D.3(d)

a. 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 design that has been fire tested, and identify the design, the test method used and the acceptance criteria:

(1) Rated fire barriers, including floor and ceiling construction and supports;

(2). Fire dampers/fire doors, as well as how they are installed in the ventilation ducts that penetrate rated fire barriers of safety-related areas (3 hr. rated fire door dampers required in 3 hr. rated barrier penetrations, including switchgear rooms, battery rooms, etc.). Verify that fire door dampers installed in the horizontal position are approved for horizontal installation:

(3) Fire barrier penetration seals around ducts, pipes, cables, cable trays and in other openings. Such seals should carry a rating equivalent to that of the barrier penetrated. Verify that all seals are of the thickness specified in the tests, and that cables and cable trays are supported in a manner similar to supporting arrangements used in any tests, or verify that collapse or distortion of the trays, with the resultant load and torque on the penetration seal, will not affect the integrity of the penetration seal.

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b. In your analysis you indicate many areas where 3 hr. fire rated barriers have penetration openings which are either not sealed or provided with less than 3 hr. rated doors, dampers, or other closures. It is our position that all such penetrations be sealed with material which will provide a fire rating equivalent to that of the barrier penetrated.

5. Page 3-53, Position D2(b)

Indicate the function of the railroad airlock mentioned in your response to this position and analyze the need for an automatic suppression system in the area. Also explain the need to store the nitrogen and compressed air cylinders in this area in violation of Appendix A guidelines.

6. Page 3-55, Position D2(d). Indicate if any flammable or combustible liquids, other than the diesel generator fuel oil storage tanks or lubricating oils, etc. which are inherent in any machinery, are stored in any areas which contain or expose areas which contain safety related equipment or circuits.

7. Page 3-60, Position D3(e)

You indicate that fire breaks will not be installed except at fire area boundary walls. It is our position that fire stops be provided at 20 ft. horizontal and 15 ft. vertical intervals (if the vertical run is 20 ft. or more) along cable routings.

8. Page 3-65, Position D3(j) and page 3-97, Position E4.

a. You indicate that there are some cables in the underfloor area in the control room that are not protected by the Halon

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extinguishing system. It is our position that all fully enclosed electrical raceways in the underfloor space, should have automatic fire suppression inside.

b. You indicate that the Halon system installed to protect the cables in the underfloor areas of the control room is designed for a 5% concentration with an "indefinite" soak time. It is our position that the Halon protection provide a 20% concentration for a soak time of at least 20 minutes. Revise your design to comply with this position.

9. Pages 3-66 and 67, Position D4(a)

a. Describe the procedure employed for heat and smoke removal using fixed or portable equipment in areas that house safety related systems or components. Describe how these areas can be ventilated for manual firefighting purposes. Consider that control or power 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 where safety-related system or components are located, verify that products of combustion exhausted from one area will not be exhausted to other safety-related areas of the plant.

c. Verify that the portable smoke removal equipment will be operable with a loss of off-site power.

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10. Page 3-70, Position D4(d)

Indicate if the off-gas system charcoal filter units are protected in accordance with Regulatory Guide 1.52.

11. Page 3-74, Position D.4(h)

Describe the quantity, placement, and reserve supply (6 hr. onsite required) for the self-contained breathing apparatus used at various locations.

12. Pages 3-76, Position D.5(a)

Your response to Section D.5(a) of BTP 9.5-1, Appendix A, is not acceptable. Any hard-wired system can be rendered inoperable by a fire. It is our position that the emergency lighting units have individual 8 hr. minimum battery power supplies and that they be provided in all areas required to be manned for safe shutdown and in access and egress routes to and from all fire areas. Verify that sufficient 8 hr. units will be installed to comply with the guidelines.

13. Page 3-79, Position D.5(d)

Indicate if the fire brigade is equipped with portable radios, and verify that communications with the control room via the portable radios is possible from all plant areas.

14. Page 3-80, Position E.1(a)

a. You indicate that ionization and photoelectric detectors are installed for 900 ft^2 and 1000 ft^2 coverage respectively. However, since the UL tests are based on 900 ft^2 coverage and this

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and this 30 ft. maximum spacing is also recommended in NFPA 72E. The 900 ft^2 recommended spacing is based on a smooth ceiling with no forced air flow. Based on the above, the instllation of your photoelectric detectors is not acceptable. In addition, using the maximum 900 ft^2 spacing for any smoke detectors in a power plant, with the many obstructions (i.g. cable trays, pipes, ducts, etc.) and forced air flow, is not adequate in many areas. 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. It is our position that the complete fire alarm system, including waterflow and valve supervision, be revised to conform to applicable guidance in NFPA 72D for Class A systems and in NFPA 70 for Class I circuits. Indicate your intent to comply with this position and 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. It is our position that all fire detection and actuation systems should be connected to the plant emergency power supply. Indicate if your response on page 3-83 indicates compliance with this position.

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15. Page 3-81, Position E.1(b)

It is our position that fire detection systems should provide local audible alarms at the location of the fire in accordance with Appendix A guidelines. Indicate your intent to comply.

16. Page 3-86, Position E2

a. Verify that the fire pumps and their controllers are either UL listed or FM approved for fire pump service.

b. Indicate the design ratings (capacity and pressure) of all five fire pumps, and explain the procedures used to test the fire pumps. Provide details of the pump acceptance tests, including flows and pressures, for all fire pumps.

c. Indicate if alarms indicating pump running, driver availability, failure to start, and low fire main pressure are provided in the control room.

d. Provide a schematic diagram of the piping in the Well No. 2 Pump House for the fire pumps located there, including the connection to the underground fire loop. Explain what is meant by the phrase "temporary well pumps" on Figure 77 in regards to these pumps.

e. Describe the start-stop sequencing arrangements for all five fire pumps, including pressures, and also indicate the normal fire main pressure.

17. Page 3-87, Position E2(d), and page 3-88, Position E2(e)

a. Indicate if the 351,000 gal. water supply for the fire pumps in the circulating water pump house is a dedicated supply

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reserved only for fire pump use and indicate how this is accomplished. If such is not the case, provide a detailed analysis of the overall expected maximum demand on the water supply to demonstrate that fire protection water will always be available.

b. You are not in compliance with Appendix A regarding the capacity of the storage tank for the fire pumps at the Well No. 2 pump house. It is our position that 100% capacity (351,000 gal.) storage be provided for these pumps.

18. Page 3-94, Position E3(d)

You indicate that the standpipe system is designed in accordance with NFPA 14, but you then proceed to describe a system that does not comply with NFPA 14.

a. It is our position that a sufficient number of 1½ in. standpipe hose stations be provided so that an effective hose stream can be directed into all areas of the building with a maximum of 100 ft. of 1½ in. hose at each station, and that no more than 100 ft. of hose be provided at each station.

b. It is our position that those 1½ in. standpipe hose stations presently located inside enclosed stairwells be relocated outside the stairwell so that the integrity of the stairwell is not violated by having a hose blocking the door open.

c. It is our position that pressure reducing devices be installed where required by NFPA 14.

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d. Describe how water is supplied to standpipes and hose connections in the event of a Safe Shutdown Earthquake to comply with the requirements of Appendix A. Pressures from this supply should be adequate to satisfy requirements of NFPA 14.

Indicate your intent to comply with these positions in accordance with the requirements of Appendix A.

19. Page 3-100, Position E6

You indicate that primary Class A fire extinguishing capability for portable extinguishers is provided by dry chemical type extinguishers. It is our position that adequate water pressure type portable extinguishers be provided to combat possible small deep seated fires in Class A materials, including cable insulation, throughout the plant, including in the control room.

20. Page 3-101, Position F.1(a)

It is our position that an oil containment and collection system be provided for the reactor coolant pump lube oil systems or that an automatic suppression system be installed to extinguish any lube oil fire. Such an extinguishing system must cover any area which might be affected by a pressurized oil spray from any crack in the lube oil system.

21. Page 3-103, Position F.1.b.

a. You do not indicate that portable extinguishers are permanently installed inside containment. It is our position that you comply with Appendix A by permanently installing portable

extinguishers throughout the plant, including in containment, in accordance with NFPA 10.

b. You indicate you are not in compliance with Appendix A requirements for standpipe and hose stations inside containment. 3/4-inch hose bibs connected to the demineralized water supply do not meet either Appendix A or NFPA 14 requirements. It is our position that you provide 1½ inch standpipe hose connections and hose at strategic points throughout containment, and that these stations be connected to the fire water supply system.

22. Page 3-105, Position F2

a. You state that access to the control room is through doors "with construction equivalent to" rated fire doors. Indicate if the doors are labeled fire doors. It is our position that 3 hr. fire rated doors be provided to separate the control room from other areas of the plant. Locations where two "equivalent" 1½ hr. doors are presently installed to not necessarily provide 3 hr. fire rated protection.

b. Indicate how the control room ventilation system will prevent smoke from entering the control room.

23. Page 3-113, Position F7

It is our position that the battery room ventilation systems be provided with alarms which will annunciate in the control room upon loss of ventilation air flow from any battery room.

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24. Page 3-114, Position F8

You state that the turbine oil system is separated from all safety-related equipment by a 3 hr. fire rated barrier or by a spatial separation of at least 50 ft. Indicate all areas where the turbine oil system is not separated from areas containing safe shutdown related equipment or circuits by at least a 3 hr. fire rated barrier, and describe the system involved and the protection provided.

25. Page 3-116, Position F9

Since the diesel generator day tanks exceed the 1100 gal. capacity limit as established in this position, it is our position that your design be revised to comply with Position F10 of Appendix A. Indicate how you will revise your design to comply with Position F10.

26. Page 3-120, Position F12

Verify that the storage configuration of new fuel will always be maintained so as to preclude criticality for any water density that might occur during fire water application. If such is not the case, indicate your intent to revise your design to comply with the guidelines of Appendix A.

27. Page 3-122, Position F14

Verify that all radwaste areas are separated from areas containing safe-shutdown related equipment or circuits by minimum 3 hr. rated fire barriers, including doors and other penetration closures. If this is not the case, then indicate how this will be accomplished.

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28. Page 3-123, Position F-15

a. You state that flammable liquids will not be stored in decontamination areas and then proceed to explain that they will be stored in such areas in approved safety containers. It is our position that you comply with Appendix A by providing automatic sprinkler protection in these areas.

b. Describe the ventilation systems for these areas and indicate how they will isolate the decontamination areas as required by Appendix A.

29. Page 3-127, Position G1

a. Indicate if a permit system will be required to utilize welding and cutting equipment in areas other than the machine shop.

b. Indicate the location where welding equipment inside the plant will be stored when not in use.

30. Page 3-128, Position G2

You indicate that you are not in compliance with this section of Appendix A. It is our position that you comply with Appendix A by providing automatic sprinkler protection for dry ion exchange resin storage areas.

31. Page 3-130, Position G4

Indicate the location where HEPA and charcoal filters will be stored after removal as stated in your submittal.

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32. a. You have apparently conducted your fire hazards analysis with the assumption that offsite power is always available. Revise your analysis to analyze the effects of fire on safe plant shutdown with the loss of offsite power.

b. On page 2-5 you assume that pipe of welded construction will not fail. This assumption is not valid. Revise your analysis to include the effects on a DBF of failure of flammable or combustible liquid piping, either as a source of the fire or as feeding the fire.

33. Page 2-7, Item 2.8

Schematically indicate the construction of the spacer system described in this item, and indicate all locations where the combustible material is exposed.

34. Pages 2-9 through 2-14, Fire Areas DG-I, II and III, and Figure 37

Your analysis indicates that the doors to each of these areas from the outside are non-rated doors. It is our position that these doors be replaced with 3 hr. rated fire doors.

35. Pages 2-9 through 2-26, Fire Areas DG-I through DG-IX

a. Describe how the flow of fuel oil would be shut off if a fuel oil line were to rupture between an oil tank transfer pump and the day tanks or between the day tank and the diesel generator. The resultant fire from such a leak would not necessarily damage the pump if the leak was not in the same area as the pump.

Analyze the effect on safe plant shutdown of such a fuel fed fire considering loss of offsite power.

b. Indicate the routing of all fuel oil lines from the storage tanks to the diesel generators and day tanks.

c. See Question #25 regarding the size and location of the diesel generator day tanks.

36. Reactor Building

a. Your diagrams indicate that not all doors separating this building from other buildings are 3 hr. rated fire doors. It is our position that the doors which separate the Reactor Building from the Service Building and the Turbine Generator Building be replaced with 3 hr. rated fire doors. Two 1½ hr. doors do not provide "a total rating of 3 hrs."

b. In response to Position F11 of Appendix A, you indicated on page 3-119 of your submittal that rooms housing safety-related pumps were provided with early warning fire detection. However, in your analysis of the various fire areas you indicate that there is no fire detection capability or only heat detection capability on one level in many of the safety-related pump rooms in the Reactor Building. It is our position that you provide fire detection capability in the form of smoke detection on all elevations of these pump rooms to detect a fire in the early stages of development.

c. Describe the location and purpose of the "rubber closure strip" identified in various areas of the Reactor Building.

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37.. Page 2-87, CRD Repair Room

In your analysis you indicate the presence of both divisions of safety-related cable. Therefore, it is our position that smoke detection capability be provided for this area. Also see Question #1.

38. Page 2-107, General Floor Area (El. 522'), and Figure 64. Analyze the effect on safe plant shutdown if a fire were to destroy all the CRD HCU modules on either the east or west side (not both) of the Reactor Building.

39. Page 2-139, General Floor Area (El. 548'), and Figure 64. Indicate if the RBCC pumps located in this area are required for safe plant shutdown. See Question #1.

40. Page 2-143, South Valve Room. Indicate the location of this area on your diagrams.

41. Page 2-183, Radwaste Building, RC-1.

You are apparently not in compliance with Appendix A guidelines that require automatic sprinkler protection in all areas of the Radwaste Building where combustible materials are stored. It is our position that you comply with this requirement for automatic sprinklers because of the presence of the safe-shutdown systems and control room in this building.

42. Page 2-199, Cable Spreading Room.

You state that there is a non-fire rated floor hatch cover in the cable spreading room. It is our position that this opening be protected by a 3 hr. rated floor hatch cover.

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43. Page 2-203, Cable Chase.

a. You state that the low range blast doors which form part of the fire barrier for the cable chase "are equivalent in construction to a 3 hr. rated door." Provide a certification of a 3 hr. rating for these doors or replace the doors with 3 hr. rated fire doors.

b. You state that pipe penetrations from the Reactor Building are not sealed with fire-rated material. It is our position that these penetrations be sealed with a noncombustible material which will provide a 3 hr. rated fire barrier.

c. You state that a preaction sprinkler system is provided in this area, but the same is not indicated on your drawings. Verify that the system is provided for the cable chase.

44. [illegible]

Page 205 through 2-217 and 2-231, and Figure 67.

Your analysis for Electrical Equipment Rooms 1 and 2, Battery Rooms 1 and 2, Switchgear Rooms 1 and 2, and the Remote Shutdown Room state that ionization detectors are provided in each area. However, Figure 67 does not indicate any detection capability in these areas. Verify that ionization detection is provided in each of these rooms and in the corridor area adjacent to these rooms.

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45. Page 2-219, Control Room, and Figures 30, 50 and 69.
Your diagrams indicate that peripheral areas in the control room area, including the office, kitchenette and dining area, and computer related areas, are separated from the control room by non-rated partitions. It is our position that these areas be separated from the control room by minimum 1 hr. rated fire barriers, including the closure of any openings, and that they be provided with automatic suppression systems.

46. Pages 2-223 and 225, Unit A and B Air Conditioning Rooms, and Figure 30.
Figure 30 indicates that 1½ hr. fire doors separate these rooms from Fire Area RC-X111. It is our position that these doors be replaced with 3 hr. rated fire doors.

47. Pages 2-235 through 240, Turbine Generator Building.

a. Indicate if the Turbine Oil Storage Room and the Turbine Oil Reservoir Room are provided with curbs which will contain the contents of the storage tanks.

b. Analyze the effects on safe cold shutdown systems given a fire which causes collapse of the turbine building roof. Consider the structural integrity of the wall which separates the Turbine Building from areas which contain safe shutdown equipment and circuits, and the effect a possible collapse of this wall will have on the safe shutdown equipment and circuits.

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48. Page 2-241, Circulating Water Pump House, and Figure 36.

a. Indicate the combustibility of the insulation provided under the steel deck roof to verify that it complies with Appendix A guidelines.

b. You state that the door to the diesel fire pump fuel oil tank is a 3 hr. fire door and Figure 36 indicates only a 1½ hr. fire door. Verify that this door is a 3 hr. rated fire door. It is also our position that a curb be provided at the door to the fuel oil tank room so that it will contain 110% of the contents of the fuel oil tank.