

# Florida Power

CORPORATION

Crystal River Unit 3  
Docket No. 50-302

March 22, 1991  
3F0391-15

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Subject: Updated Design Information for the Auxiliary Feedwater Pump Addition

Reference: A. FPC letter dated May 31, 1990  
B. NRC letter dated September 19, 1990

Dear Sir:

Florida Power Corporation (FPC) is submitting this letter to provide the NRC with updated design information about the auxiliary feedwater (AFW) pump addition at Crystal River Unit 3 (CR-3). We are providing revisions to certain parts of Reference A. These changes are not expected to alter the conclusions in your letter of September 19, 1990.

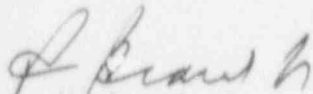
Since the conceptual design was submitted in the reference letter, FPC has evaluated the safety significance and cost benefit of the new AFW pump being totally initiated and controlled from the main control room. FPC has decided to proceed with a design in which the AFW pump is normally isolated from the Emergency Feedwater (EF) System with closed manually operated isolation valves. The installation of this AFW pump addition remains planned for Refuel 8, now scheduled for the Spring of 1992.

Reference A contained 5 attachments describing the project, conceptual drawings including preliminary piping layouts, and a schedule of activities. Attachments 1 and 2 to this letter replace Attachments 1 and 2 in the reference letter.

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Changes to the Project Description (Attachment 1) are indicated by a black line in the right margin. Attachments 3 and 4 of the reference letter are not being updated with this submittal because they are conceptual piping layout drawings and this design revision is adequately shown in the schematic (Attachment 2). Attachment 5 is a bar chart with schedular information showing completion of the installation in Refuel 8. This schedule has not changed.

Sincerely,



P. M. Beard, Jr.  
Senior Vice President  
Nuclear Operations

PMB/JWT

Attachments

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

## AUXILIARY FEEDWATER PUMP ADDITION TO THE FEEDWATER SYSTEM

### PROJECT DESCRIPTION

#### BACKGROUND

This project will install an additional non-safety-related source of feedwater to reduce reliance on long-term High Pressure Injection/Power Operated Relief Valve (HPI/PORV) cooling should a loss of all main and emergency feedwater occur. FPC's philosophy for this additional source of feedwater is to install a system which is reliable, simple to operate, and maintains the integrity of the Emergency Feedwater (EF) System which it is intended to supplement. To assure that reliability is maintained, the AFW design will provide accessibility to several on-site sources of feedwater and the AFW pump will be specified using a recognized industry standard which produces reliable commercial grade feedwater pumps. All AFW operation will be accomplished from the main control room, except for manually opening/closing two isolation valves in the Intermediate Building. The system will be simple to operate by remote-manual controls located on the same main control room panel as the EF System and independent of the Emergency Feedwater Initiation and Control (EFIC) System. The integrity of the EF System will be maintained by connecting the AFW supply to the emergency feedwater lines downstream of the EF System vector control valves, and isolating this interconnection with closed manual valves. The AFW addition will also utilize the same upper feedwater nozzles as the EF System.

#### DESIGN BASES

1. The design of the AFW pump, designated FWP-7, and associated equipment is based on the following sequence of events:
  - a. A loss of main feedwater (MFW) occurs as the initiating event.
  - b. Both trains of the Emergency Feedwater System fail to supply water to the steam generators.
  - c. The AFW pump addition is initiated.
  - d. Once the AFW pump addition is started, the steam generator level is manually controlled by the control room operator.
2. The AFW addition is designed to provide an additional non-safety grade method of secondary heat removal, in order to reduce reliance on long term HPI/PORV cooling following a loss of all main and emergency feedwater. The AFW addition has been sized to reduce the time that HPI/PORV cooling is relied upon after a loss of all feedwater. When the AFW addition is started, it can provide up to 250 gpm of auxiliary feedwater to the upper nozzles of each steam generator at maximum system pressure.

3. Following the failure of both trains of the Emergency Feedwater System, no subsequent failures are assumed to occur on any safety-related component for the remainder of the event, including an automatic/spurious restart of the Emergency Feedwater System after the AFW addition has been initiated.
4. The AFW addition is designed to withstand the spurious or inadvertent actuation of the AFW Pump and control valves. The pump will normally be off and the control valves will normally be closed. Spurious actuation of one or all of these components will not admit water to the steam generators since normally closed manual valves FWV-222 and FWV-223 will prevent this flow. In addition, AFW control valves FWV-216 and FWV-217 are designed to fail closed on a loss of instrument air or electric power.
5. Piping and valves within the Intermediate Building will be Seismic Category I. AFW piping, valves, and components located outside the Intermediate Building will be Seismic Category III, non-safety-related. Piping will be designed to ANSI B31.1-1967.
6. The AFW addition will have high reliability. The design minimizes sharing of equipment with the existing Emergency Feedwater System, and also minimizes the number of active components required to operate to supply auxiliary feedwater to the steam generators.
7. FWP-7 and AFW control valves FWV-216/217 will be designed for remote manual actuation from the Main Control Room. The AFW addition will be completely independent of EFIC, which controls the Emergency Feedwater System.
8. No credit will be taken for this subsystem to meet fire protection requirements. The AFW design will ensure that existing fire protection features will not be degraded.
9. Since the AFW addition will operate only under emergency conditions, High Energy Line Break (HELB) rupture protection is not required. Existing HELB protection will not be degraded.
10. FPC is providing protection (e.g. raised pedestals) for AFW equipment against the flooding resulting from a main feedwater line break, since such an event could create a need for AFW. Complete protection against other internal flooding events is not being provided.
11. Electrical and control systems will not be Class 1E.

## DESIGN FEATURES

1. FWP-7 and most of the associated piping will be located in the Turbine Building, with the remainder of the piping located in the Intermediate Building. The layout of the equipment and piping is shown on the Attachment 2, CRYSTAL RIVER 3 FWP-7 CONCEPTUAL DESIGN Flow Schematic.
2. FWP-7 will normally be aligned to take suction from the existing Condensate Storage Tank, CDT-1, as the primary water source. The Condenser Hotwell and the Emergency Feedwater Tank, EFT-2, will be available as backup water sources.
3. The design will include a minimum flow recirculation line which will be sized for approximately 240 gpm and a full flow recirculation test line. The minimum flow recirculation line will not be isolated while feeding the generators.
4. FWP-7 will be capable of delivering a minimum of 500 gpm to the steam generators (250 gpm to each steam generator) at maximum system pressure. Feedwater will be injected into each steam generator using the upper nozzles normally used by the Emergency Feedwater System.
5. In general, FWP-7 is being specified to the requirements of API-610, February 1989, "Centrifugal Pumps for General Refinery Service". To the extent practical, the AFW pump and motor will be self-contained, with little or no reliance on external systems for cooling, lubrication, etc.
6. The motor for FWP-7 will be fed from new non-Class 1E 4160V switchgear. This switchgear will be powered from the existing 6900V Reactor Auxiliary Bus 3A which is not capable of being connected to the emergency diesel generators.
7. Flow will be independently regulated to each steam generator by new air-operated control valves, designated FWV-216 and FWV-217.
8. FWP-7 and the flow control valves will be remote manually operated from the main control room. The pump and valve controls will be located on the main control board near the controls for the Emergency Feedwater System and will consist of the following:
  - a. FWP-7 control switch.
  - b. FWV-216/FWV-217 control switches (2 total).
  - c. Flow indication to each steam generator.
9. A local control station will be provided for FWP-7 and local control of FWV-216 and FWV-217 will be by manual handwheel only. Local flow indication only will be provided for the minimum and full flow recirculation lines.

## OPERATION

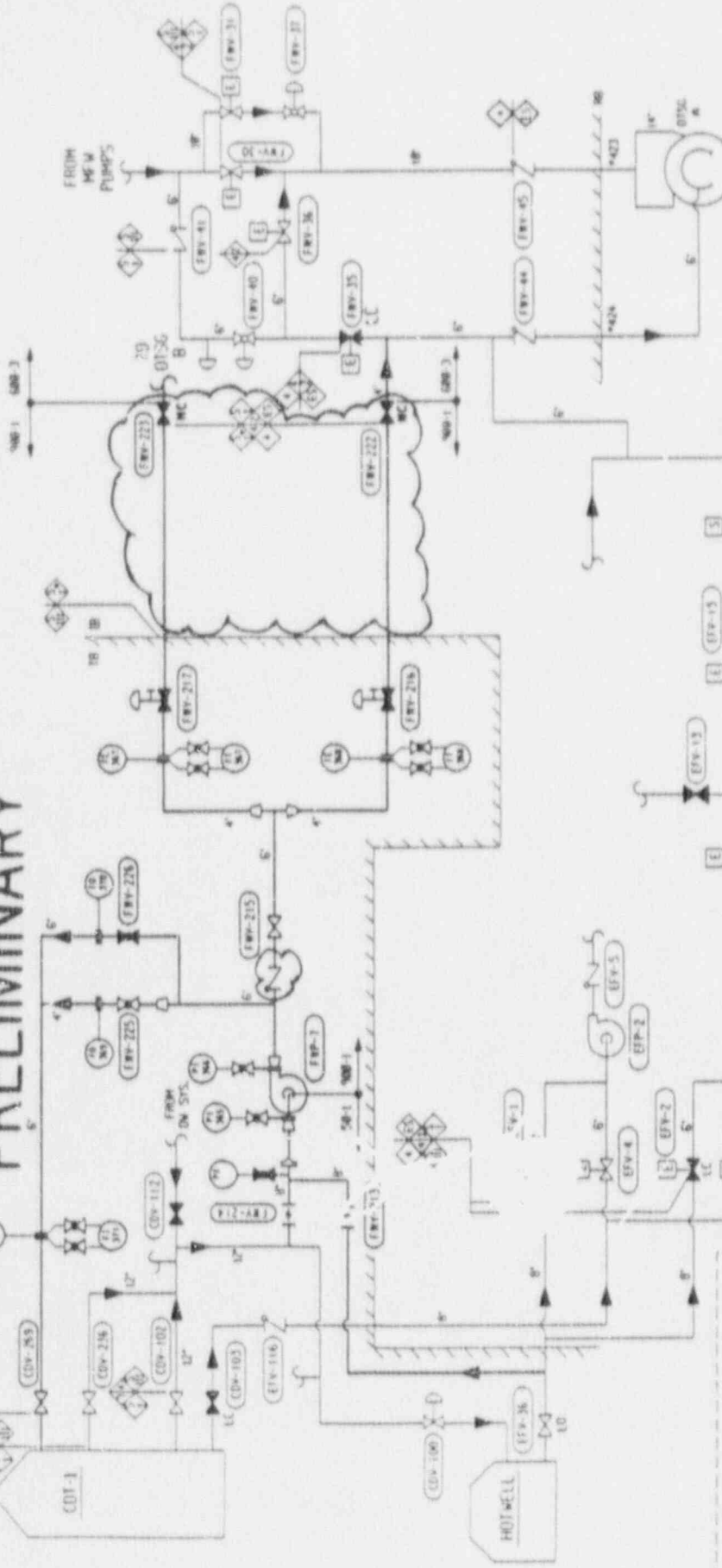
1. The AFW pump will be used after a failure of both Emergency Feedwater System trains. AFW will be selected after the Emergency Feedwater System since it must be manually initiated.
2. The AFW addition is not designed for use in plant start-up or normal plant operations.
3. To supply auxiliary feedwater to the steam generators will require only three actions:
  - a. Start the AFW pump (on recirculation) from the main control room.
  - b. Open manual isolation valves FWV-222 and FWV-223 located in the Intermediate Building.
  - c. Open/regulate the AFW flow control valves from the main control room, based on observed flow indication and steam generator level.
4. Provisions will be made for periodic testing of the AFW pump.
5. The AFW addition and the Emergency Feedwater System will not be intentionally operated together to feed the steam generators, due to upper nozzle flow limits. If simultaneous AFW addition/Emergency Feedwater System operation occurs as a result of spurious or inadvertent actuation, the control room operator will be procedurally instructed to secure one of these sources.



INDICATES CHANGES FOR RE-DESIGN TO MANUALLY ISOLATED AFW SOURCE

Rev 1 Jul 13 130440 34 1995  
ZRON 100, 61CR3, DOM11

# PRELIMINARY



NOTE:

VENT & DRAIN VALVES HAVE NOT BEEN SHOWN  
& TAG NUMBERS ON OTHER SMALL BORE VALVES  
HAVE NOT BEEN SHOWN DUE TO DRAWING SPACE LIMITATIONS.



CRYSTAL RIVER 3  
ADD AFW PUMP FWP-7

LEGEND:  
NEW PIPING  
EXISTING PIPING

W.D. 845515-001  
MAP 88-87-05-01  
MAP 88-87-05-03