



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

TERA

June 16, 1980

Docket No. 50-29

Mr. James A. Kay
Senior Engineer - Licensing
Yankee Atomic Electric Company
25 Research Drive
Westborough, Massachusetts 01581

Dear Mr. Kay:

RE: NRC REQUIREMENTS FOR AUXILIARY FEEDWATER (AFW) SYSTEM AT YANKEE ROWE

We have reviewed your submittal dated December 21, 1979, in response to the subject requirements, identified in our letter dated November 9, 1979.

The staff positions in the enclosure to this letter indicate the status of our review of your responses to our requirements. The enclosure also identifies the additional information needed to complete our review of item C.1, "AWF System AC Power Dependency GL-3".

As indicated in the enclosure, items D.1, "Protection Against Internally and Externally Generated Missiles", and D.2, "Automatic Initiation and Termination of AFW Flow to Steam Generators", will be evaluated under the Systematic Evaluation Program (SEP) and will be addressed in a separate safety evaluation report to be issued by the SEP.

You are requested, within 30 days from receipt of this letter, to submit the needed information concerning item C.1, and to indicate your intentions with respect to meeting the requirements identified in the enclosure in staff position C.3.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gus C. Lainas".

Gus C. Lainas, Assistant Director
for Safety Assessment
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

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Mr. James A. Kay

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June 16, 1980

cc w/enclosure:

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STAFF POSITIONS

AUXILIARY FEEDWATER SYSTEM RELIABILITY EVALUATION

YANKEE ROWE

DOCKET NO. 50-29

A. Short Term Generic Recommendations

1. Recommendation GS-2

The licensee's response is acceptable. Presently, all single valves or multiple valves in series in the flow path which could interrupt the AFW flow are maintained in locked open position. These valves are verified every 15 days to be locked open by existing operating procedure. In addition, the technical specifications require that the position of all AFW valves in this flow path that are not locked, sealed or otherwise secured in position be verified at 15 day intervals. The licensee has submitted a proposed change to these technical specifications to require that each valve in the flow path which could interrupt all AFW flow be locked open and that the position of all valves be verified every 15 days.

2. Recommendation GS-4

The response is acceptable. The licensee indicates that the existing operating procedures have been revised to include the transfer of AFW suction to its alternate water sources.

3. Recommendation GS-5

The licensee's response is acceptable. The AFW system at Yankee Rowe is capable of providing adequate flow for at least two hours following a complete loss of AC power. The system is manually started and controlled using the existing operating procedures. The AFW pump bearings do not require external cooling water and pump sealing water is provided by gravity flow from the Demineralized Water Storage Tank (DWST).

Emergency lighting and a plant communication system are provided at the pump and at the control valve station. Emergency lighting is battery powered and the communication system can be powered from the vital bus.

4. Recommendation GS-6

The licensee's response is acceptable. The operating procedures presently used at Yankee Rowe require operational testing following maintenance and verification of valve line-up following system testing. The operating procedures have been modified to require a second operator to verify independently that the valves are properly aligned. The licensee has submitted a proposed revision to the technical specification requiring that prior to startup from cold shutdown the AFW flow path will be verified both by valve line-up and by flow testing.

5. Recommendation - Cycling of Manual Valves

The licensee's response is acceptable. The operating procedures have been changed to require a quarterly exercise of the normally closed valves in the connection between the charging pumps, safety injection pumps and the AFW system.

B. Additional Short Term Recommendations

1. Primary AFW Source Low Level Alarm

The licensee's response is acceptable. Yankee Rowe has one pneumatic level instrumentation loop for the primary water supply. An additional electronic level instrument loop with indication on the main control board indicated by a pressure switch will be installed in the pneumatic level loop. Each low level annunciator setpoint will permit the operator at least 20 minutes to change over to an alternate source of water.

2. AFW Pump Endurance Test

The licensee indicated that an endurance test will be performed during the 1980 refueling outage. We will require that an endurance test be conducted for each AFW pump in accordance with the attached revised Additional Short Term Recommendation No. 2. Note that the test requirement has been reduced from 72 hours to 48 hours. The licensee informed us that the required AFW pump endurance test has been completed and that the requested test information will be submitted.

3. Dedicated Operator for Local Manual Realignment of Valves

The licensee's response is acceptable. The operation off the AFW system does not require manual realignment of valves to conduct periodic tests. The initiation of AFW would simply require opening the AFW to the main feedwater isolation valves and throttling the recirculation valve. A dedicated operator is already provided and is in continuous communication with the control room when the AFW pump is running.

C. Long Term Recommendations

1. AFW System AC Power Dependency GL-3

The licensee's response is incomplete. The present AFW pump at Yankee Rowe is a bladed turbine driven reciprocating positive displacement pump. It was not designed for sudden starts. Normal starting procedure has the pump recirculation line open. Thus the pump is started manually and brought up to speed without load. The load is gradually applied by opening the flow control valve and slowly closing the recirculating valve. A dedicated AFW system operator has been provided for this purpose. The

operator has approximately one hour's time to perform the manual actions since the steam generator at Yankee Rowe has relatively long dry-out times. In addition, the licensee has proposed to provide two additional motor driven AFW pumps which can be started remotely from the control room as well as started locally for all events when AC is available. These pumps and associated equipment will be installed at the first refueling outage following pump delivery. We require that the licensee provide drawings indicating the locations of the motor driven AFW pumps and the associated piping arrangement.

In the event of loss of AC power to operate the electric driven AFW pumps, the operator will have ample time to start the steam driven emergency boiler feed pump. Existing procedures for starting this pump will be used if the electric driven pumps are not available in the event of loss of AC power.

2. The licensee's response is acceptable. Refer to Item C.1 above.

3. Postulated High Energy Line Break

The licensee's response is acceptable. However, we will require the licensee to revise the plant operating procedures to include the operation of the charging pumps or safety injection pumps in the event that the normal AFW system flow path is not available.

4. Impact of Containment Isolation Signal on Steam Supply Line to AFW Turbine

The licensee's response is acceptable. The air operated trip valve in the steam header which supplies steam to the turbine driven pump will not be tripped on a Safety Injection Actuation Signal (SIAS).

5. Emergency Power Supply to the Charging Pumps

The licensee's response is acceptable. The charging pumps can be manually operated from the emergency bus.

D. Additional Long Term Concerns

1. Protection Against Internally and Externally Generated Missiles

2. Automatic Initiating & Termination of AFW Flow to Steam Generator

The Yankee Rowe plant is within the scope of the Systemic Evaluation Program (SEP). The additional long term concerns stated above will be evaluated by the SEP. The SEP will issue a separate Safety Evaluation Report in this regard.

Attachment:
As stated

ATTACHMENT

Revision to Recommendation No. 2 of "Additional Short Term Recommendations" Regarding Auxiliary Feedwater Pump Endurance Test

The licensee should perform an endurance test on all AFW system pumps. The test should continue for at least 48 hours after achieving the following test conditions:

- Pump/driver operating at rated speed
- and
- Pump developing rated discharge pressure and flow or some higher pressure at a reduced flow but not exceeding the pump vendor's maximum permitted discharge pressure value for a 48-hour test
- For turbine drivers, steam temperature should be as close to normal operating steam temperature as practicable but in no case should the temperature be less than 400°F.

Following the 48-hour pump run, the pumps should be shut down and allowed to cool down until pump temperatures reduce to within 20°F of their values at the start of the 48-hour test and at least 8 hours have elapsed.

Following the cool down, the pumps should be restarted and run for one hour. Test acceptance criteria should include demonstrating that the pumps remain within design limits with respect to bearing/bearing oil temperatures and vibration and that ambient pump room conditions (temperature, humidity) do not exceed environmental qualification limits for safety-related equipment in the room.

The licensee should provide a summary of the conditions and results of the tests. The summary should include the following: 1) A brief description of the test method (including flow schematic diagram) and how the test

was instrumented (i.e., where and how bearing temperatures were measured). 2) A discussion of how the test conditions (pump flow, head, speed and steam temperature) compare to design operating conditions. 3) Plots of bearing/bearing oil temperature vs. time for each bearing of each AFW pump/driver demonstrating that temperature design limits were not exceeded. 4) A plot of pump room ambient temperature and humidity vs. time demonstrating that the pump room ambient conditions do not exceed environmental qualification limits for safety-related equipment in the room. 5) A statement confirming that the pump vibration did not exceed allowable limits during tests.