



Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10 CFR 50.12

December 18, 2003
3F1203-15

Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – Final Response to Request for Additional Information
Related to Crystal River Unit 3 – Revised Appendix R Exemption Request – Fire
Area CC-164-121

- References:
1. Crystal River Unit 3 – Revised Appendix R Exemption Request –
Fire Area CC-164-121 (Accession No. ML030420412)
 2. Request for Additional Information Related to Crystal River Unit 3 – Revised
Appendix R Exemption Request – Fire Area CC-164-121 (TAC No. MB7987)
(Accession No. ML033090003)
 3. Crystal River Unit 3 – Response to Request for Additional Information Related
to Crystal River Unit 3 – Revised Appendix R Exemption Request – Fire Area
CC-164-121 (Accession No. ML033430359)

Dear Sir:

Progress Energy Florida, Inc (PEF) hereby submits final responses to Reference 2. Responses to Requests for Additional Information (RAIs) 1, 2, 4c, and 5 were provided in Reference 3. Responses to RAIs 3, 4a, 4b, 4d, 4e, and 4f and an enhanced response to RAI 4c are contained in the Attachment to this letter as committed in Reference 3.

This letter establishes no regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,


James H. Terry
Manager Engineering

JHT/rmb

A006

Attachment: Final Response to Request for Additional Information Related to Crystal River Unit
3 – Revised Appendix R Exemption Request – Fire Area CC-164-121

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

PROGRESS ENERGY FLORIDA

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT

**FINAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
RELATED TO CRYSTAL RIVER UNIT 3 – REVISED APPENDIX R
EXEMPTION REQUEST - FIRE AREA CC-164-121**

**FINAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
RELATED TO REVISED APPENDIX R EXEMPTION REQUEST
FIRE AREA CC-164-121**

Request 3

The charcoal filters are normally isolated by ventilation dampers. State whether these dampers are fire rated. Describe the expected travel path of the smoke and hot gasses in case these ventilation dampers fail during a filter fire. State whether the smoke and hot gasses would interfere with control room ventilation, setting up the Appendix R chilled water system (ARCWS), or the actuation of the manual suppression system.

Response 3

The charcoal filters are normally isolated by ventilation dampers. These dampers are Johnson Controls D-1300 Leakage Rated (Smoke Control) dampers, and are constructed of galvanized sheet steel. The frames are 13-gauge steel with a pressed channel configuration on all sides for strength. The blades are double-sheet 22-gauge steel with extruded edge seals. The blade ends and edges are provided with synthetic elastomer seals to limit leakage. The filter inlet dampers are approximately 20 square feet, while the outlet dampers are approximately 17 square feet. These dampers are low leakage. No specific fire rating is listed by the manufacturer for these dampers.

The control logic for these dampers is such that they will fail closed on a loss of motive operating air or on a loss of power to the solenoid valves that supply and exhaust control air for the pneumatic operators. Thus, there is no expected travel path of smoke and hot gasses should these ventilation dampers fail during a filter fire.

There are two normal-duty and two emergency duty (through charcoal filters) fans. All four fan units are installed in parallel and draw air from a common return air inlet plenum. They all exhaust into a common supply plenum / duct, distributing cooled air to the entire Control Complex.

In the unlikely event of an internal filter fire, the fan associated with that filter would be shut down using Abnormal Procedure AP-880, "Fire Protection," and the inlet and outlet dampers would close. Should the fire damage the seals of a closed discharge damper, the discharge air pressure from any of the other three fan units, any one of which could be operating, would restrict flow from the outlet of the filter housing with the fire. Also, seal damage to a filter inlet damper could allow smoke to be drawn from the filter housing with the fire toward an operating fan unit, where it would mix with recirculating air. This mixture could then be supplied to the various elevations of the Control Complex. However, during a fire, AP-880 directs Operations personnel to secure the ventilation systems in the affected areas.

This action minimizes the spread of smoke throughout the Control Complex. With all four fan units secured, smoke would not be supplied to other Control Complex elevations, and would remain in the general area at the EL 164 feet.

Alignment of the Appendix R chiller for a fire in this fire area would be performed using AP-990, "Shutdown From Outside The Control Room," Enclosure 4. Actions for completion of the alignment of the Appendix R chiller do not require entry into this fire area.

The discussion of whether the smoke and hot gasses would interfere with the actuation of the manual suppression system is included in the response to Request 2 which was provided in Reference 3.

Request 4a Appendix R Chilled Water System (ARCWS)

The revised exemption states in Justification 10, Page 3 of 6, that the time to place the ARCWS in service is less than 90 minutes. Provide the technical basis for the acceptability of 90 minutes without cooling. Describe the temperatures expected in areas containing hot shutdown equipment and whether the hot shutdown equipment in these areas has been analyzed for these temperatures.

Response 4a

The ARCWS will cool the areas containing hot shutdown equipment in the Control Complex so that operational temperature limits are not exceeded following a fire and loss of normal ventilation. The time to place the ARCWS in service has been revised.

The ARCWS directs chilled water from the Appendix R chiller, CHHE-2, to associated heat exchangers located in the Control Complex. The system design is required to remove 589,458 BTU/hr. CHHE-2 rated capacity is 924,000 Btu/hr.

The current revision to Engineering Calculation H97-0004 shows that the limiting Control Complex temperature would reach a maximum of 104 degree F in about 81 minutes, with a recommended time limit of 70 minutes established for conservatism. The time validation for placing the ARCWS in service begins approximately 50 minutes from the implementation of AP-990 and takes 9.5 minutes to perform. This ensures the Control Complex temperatures for hot shutdown equipment will remain within operational limits.

Request 4b Appendix R Chilled Water System

Indicate whether the ARCWS has the capability of removing the heat from the affected areas due to the increased heat load from the loss of cooling for 90 minutes. Consider capability while assuming maximum expected ambient temperature conditions.

Response 4b

The ARCWS is required to remove 589,458 Btu/hr from the associated Control Complex room. The Appendix R chiller has a rated capacity of 924,000 Btu/hr at maximum expected ambient temperature conditions. As discussed in answer 4a, the ARCWS is required to be in service within approximately 70 minutes of confirming a fire and normal ventilation is lost. When the ARCWS is placed in service, no equipment maximum temperature limit has been exceeded, and the ARCWS has the rated capacity to ensure those limits are maintained. This is accomplished because the cooling load in each room is less than the installed Appendix R chiller capacity.

Request 4c Appendix R Chilled Water System

Describe the actions required to get the ARCWS in service. Also, describe the configuration of the ARCWS. For example, list the chillers, fans, ducting, and whether any tools are required. State whether the minimum operations staff is trained on setting up the ARCWS. Confirm that the minimum shift staff has the capability of setting up the ARCWS simultaneously with fire brigade operations and plant shutdown.

Response 4c

During normal plant operation, the system provides chilled water to the Turbine Building Switchgear Room cooling coils with the equipment in the Control Complex isolated. If the system is needed due to a fire that disables the Control Room Emergency Ventilation System (CREVS), the Turbine Building Switchgear Room cooling coils can be isolated with valves in the Turbine Building on EL 145 feet, and the flow can be directed to the equipment in the Control Complex with valves in the Turbine Building on EL 119 feet. Alignment of the Appendix R chiller for a fire in this fire area would be performed using AP-990, "Shutdown From Outside The Control Room," Enclosure 4. As discussed in answer 4a, the ARCWS is required to be in service within approximately 70 minutes of confirming a fire and normal ventilation is lost. The timed validation for Enclosure 4 is 9.5 minutes and begins approximately 50 minutes from the implementation of AP-990.

The system consists of a chilled water cooling coil, chilled water piping, and local area coolers and fans designed to provide 100% of the cooling for the designated areas by recirculation of the air in the specific room. The manual controls and indicators are located in the Turbine Building (EL 145 feet). The alignment would provide cooling to the following locations using permanently installed plant

equipment: 480 volt Engineered Safeguards (ES) switchgear, 4160 volt ES switchgear, Battery Charging rooms, Inverter rooms, Remote Shutdown room and the Emergency Feedwater Initiation and Control (EFIC) rooms. The configuration of the ARCWS is presented in CR-3 Final Safety Analysis Report, Section 9.7.2.1.g.2 and depicted in Figure 9-25. There are no tools required for this evolution.

Secondary Plant Operators (SPOs) are qualified to perform this task. The SPO is the lowest level position on shift which means all operators on shift are also qualified to perform this task.

The staffing requirements for performance of AP-990 have been evaluated. No credit for the two Operations personnel on the Fire Brigade are assumed for any actions associated with AP-990. The normal Operations staffing requirements are based on 2 SPOs, 1 Primary Plant Operator (PPO), 3 Reactor Operators (ROs), 1 Shift Technical Advisor (STA), and 2 Senior Reactor Operators (SROs). All actions associated with the Emergency Operating Procedures and Abnormal Procedures (including AP-990 for plant shutdown and ARCWS operation) are performed with 1 SPO, 1 PPO, 2 ROs, 1 STA, and 2 SROs. Thus, the remaining 1 SPO and 1 RO (and 3 Nuclear Facility Service personnel) are on the Fire Brigade.

Request 4d Appendix R Chilled Water System

During 90 minutes while setting up the ARCWS, establish whether fans and elephant trunk can be used to keep the affected areas at ambient temperature. If so, provide assurance that there are adequate fans to support ventilation of the main control room, cable spreading room, essential switchgear rooms, battery rooms, inverter rooms, and the emergency feedwater initiation and control system rooms, at the same time that fans are required to ventilate the fire-affected area.

Response 4d

During the time to set up the ARCWS, utilization of fans and elephant trunks is not credited. Thus, fans to support ventilation of the Main Control Room, cable spreading room, remote shutdown room, essential switchgear rooms, battery rooms, inverter rooms, and the Emergency Feedwater Initiation and Control rooms are not required.

The ARCWS, as designed, supports all Control Complex rooms with the exception of the Main Control Room and the Cable Spreading Room. The Remote Shutdown Panel Room is utilized during an Appendix R fire instead of the Main Control Room. The Cable Spreading Room is also not serviced by the ARCWS; it is within the same fire area as the Main Control Room.

Request 4e Appendix R Chilled Water System

Describe the elevated temperature in the main control room and establish how long the operators would be required to work in an area with elevated temperature.

Response 4e

There are three fire areas in which a fire scenario would force evacuation of the Control Room. These are: a fire in the Control Room itself; in the Cable Spreading Room; or in the Mechanical Equipment Room where the charcoal filters are located. The only immediate action (from within the Control Room) required of the Operators in the event of a Control Room evacuation is to trip the Reactor, a short duration activity.

Operators are required to utilize the Remote Shutdown Room during an Appendix R fire, should the Main Control Room become uninhabitable.

For work within the Control Complex, Engineering Calculation M97-0020 evaluated the effects of elevated temperatures on Control Room operators and other personnel exposed to temperatures up to 110 deg F. Area temperatures are not expected to exceed 104 deg F in this fire scenario, so this is a conservative assessment. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook was used to conclude that exposure to temperatures up to 110 deg F are acceptable for personnel for short durations (up to approximately 2 hours). Some mild heat strain could occur, but is not expected due to the short duration of exposure. Subtle decrements in intellectual functions, dexterity and alertness could occur as a result of mild heat strain.

If Control Room evacuation was necessary, the operators would move to the Remote Shutdown Room which would have Appendix R cooling established within the 70 minutes noted in Response 4a, above.

Request 4f Appendix R Chilled Water System

Describe measures in place to protect operators during extended periods in areas of elevated temperatures.

Response 4f

See response to 4e. For work within the Control Complex, area temperatures are not expected to exceed 104 deg F. Therefore, it was concluded that exposure to temperatures up to 110 deg F are acceptable for personnel for short durations (up to approximately 2 hours).