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SCHWENCER,A. Licensing Branch 2

SUBJECT: Responds to fire protection site audit concerns noted in 830413 trip rept.Corrective actions:fire detectors installed instrument racks will be encl w/concrete & use of automatic sprinkler sys reevaluated.

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July 1, 1983
G02-83-597

Docket No. 50-397

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
RESPONSE TO FIRE PROTECTION
SITE AUDIT CONCERNS

Reference: Memorandum, D. Kubicki (NRC) to V. Benaroya (NRC), Trip Report: Fire Protection Site Audit - WPPSS Nuclear Project No. 2, dated April 13, 1983

As a result of the subject audit, we herewith submit our response to the concerns listed in the reference memorandum.

Concern

1. *To satisfy the requirements of Appendix R and the guidelines contained in Section C.6.a of BTP CMEB 9.5.1, all areas of the plant that contain safety related equipment should be equipped with a fire detection system. We observed that the following areas of the plant, which contain safety related equipment, are not provided with fire detectors:*

   a. *Reactor Building, El. 548, North and South Valve Rooms*
   b. *Reactor Building, El. 548, Sampling Rooms*
   c. *Reactor Building, El. 548, RHR Heat Exchanger Rooms*
   d. *Reactor Building, El. 522, North and South Valve Rooms*
   e. *Reactor Building, El. 522, RWCU Pump Room*
   f. *Reactor Building, El. 501, RHR Valve Room #307*
   g. *Reactor Building, El. 501, T.I.P. Room*
   h. *Reactor Building, El. 471, North Valve Room*
   i. *Reactor Building, El. 422, Below Steel Grating*
   j. *Fire Area RC III, @ 501' elevation.*

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Response

Fire detectors have been installed in Fire Area RC III at elevation 501 which is below the grated floor (item j).

Fire detectors will be installed in the following areas by fuel load:

a. Reactor Building, El. 548, South Valve Room
b. Reactor Building, El. 548, RHR Heat Exchanger Rooms.

The detectors will be extended from the existing fire detection system on the 548 floor elevation.

Fire detectors are not needed in the following areas due to lack of or minimal combustible loading and the areas do not contain dedicated safe shutdown equipment:

a. Reactor Building, El. 548, North Valve Room
b. Reactor Building, El. 548, Sampling Room
c. Reactor Building, El. 522, North and South Valve Rooms
d. Reactor Building, El. 522, RWCU Pump Room
e. Reactor Building, El. 501, RHR Valve Room #307
f. Reactor Building, El. 501, T.I.P. Room
g. Reactor Building, El. 471, North Valve Room
h. Reactor Building, El. 422, Below Steel Grating

Concern

2. *To comply with Section C.6.a of BTP CMEB 9.5.1, the fire detection systems should be designed in accordance with NFPA Standard No. 72E. Section 4-3 of the standard stipulates that the location of smoke detectors must anticipate smoke stratification. We observed that in several fire areas, such as RC III adjoining the control and cable spreading rooms, smoke detectors were not installed at each floor elevation. The applicant should verify that the location of smoke detectors in areas that encompass more than one floor elevation will not be compromised by smoke stratification.*

Response

Smoke detectors in areas that encompass more than one floor elevation will not be compromised by smoke stratification as the ventilation system in these areas exhaust air within 1 to 2 feet of the ceiling and return air enters near the floor. The return air will help push or force smoke and products of combustion toward the ceiling where the ionization detectors are located, therefore assuring of an alarm in the event of a fire.

Concern

3. *In our SSER of December 27, 1982, we accepted the use of a cable tray/conduit wrap that had withstood a 3-hour fire exposure when tested in accordance with ASTM E 119. We noted in our site audit that the applicant proposed to use the cable wrap material with fire dampers and doors to protect certain instrument racks and panels. The wrap material with the fire dampers and doors have not been tested for this application. We therefore do not have reasonable assurance that the protection would be able to withstand an anticipated fire exposure.*

Response

The instrument racks will be enclosed on all sides with an 8 inch thick concrete wall which is one foot higher than the instrument rack.and a one hour fire rated door. There will be no roof on the enclosure. The enclosure will act as a fire shield wall. The combustible loading in the area of these instrument racks is minimal with less than 30,000 B.T.U.'s per square foot. In addition, heat will be removed from the areas due to the open stairways and hatch in the Reactor Building. These openings will not allow heat to collect at the ceilings of each floor but to be vented to the top floor of the building. Therefore, the fire shield wall will provide adequate protection for the instrument racks.

Concern

4. *By letters dated January 21, 1982 and October 4, 1982, the applicant committed to wrap one train of safe shutdown cables and conduits so as to protect them from fire damage. We observed that in the Reactor Building and in the Radwaste and Control Building the protected trays and conduits are potentially vulnerable to damage from unprotected trays, HVAC ducts and structural members. The applicant should verify that collapsing debris will not damage redundant shutdown related cables.*

Response

The Reactor Building has two open stairways and an open hatch from the 441 elevation to the 606 elevation. In the event of a fire, these openings will act as chimneys, venting heat and smoke to the top of the building. Therefore, little heat will collect at the ceiling to damage the steel supports on equipment. Another factor is the limited amount of combustible loading per floor in the Reactor Building. The combustible loading per floor has been estimated to range from 10,000 to 30,000 B.T.U.'s per square foot which includes a transient combustible load of 55 gallons of lubricating oil. Most of the combustible loading per floor is electric cables on cable trays with about one-half of it to be covered with a Thermo-Lag enclosure further limiting the combustible loading per floor. The fuel load per floor is not enough to cause the steel over the protected cable trays to be damaged by heat. Along with the venting of the rooms by the open hatch and stairways, there is no chance that the steel could be weakened by heat released by a fire if one should occur. Therefore, no area was found to need protection of the steel support which go over the protected cable tray and conduits.

Concern

5. *To comply with Section C.7.b of BTP CMEB 9.5.1, control room peripheral areas should be protected by an automatic fire suppression system and should be segregated from the control room proper by one hour fire rated construction. We observed that the peripheral areas were neither protected by an automatic fire suppression system nor segregated by one hour fire rated construction.*

Response

The control room peripheral areas are enclosed with a non-combustible rated wall material, (Flame spread of 25) but have a wood fur strip attached to the metal studs to which the non-combustible wall material is attached. Automatic sprinklers on a wet pipe system will be provided as fire protection for these peripheral room areas. The water supply will be from the adjacent plant fire main. A water flow switch will be installed and alarm at the Control Room alarm panel. This will be installed prior to fuel load.

This will provide automatic suppression for the Control Room peripheral areas.and adequate protection for these peripheral areas.

Concern

6. *In Amendment 19, the applicant committed to comply with NFPA Standard No. 13 in the design of automatic sprinkler systems. In fire zone RC-III in the Radwaste and Control Building, the sprinkler heads are obstructed by cable trays and other structural features which conflict with the requirements of Section 4-4 of NFPA 13.*

Response

The automatic sprinkler system in fire zone RC-III has been reevaluated and adjustments are being made to the system. These adjustments include additional sprinkler heads, extending existing heads and changing existing heads to correct sprinkler pattern deficiencies. The adjustments will add full sprinkler coverage for fire zone RC-III and eliminate obstructions by cable trays and other structural features. This will be completed prior to fuel load.

Concern

7. *To comply with Section C.6.a of BTP CMEB 9.5.1, the smoke detectors should be tested and accepted for specific applications by an independent testing laboratory. The applicant should verify that the photoelectric smoke detectors have been approved for a 1200 ft.^{2} spacing as observed in the plant.*

Response

A review of the photoelectric smoke detection spacing from the as-built drawings revealed that the greatest detection spacing is approximately 750 square feet. This spacing is below the minimum 900 square foot spacing required by the fire codes.

Concern

8. *To comply with Section C.5.a of BTP CMEB 9.5.a, interial wall and structural components and thermal insulation material should be noncombustible. The applicant should verify that the laminated wall panels in the control room and the urea-formaldehyde foam insulation observed in several areas of the plant are noncombustible.*

Response

According to the manufacturers product description, the laminated wall panels in the control room have a flame spread of 25 according to the ASTM E84 fire test.

The insulation material is a foamglas insulation with a flame spread of 5 according to the manufacturers information.

As both materials have a flame spread of 25 or less, these meet the NFPA noncombustible rating.

Concern

9. *In Amendment 19, the applicant committed to comply with Section III N of Appendix R to 10 CFR 50 regarding the supervision of fire doors. We observed that stairway fire doors in the Reactor Building have fusible-link type hold open devices which are not consistent with the commitment.*

Response

The fusible link hold open devices on the fire doors in the stairway of the Reactor Building will be removed prior to fuel load.

Concern

10. *In Amendment 19, the applicant committed to install U.L. labeled, 3-hour rated fire doors in the following locations:*

- *Hydrogen recombiner room (RB - El. 572')*
- *Division 1 & 2 MCC rooms (RB - El. 572')*
- *Fire Zone R-XVIII (MCC rooms)*

We observed that unlabeled doors were installed in these locations.

Response

Three-hour U.L. labeled fire doors have been installed in the Hydrogen Recombiner MCC room on the 572 elevation and Fire Zone R-XVIII MCC Room in the Reactor Building. The Hydrogen Recombiner room and Division 1 and 2 MCC room on the 572 elevation are the same room.

Concern

11. *In Amendment 19, the applicant committed to install a fire damper at the duct penetration of the concrete slab at the top of the Division 1 and 2 MCC rooms (Reactor Building, elevation 572 ft.). We noted that no damper had been installed at these locations.*

Response

A three-hour rated fire damper has been installed in the HVAC duct penetration of the concrete slab at the top of the Division 1 and 2 MCC room at the 572 elevation in the Reactor Building.

Concern

12. *In Amendment 19, the applicant committed to comply with NFPA Standard No. 30, "Flammable and Combustible Liquids Code". In the water filtration building, the diesel fuel day tank is on unstable supports which is contrary to this commitment.*

Response

The supports for the diesel fuel day tank in the water filtration building will be strengthened to provide satisfactory support for tank. This redesign and work is presently scheduled to be completed after fuel load. As this diesel fuel tank supplies the redundant fire pump and the main fire pumps in the Circulating Water Pump House have adequate support for the diesel fuel storage tank, the deferral of work until after fuel load will cause no problem.

Concern

13. *In Amendment 19, the applicant committed to comply with NFPA Standard No. 15 in the design of the water spray fire suppression systems. We observed that the water spray heads and baffle plates protecting the diesel generators and fuel tanks do not provide complete protection (coverage) for the hazards in the area which is not consistent with that commitment.*

Response

The water spray heads over the diesel generators and fuel tanks have been repositioned to provide adequate automatic sprinkler coverage for these hazards. The sprinkler head heat collectors (baffle plates) have also been repositioned and another clamp installed to assure that the collector will remain in its proper position.

Concern

14. *In Amendment 19, the applicant committed to seal any openings in fire barriers to prevent the passage of smoke and heat. We observed a penetration of the wall between the diesel generator rooms and the switchgear rooms which is not consistent with that commitment.*

Response

The fire barrier penetration at the floor trench in the diesel generator room will be sealed prior to fuel load.

Concern

15. *In Amendment 19, the applicant committed to install a pre-action sprinkler system in the diesel generator fuel oil storage tank rooms in accordance with NFPA Standard No. 13. We observed that the deluge valves for these systems had tripped for no apparent cause.*

Response

The diesel generator fuel oil storage tank room pre-action sprinkler system has been reset and will be in service at the time of fuel load. These systems are presently going through final testing which will be completed prior to fuel load.

Concern

16. *To comply with Section C.5.a of BTP CMEB 9.5.1, fire barriers should be provided to separate redundant safety divisions so that both are not subject to damage from a single fire. On elevation 422 ft. of the Reactor Building, we observed that access for manual fire fighting is through a single door in a fire wall which separates redundant shutdown components. If this door was opened during a fire, both shutdown divisions would be vulnerable to damage.*

Response

There are double doors through a single opening between the two RHR rooms at the 422 elevation in the Reactor Building. Both of these rooms contain equipment required for safe shutdown and they are redundant to each other. During plant operating periods, these doors will remain closed and locked and will only be opened during shutdown modes of the plant and in the unlikely event of a fire in the RHR room on the northeast corner of the plant (Fire Zone R-V).

These rooms contain minimal amounts of combustibles, such as 800, 50 and some smaller horsepower electric motors, some electric cables and about 3 electric operated valves. Due to the low combustible loading in each room, radiated heat from a fire in one room would not affect any equipment in the adjoining room and smoke from a fire would have no affect on any equipment in either room. Both smoke and heat would flow upwards in the room of the fire's origin (the rooms are about 50 ft. high) and not expose any equipment in the adjoining room to possible damage.

In the event of a fire alarm in this area, the procedures are to search for the source of the alarm but the north RHR room will not be entered by the adjoining door to the south RHR room. The north RHR room will be entered by the door on the north side of the room (Fire Zone R-V). If a fire is discovered, the Fire Brigade will use the hose station in the southwest corner of the building. They will extend two hoses from this standpipe. One hose will be used to extinguish the fire inside the north RHR room and the other hose stream will be used to place a water spray pattern over the open doorway. This will assure against any heat or smoke exposing the equipment in the south RHR room.

Due to the minimal combustible fire loading, the room configuration, the equipment not being susceptible to smoke or heat exposure and the fire brigade procedures which minimize exposure to the adjoining room, there is no exposure to the south RHR room from a fire in the north RHR room.

Concern

17. *To comply with Section C.7.h of BTP CMEB 9.5.1, fire doors and other penetrations of fire barriers in the Turbine Building should be located so as not to be directly exposed to a turbine oil fire exposure or spill. We observed that there was no curb or floor drain at the fire doors at elevation 441 ft. of the Turbine Generator Building to prevent the possibility of oil leaking from a turbine oil line rupture from passing through the fire doors.*

Response

The oil lines in the Turbine Generator Building come from the Reactor Feed Pump Turbine Oil Reservoir and go to an instrument rack control panel. These oil lines are welded pipe and can be shutoff at the Reactor Feed Pump. It would take a large amount of oil to expose any safety related equipment in the plant and there is very little chance of this happening. The oil would have to get into the corridors between the Turbine Generator Building and the Reactor Building then to the corridor between the Reactor Building and the Radwaste Building. Halfway down this corridor are some safety related cables in cable trays which have automatic sprinkler protection over them and a one hour Thermo-Lag enclosure around them. The possibility of any oil spill ever getting this far is very remote and therefore the curb is not needed and will not be installed. Also, the automatic sprinkler protection with the one hour enclosure around the cables provide adequate protection.

Concern

18. *In Amendment 19, the applicant indicated that the plant was in compliance with Section III G of Appendix R. By letters dated January 21 and October 4, 1982, the applicant committed to wrap one train of safe shutdown cables and conduit so as to protect them from fire damage. The applicant should verify that all cables and components associated with the "dedicated" shutdown capability (the "chosen" system as defined during the audit) are protected from fire damage and that redundant shutdown systems are isolated in separate fire areas.*

Response

The dedicated shutdown cables and components will be protected by a Thermo-Lag barrier or by other means. Burns and Roe has reviewed the equipment necessary for safe shutdown and those cables are in the protected cable trays and conduits. During their review, they also reviewed the protected cable trays and conduits to assure that the redundant cables were not in the protected cable trays or conduits.

A section will be added to the Fire Protection Evaluation Report which shows the protected safe shutdown cables, conduits and equipment. This will allow someone to easily identify those components. At a later date the Supply System will identify the redundant components and add these to the Fire Protection Evaluation Report.

Concern

19. *By letter dated March 4, 1983, the applicant indicated that hose stretch tests had verified that all locations of the Reactor Building could be reached with not more than 150 ft. of fire hose. We observed that in the Division 2 MCC area on elevation 522 feet, structural modifications have occurred which may affect the results of the hose stretch tests. The applicant should verify that the MCC area can be adequately protected by the manual hose system.*

Response

The Division 2 MCC room in the southeast corner of elevation 522 of the Reactor Building has had the north doorway blocked up for ALARA concerns. A fire hose stretch test confirms that from either standpipe in the Reactor Building this MCC room can be entered with 150 ft. of hose.

Concern

20. *The following features of the fire protection program were observed to be incomplete:*

- *The installation of the TSI Thermal Lag Fire Barrier around shutdown-related cable trays, conduit, and panels.*
- *The repeaters for the plant radio communications network (these repeaters have to be located and/or protected such that they are not vulnerable to damage from a fire).*
- *Hose, nozzles, gated wyes, caps, etc. associated with the standpipe hose stations.*
- *Supervision (tamper switches, locks) for internal and external water supply control valves.*
- *Deactivation of fire pump shutdown controls in the control room.*
- *Penetration seals for fire rated walls and floor/ceiling assemblies.*
- *Removal of non-fire rated transoms over fire doors.*
- *Removal of styrofoam daming at penetrations of fire rated walls and floor/ceiling assemblies.*
- *Installation of 8-hour battery powered lighting units per Section III J of Appendix R.*
- *The fire wall which separates the Service Building from the Turbine Generator Building at elevation 441'.*
- *Fire doors have not yet been installed at the following locations:*

  a. Both RHR heat exchanger rooms (RB, El. 572')
  b. Fire Area R XVIII - Valve Room

Response

This item identified several fire protection features and they will be addressed as follows:

The following items have been completed:

- o Deactivation of fire pump shutdown controls in the control room
- o Removal of non-fire rated transoms over fire doors - These doorways were replaced with U.L. listed 3 hour rated doors
- o The installation of fire doors in both RHR heat exchanger rooms on the 572 elevation and Fire Zone R XVIII valve room in the Reactor Building.

The following will be completed by fuel load:

- o The Thermo-Lag Fire Barrier around safe shutdown related cable trays and conduits
- o The repeater for the plant radio communication network
- o Hose, nozzles, gated wyes, and caps for the standpipe hose stations
- o Supervision for internal and external water supply control valves
- o Penetration seals for fire rated walls and floor/ceiling assemblies
- o Removal of styrofoam daming at penetrations of fire rated walls and floor/ceiling assemblies
- o Installation of 8 hour battery powered lighting units
- o The fire wall between the Service Building and the Turbine Generator Building.

Should you have any further questions, please contact Mr. R. M. Nelson, Manager, WNP-2 Licensing.

Very truly yours,

G. D. Bouchey
Manager, Nuclear Safety and Regulatory Programs

AKJ/tmh

cc: R Auluck - NRC
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