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

November 14, 1978

NRC PDR

Docket No. 50-302

Mr. W. P. Stewart
Director, Power Production
Florida Power Corporation
P. O. Box 14042, Mail Stop C-4
St. Petersburg, Florida 33733

Dear Mr. Stewart:

We are reviewing the Crystal River Unit 3 fire protection program as described in your June 22, 1977 submittal and have determined that the additional information requested in Enclosures 1 and 3 is necessary to continue our review. In addition, the NRC staff positions in Enclosure 2 must be addressed. You should be prepared to discuss these items at the forthcoming fire protection site visit (November 28 - December 1) and you are requested to provide your written response within 30 days from receipt of this letter.

Sincerely,

Robert W. Reid

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:
1. Request for Additional Information
2. NRC Staff Positions
3. Request for Drawings

cc w/enclosures: See next page

7811280382

Florida Power Corporation

cc: Mr. S. A. Brandimore
Vice President and General
Counsel
P. O. Box 14042
St. Petersburg, Florida 33733

Crystal River Public Library
Crystal River, Florida 32629

ENCLOSURE 1

CRYSTAL RIVER UNIT 3

Docket No. 50-302

REQUEST FOR ADDITIONAL INFORMATION

INDEX

26. Automatic Operation of Fire Dampers/Doors

27. Separation of Redundant Communication Systems

28. Proximity of Regular and Emergency Lighting Wiring

29. Fire Detection System Design

30. Fire Suppression System Design

31. Requirements for Manual Hose Stations

32. Pin-type Hose Rack

33. Fire Hazard at the Containment Cable Penetration

34. Portable Extinguisher Rating

35. Fire Hazard Associated with the Plant Computer

36. Remote Shutdown Panels

37. Radiological Consequences of a Fire

38-71

Plant Specific Concerns

1. Combined Fire and Security Emergency

Describe the responsibilities of key plant personnel, in the event of a combined fire and security emergency.

2. Fire Hazard Analysis

Discuss the capability to safely shutdown the reactor in the event of a design basis fire in each plant fire area. This discussion should include:

(1) A description of the methods available to safely shut down the reactor and remove decay heat. The general functional requirements should include but not be limited to:

(a) the ability to monitor and control primary system coolant inventory;

(b) the ability to monitor and control reactor neutron level, to assure subcriticality is maintained;

(c) the ability to remove decay heat to bring the plant to a cold shutdown condition;

(d) auxiliary services such as cooling water, lubrication, control air and HVAC for the components performing these general functions.

(2) A description of the electrical power and control requirements for each shutdown method.

(3) A description of the location of the equipment, and the routing of electrical power and control cable required for each method, with respect to each individual bounded fire area.

(4) A description of the system redundancy which exists to insure its capability to carry out its intended function. Describe any other systems which can alternatively perform the required function.

(5) For electrical systems, provide one set of the electrical distribution diagrams, marked showing the boundaries of the required power distribution.

The consequences of a design basis fire in each bounded fire area should then be evaluated to determine the effects of that fire on the plant's safe shutdown capabilities. A design basis fire is assumed to disable all equipment within a bounded fire area and all equipment associated with cabling passing through an area.

Provide the results of this evaluation, with its basis to include the consequences of a design basis fire in each bounded fire area with respect to the plant's safe shutdown capabilities. In those areas where a design basis fire could effect a safe shutdown, provide a summary of the existing and proposed fire protection for the area, and a justification of the adequacy of this this fire protection. Fire protection for the area includes detection, suppression capabilities, flame retardant coating, physical separation, separation by marinite, separation by conduit, etc.

3. Instrument Air System

Verify that the effects of a fire on the instrument air system will not cause a transient more severe than those already analyzed in the FSAR.

4. Valve Concern

(1) Provide a list of remote operated valves, with their fail positions, in safe shutdown systems identified in No. 1.

(2) Discuss the possibility of fire induced faultings in electric circuits causing such valves to fail in unsafe positions.

(3) Describe the provision and accessibility to manually operate these valves, if necessary, during the shutdown operation.

(4) Since fire induced faultings could be a common mode failure, discuss the possibility that a fire in the cable spreading room, the control room, etc., could fail a certain combination of valves, in safety-related systems, in such positions as to cause an accident which is more severe than those analyzed in the FSAR.

5. Failure Analysis

Provide failure analysis which verifies that a single failure does not impair the primary and backup fire suppression capabilities (active or passive). The analysis should include consideration of failures in the suppression system, the fire detection system or the power sources for such systems.

6. Effects of Extinguishing Agents

Provide the results of an analysis which shows that rupture or inadvertent operation of a fire fighting system will not subsequently cause damage or failure of safety-related equipment required for safe shutdown.

7. Lightning Effects

Describe the means provided to prevent lightning from initiating fires which could damage safety-related equipment. Describe the means provided to prevent lightning from damaging the fire protection system.

8. Safety-Related Systems Interlocked with Fire Fighting Systems

Identify any safety-related systems or their auxiliaries which are interlocked to and could be disabled by operation of a fire fighting system.

9. Fire Brigade Equipment

Describe the equipment provided for the fire brigade. Describe means that will be used to either override the locking mechanism, or breach a barrier to provide fire brigade access and personnel egress in the event of a locking mechanism failure. Describe the training and tools provided for this purpose.

10. Shared Emergency Equipment

List the emergency equipment that is shared or proposed to be used by both the fire brigade and the security team. Provide the results of an analysis that demonstrates the number of units available and unit (or system) design is adequate to support a combined fire-security emergency.

11. Operation, Maintenance, and Testing Procedures

Provide a summary of the procedures established to control operation, maintenance and testing of fire protection (detection and suppression) systems and components.

12. Removal from Service Procedure

Provide a summary of the procedures established to control the disarming of any automatic or manually actuated fire protection system. Identify the management position responsible for authorizing the disarmament and the means used to assure the system is returned to normal.

13. Fire Barriers

Identify fire barriers, doors, dampers and seals that do not have three hour rating. For those barriers, describe the fire rating of the associated doors, ventilation dampers and seals for cable, pipe and ventilation duct penetrations.

14. Steel Structures

Identify areas which contain unprotected structural steel. Describe the type of existing or proposed fire protection.

15. Safety Areas Without Fire Protection

Identify all areas that contain safety-related equipment and/or cables in open cable trays that are not provided with either fire detection or automatic fire suppression. Justify the lack of either of the above.

16. Curbs and Drains

(1) Provide the results of an analysis which shows that drains have sufficient capability, and/or equipment pedestals have sufficient height to prevent standing water from sprinklers and fire hoses from damaging safety-related equipment or supporting systems necessary for safe shutdown of the plant. As an alternative, show that the standing water does not damage such equipment.

(2) Identify the areas containing safe shutdown equipment that are not provided with floor drains. Describe the drainage path for those areas without drains.

(3) Identify the areas containing combustible liquids that are not provided with floor drains. Describe the drainage path and provisions for containing or diverting the combustible liquid in

those areas without drains. In those areas with drains, state the capability and location of the drain reservoirs and describe the provisions to prevent the spread of flammable liquid fires via the drain system to areas which may jeopardize safety-related equipment.

(4) Provide the results of an analysis that shows that curbed areas surrounding combustible liquid tanks have sufficient capacity to contain the full contents of the tanks plus the quantity of water required for extinguishment of a fire involving the combustible liquid.

17. Piping Containing Combustibles

Identify all piping containing flammable gas or combustible liquid which is routed through areas containing safety-related equipment, safety-related cables or though which personnel must pass to reach safety-related equipment for local operation. Provide an analysis to show that a fire involving the liquid or gas will not prevent safe shutdown or result in the loss of function of a safety-related system.

18. Pipe and Ventilation Duct Penetrations

Provide the results of an analysis which shows that the fire barrier penetration seals for pipe penetrations and ventilation ducts are adequate to prevent the spread of smoke and fire through the barrier considering the combustible loading and possible air pressure differential.

19. Diesel Fuel Transfer Shut-Off

Describe the means provided to automatically and/or manually stop the transfer of diesel oil from the bunker tanks to the diesel generator day tanks in the event of a fire in the area housing the day tank, or through which the fuel oil transfer piping is routed.

20. Combustible Fluid Reservoirs and Storage

Provide a listing of all fixed tanks and pumps which contain oil or other combustible fluids, and indicate the location of the container and quantity of combustible fluid contained. Describe the fire protection provisions associated with each such location.

21. Interface Between Safety and Non-Safety Equipment

Certain cables electrically connected to equipment necessary for safe shutdown may be used for functions designated as non-safety related and therefore classified as non-safety related. Examples of these might be remote indicating lights for valves breakers, etc. Describe whether such cables are kept with the safety division to which they were originally connected and if not, describe the effects on safe shutdown equipment due to shorts to these cables as a result of fire.

22. Cable Insulation Materials

Identify whether flame test procedures were performed on electrical cables. Provide the acceptance criteria and results of the flame tests.

23. Prevention of Fire and Smoke Spread

Describe the manner in which fire and smoke are prevented from spreading from area to area via the the normal and emergency ventilation systems in all parts of the plant areas. Describe the location, actuation method and fire rating of dampers used for fire and smoke control in both air supply and return air systems. Describe the details of interlocks for ventilation system shutdown or mode change that can be utilized for fire and smoke control.

24. Ventilation System Power and Control

Identify the areas where ventilation systems power supply or controls are located within the area they serve. Provide the basis for leaving ventilation system power and control cables within the area they serve.

25. Preventing Recirculation of Ventilation Air

Describe the separation between the air intakes and exhausts for normal and emergency ventilation systems and the provisions which prevent smoke from being drawn back into the plant.

26. Automatic Operation of Fire Dampers/Doors

Discuss the provisions for automatic closure of ventilation fire dampers and fire doors in all areas protected by total flooding as suppression systems and provisions for re-opening the fire dampers remotely for post fire smoke venting.

27. Separation of Redundant Communication Systems

Describe the proximity of the cables for redundant communication systems to each other at the containment penetration. Identify any parts of the plant to or from which communication by all systems might be lost to a single fire and discuss how the communication will be maintained during the fire emergency.

28. Proximity of Regular and Emergency Lighting Wiring

Provide the results of an evaluation of the potential for a fire in a safety-related area to cause damage to electrical wiring which would result in the loss of both regular and emergency lighting to areas providing access for fire fighting and/or safe shutdown operations.

29. Fire Detection System Design

Provide design data for the automatic fire detection system in each fire area, including such items as type, number, and location of the detectors; and signaling, power supply and supervision of the system. Identify any deviation(s) from NFPA 72D.

30. Fire Suppression System Design

Provide the design data for all automatic suppression systems (both existing and proposed) including such items as design densities, soak times, power supplies, and associated alarms. Identify areas of non-compliance with appropriate NFPA standards.

31. Requirements for Manual Hose Stations

Provide the results of a study which verifies that the manual hose stations conform to all the recommendations contained in NFPA 14. Verify that all points of safety-related areas and other areas with major fire hazards can be reached with the hose line stored at the manual hose stations.

32. Pin-Type Hose Rack

Verify that the pin-type rack, if used, is approved to store the rubber lined hose by the hose manufacturer.

33. Fire Hazard at the Containment Cable Penetration

Identify the consequences on safe shutdown of a fire at the cable penetration area on either side of containment.

34. Portable Extinguisher Rating

Verify that at least one portable extinguisher in the control room has a Class A rating.

35. Fire Hazards Associated with the Plant Computer

Provide the results of an analysis which demonstrates that a fire within the computer area will neither expose any safety-related equipment, nor affect the safe plant shutdown. Verify that the barrier around the area is compatible with the combustible loading in the area.

36. Remote Shutdown Stations

Identify the locations from where remote shutdown can be accomplished and provide the results of analysis to demonstrate that no fire which could impair the control from the control room could also prevent the control from these areas.

37. Radiological Consequences of a Fire

Evaluate the radiological consequences of a fire in radwaste areas and areas containing contaminated materials such as filter cartridges, spent resin, etc.

PLANT SPECIFIC CONCERNS

Referenced page number in Florida Power Corporation's submittal are indicated in parenthesis following the question.

38. Clarify statement on 480 volt and D.C. power cable being in the same tray (5-11).

39. Provide technical information substantiating effectiveness of fire retardant coating materials used in the plants (5-15).

40. Justify lack of emergency back-up lighting for all safety-related areas in addition to egress lighting now being provided (5-36).

41. Provide locations of breakers controlling safe shutdown equipment (5-39, 40).

42. Provide justification for not including cable insulation within interlocked armor in combustible inventory.

43. Provide list of safety-related equipment.

44. Justify quantities of gasses stored in the following areas:

Propane	-	Elev. 95	-	Zone 7	-	Control Complex
Acetylene	-	Elev. 95	-	Zone 9	-	Control Complex
Acetylene	-	Elev. 119	-	Zone 2	-	Inter. Building

45. Provide justification for not including cable insulation within interlocked armor in fire load.

46. Resolve difference in separation of cable trays as noted in Page 5-44 as contrasted with those noted on Page 5-12, 13, and 14 (5-44).

47. Provide rating of fire barriers Radiation Protection Service Room for east and south walls and penetrations (Section 5 of FHA, Area/zone 3, Elevation 95).

48. Provide rating of other barriers and penetrations where FHA only gives fire resistance rating on certain walls.

49. Provide information as to how long safe shutdown ability would be maintained with the loss of battery chargers (Elev. 108 ft. -- Area/zone 6).

50. Justify position that cable tray covers could limit fire between redundant divisions (Elev. 108 ft. -- Area/zone 7).

51. Describe in detail the extent of the loss of communication systems with the loss of Zone 3 - Elev. 124 - Control Complex (Elev. 124 - Area/zone 3).

52. Amplify as to the extent of the loss of communication systems with the loss of Zone 3 - Elev. 124 - Control Complex (Elev. 124 - Area/zone 3).

53. Explain combined fire zones such as Auxiliary Building, Elev. 119 - Zones 8, 9, 10, and 15. Justify calling this one zone in view of the fact 4 zone numbers are assigned.

54. Describe hazardous locations that the automatic CO_2 system covers in Turbine Building on Elevation 45.

55. Provide list of safety related and non-safety related cables located in concealed ceiling above control room; provide fire analysis for this space.

56. When will the results of the planned cable fire tests be provided? (Page 5-9)

57. Will all parts of the fire detection and signalling system, including individual fire detectors, continue to function if normal AC and DC power sources are interrupted? Clarification is required. (Page 5-18)

58. Are the hose threads on yard hydrants and interior fire hose stations compatible with the local public fire departments? (Page 5-25)

59. It is unclear whether all areas containing safety-related equipment and electrical cables can be reached with an effective fire stream using existing hose at the hose stations. (Page 5-26)

60. Justify the use of Halon 1301 as the fire suppression system in the cable spreading room from an effectiveness and reliability standpoint. (Page 5-28)

61. Provide an analysis of the potential water damage from fire-fighting in the Control Complex, considering the lack of floor drains in this area. (Page 5-29)

62. Are there areas where the fire could cause loss of all lighting such that effective manual fire suppression in safety-related areas would be precluded? (Page 5-36)

63. What is the basis for concluding that a fire loading of 80,000 Btu per square foot is equivalent to 1-hour severity, and what method was used to establish equivalent fire severity in other areas having different fire loadings? (Page 5-44)

64. What data supports the assumption that cable tray fire separations of 3 feet horizontally and 5 feet vertically will prevent fire spread? (Page 5-44)

65. In the fire safety analysis, was potential fire damage to redundant electrical cables in <u>conduit</u> (from fires in cable trays or other combustibles in the area) given

consideration? This question applies to numerous areas where it is stated that there are cable trays from one or both divisions, but there is no indication if there are redundant circuits in conduit in the same area which could be damaged by a single fire.

66.. The function of redundant cables and the effect of their loss on safe shutdown should be identified in the following areas:

A. Battery charger room 3A
B. Inverter room 3B
C. Inverter room 3A
D. Heating and ventilation MCC area (IB, 119, A/Z4)
E. Personnel access area (IB, 119, A/Z5)
F. Hallway (AB, 95, A/Z1)
G. Hallway (AB, 95, A/Z5)
H. Hallway (AB, 95, A/Z8)
I. Miscellaneous radwaste rooms (AB, 95, A/Z10 and 12)
J. Open area (AB, 95, A/Z13)
~~K. Reactor coolant evaporator room (AB, 95, A/Z14)~~
L. RCP seal injection filter room (AB, 95, A/Z15)
M. Equipment hatch area (AB, 95, A/Z16)
N. Sea water pump room (AB, 95, A/Z17)
O. Pump and tank room (AB, 95, A/Z32)
P. Nuclear service heat exchanger room (AB, 95, A/Z33)
Q. Hallway and stairwell (AB, 119, A/Z1)
R. Hallway (AB, 119, A/Z5)
S. Penetration area (AB, 119, A/Z7)
T. Equipment hatch area (AB, 119, A/Z18)
U. Area outside reactor compartment (RB, 95, A/Z1)

67. Justify the adequacy of a 1/4 inch metal plate as the fire barrier between the cable spreading room and the redundant ESF switchgear rooms below.

68. Provide information on the plant breathing air supply, per the requirements of Appendix A to BTP 9.5-1.

69. Will the deluge system remain functional upon loss of D. C. power? (Page 5-27) Will the loss of D. C. voltage negate the automatic start action of the fire service water pumps? (Page 5-23)

70. How will three tons of the five ton total capacity of CO_2 be reserved for fire protection? (Page 5-28)

71. How often and by what means are "POC" interlocks tested for the reactor building purge supply and exhaust fans? (Page 5-31)

NRC STAFF POSITIONS

P-1. There are several areas in the fire safety evaluation which contain safety-related equipment or cable trays for which no fire detection is provided or proposed. Fire detection should be provided for such areas having significant combustibles, which appears to include:

A. Heating and ventilation MCC area (IB, 119, A/Z4)
B. Neutralizer room (AB, 95, A/Z6)
C. Reactor coolant evaporator room (AB, 95, A/Z14)
D. Waste transfer pump room (AB, 95, A/Z19 and 20)
E. Decant and slurry pump rooms (AB, 95, A/Z21, 22 and 23)
F. Waste gas rooms (AB, 95, A/Z24 and 25)
G. Waste and recycle pump rooms (AB, 95, A/Z26, 27 and 28)
H. Nuclear sampling room (AB, 95, A/Z34 and 35
I. Seal return coolers and makeup tank rooms (AB, 119, A/Z11, 12 and 13)
J. Decontamination room (AB, 119, A/Z19)
K. Control rod drive cooling water filter room (AB, 119, A/Z23)

P-2. ~~Hose stations with the ability to reach all areas containing~~ significant amounts of electrical cable, and areas which could be involved in a reactor coolant pump oil leak fire should be provided inside containment.

P-3. Due to the significant quantity of combustible material involved, an oil leak collection system should be installed on each reactor coolant pump.

P-4. Air flow monitoring of the ventilation exhaust from each battery room should be provided with loss of flow alarming in the control room.

Enclosure 3

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

REQUEST FOR DRAWINGS

Florida Power Corporation is requested to have the following drawings on hand when the review team visits the plant site.

1. Scale drawing of fire service water system marked with valve supervision and proposed modification(s) in the system.

2. Ventilation and drain diagrams of various areas in the plant.

3. Electrical one-line distribution diagrams.

4. Electric tray layout prints.

5. Control prints for each of the fire pumps.

6. Elevation drawings of the plant.

7. Fire protection drawings for proposed and existing suppression systems.

8. Fire protection drawings for proposed and existing portable extinguishers.

9. Fire protection drawings for proposed and existing manual hose stations.

10. Fire protection drawings for proposed and existing detection systems.

11. General arrangement drawing of the Fire Service Pump House.