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U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Office of Nuclear Reactor Regulation
Division of Licensing
Mr. Robert A. Clark, Chief
Operating Reactors, Branch No. 3

References: (a) License No. DPR-36 (Docket No. 50-309)
(b) MYAPC letter to USNRC, dated October 17, 1980 (WMY-80-141)
(c) MYAPC letter to USNRC, dated May 7, 1980 (WMY 80-72)

Subject: Feedwater and Auxiliary Feedwater Modifications

Dear Sir:

This letter is written to provide additional design information relative to the main feedwater and auxiliary feedwater systems at Maine Yankee. This final design proposal incorporates NUREG-0737 requirements and details of subsequent discussions with your staff.

Our letter, Reference (c), outlined a proposal to modify the auxiliary feedwater (AFW) system in order to delay initial AFW flow and terminate all main feedwater flow during a steam line break transient; thereby preventing a potential of containment over pressure, and a return to criticality. The design of the AFW system has been further improved to provide a redundant means of isolating AFW flow through a five minute automatic pump start override, as detailed in Attachment 1. Portions of this overall system modification will be installed during the 1981 Spring refueling outage.

We trust you find this information satisfactory; however, please do not hesitate to contact us if you have any questions.

Very truly yours,

MAINE YANKEE ATOMIC POWER COMPANY

Robert H. Groce
Senior Engineer, Licensing

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Attachment 1

Feedwater and Auxiliary Feedwater Modification

(A) Main Feedwater System

As described in Reference (c), the main feedwater system will be modified as follows during the Spring 1981 refueling outage:

(1) A safety grade isolation signal will be generated using the low steam generator pressure excess flow check valve (EFCV) closure signal. Upon receipt of this signal, redundant solenoids on each main feedwater regulator valve and bypass valve will release air from these air-to-open valves causing the valves to close. Each feedwater regulator valve and its associated bypass valve will receive a closure signal only if the steam generator to which it provides feedwater is affected. The operators on these valves will be replaced with qualified operators.

(2) As a backup to the feedwater regulator and bypass valve trip, the pumps in the main feedwater train will also be tripped on an isolation signal (EFCV), coincident with a Safety Injection Actuation Signal (SIAS). This trip will secure the main feedwater pumps, condensate, and heater drain pumps.

Switches will be provided on the main control board to individually bypass the trip system of the three steam generators, for conditions such as plant start-up. These switches will be key locked and annunciated to facilitate administrative control.

(B) Auxiliary Feedwater System

As described in Reference (b), the auxiliary feedwater system will be modified as follows:

(1) Upon a low water level signal from any one steam generator, the two electric driven auxiliary feedwater pumps will automatically start. The auto start signal will be generated by qualified transmitters and bistables. The associated valves in the AFW system will be normally open, fail-open valves.

(2) The auxiliary feedwater flow control valves will be modified to close upon a safety grade low steam generator pressure EFCV closure signal in order to direct flow to the intact steam generators and isolate the affected steam generator. In the unlikely event of a single valve failure the same EFCV closure signal will override the auxiliary feedwater pump start signal for five minutes. This will prevent the AFW system from feeding a ruptured steam generator for five minutes, in the unlikely event an auxiliary feedwater flow control valve fails to close. Redundant solenoids will be installed on each valve with an accumulator which will provide a source of operator air, should the normal instrument air supply fail. The valve operators will be either qualified or replaced with qualified equipment during the 1982 refueling outage.

(3) The auxiliary feedwater flow control valves will be designed to automatically re-open when the steam generator pressure returns above the EFCV trip set point. At the end of the 5 minute pump start override, the auxiliary feedwater pump will automatically restart and auxiliary feedwater will flow to the intact steam generators.

(4) Switches will be provided in the control room to override the 5 minute override of the auxiliary feedwater pump start logic. These switches will be keylocked and annunciate in the main control room to prevent inadvertent operation.

(5) The following sections of IEEE 279-1971 were used in the design of the auxiliary feedwater system.

IEEE 279-1971 Paragraph:

4.1 General Function Requirements

The AFW system shall be automatically initiated when steam generator level reaches the reactor protection system setpoint (see Section 2.1 of the Maine Yankee Technical Specifications). The AFW system flow shall be isolated automatically for 5 minutes when a low steam generator pressure signal is generated. The setpoint for this trip is the same as the steam generator excess flow check valve trip signal.

4.2 Single Failure Criteria

The system will operate such that any single failure in either the auto start or auto isolation logic will not prevent the system from operating as designed. A single failure of the AFW flow control valve will prevent isolation of the affected steam generator; however, the AFW pumps will be tripped for 5 minutes as a backup. Under this conditon, operator action will be ultimately required to manually isolate the AFW flow to prevent steam generator dry-out. This system will meet single failure upon the installation of a second automatic isolation valve, which we plan to purchase in time for the 1982 refueling. Upon installation of the second isolation value there will be no further need for the five minute delay.

4.3 Quality of Components and Modules

The quality of components and modules were selected, purchased, and stored in accordance with YNSD approved QA procedures.

4.4 Equipment Qualification

Equipment has been purchased to meet all the applicable qualification requirements listed below:

IEEE Criteria No. 279, 1968 "Criteria for Protection Systems for Nuclear Power Generating Stations"

IEEE 323-1974	"IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations"
IEEE 344-1974	"IEEE Recommended Practices for Seismic Qualifications of Class 1E Equipment for Nuclear Power Generating Stations"
IEEE 383-1974	"IEEE Standard for Type Test of Class Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations"
MYPS-12, Rev. 0	"Specification for 600 Volt Power and Control Cable for Maine Yankee Atomic Power Station"

4.6 Channel Independence

The auto AFW system level sensors are 2/4 system and the auto AFWS start logic is a two train system. Channels are physically and electronically separated as much as possible.

4.7 Control and Protection System Interaction

The entire auto AFWS actuation/isolation system is a safety grade system. No control system interaction is needed. Failure of the valve positioners will not prevent isolation operation of the valve when needed

4.9/4.11 Capability for Testing

The low level and low pressure sensors will be checked once each refueling outage as per the Maine Yankee Technical Specifications. During power operation the operability of the process sensors is ascertained by comparison with redundant channels monitoring the same variables or those with a fixed known relationship to the parameter being checked.

The actuation/isolation logic can be checked during operation by operation of the bypass switches for low pressure or using a test switch for the low level trip. This reduces the redundancy to a one train system for the duration of the test.

4.11 Channel Bypass

The system will be bypassed during the test mode which will reduce it to a one train system. This one train is not redundant but the time for a test is small compared to the overall time of operation.

4.11/4.13 Operating Bypass/Indication of Bypass

The low pressure isolation system may be bypassed from the main control room during operation by the use of a key operated switch. This bypass will be annunciated when operated. This bypass can only be used after a low steam pressure transient has occurred. If the pressure returns to normal the bypass is automatically removed.

The low level actuation logic cannot be bypassed during operation except for the test switch which is key locked and annunciated.

4.17 Manual Initiation

The system allows for the manual start or stop of the two electric aux. feed pumps at any time. The valve's automatic isolation system may also be manually operated at any time through the use of the valve control stations.

C. The following drawings have been enclosed to facilitate your review.

11550-ESK-7G	Elementary Diagram - Auxiliary Systems Control Sh. 7
11550-ESK-7GA	Steam Generator Low Pressure Feedwater Trip
11550-ESK-11AG	Automatic Initiation/Isolation of Auxiliary Feedwater Pumps
11550-ESK-5AR	Elementary Diagram - 4160 V St. Gen. Auxiliary Feedwater Pumps
11550-ESK-5AX	Elementary Diagram - 4160 Volt St. Gen. Auxiliary Feedwater Pump