AUG 1 8 1976

Docket No. 50-29

Yankee Atomic Electric Company
ATTN: Mr. Robert H. Groce
Licensing Engineer
20 Turnpike Road
Westboro, Massachusetts 01581

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Gentlemen:

RE: YANKEE-ROWE

The steam generator tubing in pressurized water reactors (PWR's) is part of the reactor coolant pressure boundary. Thus, in keeping with 10 CFR Part 50, Appendix A, General Design Criterion 31, "Fracture Prevention of Reactor Coolant Pressure Boundary", the steam generator tubing should remain free of cracks, perforations and general deterioration to minimize the likelihood of failure. For some time, the NRC staff and its consultants have been examining the factors that contribute to the degradation of steam generator tubing. Based on the results of laboratory testing to date and the operating experience that has been obtained by the industry, it is apparent that, although the mechanisms are complex and varied, the contamination of the steam generator secondary coolant is the fundamental cause of tube degradation and the impairment of tube integrity. It is also apparent that careful control of the secondary water chemistry serves to inhibit the potential accumulation of corrosive impurities in the steam generator and thereby limits tube degradation.

Consequently, it is the staff's position that secondary water chemistry monitoring requirements should be made part of the Technical Specifications for all PWR's. In this connection, we recognize that different utilities use different secondary water treatment methods to limit steam generator tube corrosion. Moreover, we recognize that a licensee's choice of a particular water treatment method, including specific values of operating limits for chemistry parameters, is governed by plant and site characteristics that are unique to each facility. In addition, we do not believe at this time that sufficient service experience exists to conclude that any particular method is superior to another for controlling impurities that may be introduced into the secondary coolant. However, it is our position that secondary water chemistry monitoring requirements are necessary to ensure the control of harmful impurity accumulation in the steam generators. Such a monitoring program would provide information regarding the magnitude of impurity buildup and would make it possible to detect the presence of a potentially corrosive environment and would provide a basis for taking appropriate corrective action.

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Accordingly, we request that you propose changes to your Technical Specifications, within 30 days, that will incorporate secondary water chemistry limiting conditions for operation and surveillance requirements in accordance with the enclosed Model Technical Specification. You should examine your current practices regarding secondary water chemistry control in light of your operating experience and your particular plant and site characteristics and propose appropriate limits for the parameters listed in Table 3.XX of the Model Technical Specification. Your submittal should include the basis for each of the proposed limits.

If you have any questions, please contact us.

Sincerely,

Original signed by

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosure:
Model Technical
Specifications

cc: Mr. Donald G. Allen, President
Yankee Atomic Electric Company
20 Turnpike Road
Westboro, Massachusetts 01581

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402 Main Street
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PLANT SYSTEMS

SECONDARY WATER CHEMISTRY

LIMITING CONDITION FOR OPERATION

3.XXX The secondary water chemistry shall be maintained within the limits of Table 3.XX.

APPLICABILITY: Modes 1, 2 and 3.

ACTION:

a. With the condenser condensate total cation conductivity exceeding its Steady State Limit but within its Transient Limit, restore the conductivity to within its Steady State Limit within 7 days; or, be in HOT SHUTDOWN within the next 12 hours.

b. With the condenser condensate total cation conductivity exceeding its Transient Limit, restore the conductivity to within the Transient Limit within 96 hours or be in HOT SHUTDOWN within the next 12 hours.

c. With the total cation conductivity of the blowdown from any steam generator exceeding its Steady State Limit but within its Transient Limit, verify at least once per 24 hours that the pH and free hydroxide and total suspended solids in the steam generator blowdown are within the limits of Table 3.XX, and restore the conductivity to within its Steady State Limit within 7 days; or, be in HOT SHUTDOWN within the next 12 hours.

d. With the pH, or free hydroxide or total suspended solids of the blowdown from any steam generator exceeding its limit(s) restore the out-of-limit parameter(s) to within its limit(s) within 72 hours or be in HOT SHUTDOWN within the next 12 hours.

e. With the total cation conductivity of the blowdown from any steam generator exceeding its Transient Limit, restore the conductivity to within its limit within 72 hours or be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.XXX The secondary water chemistry parameters shall be determined to be within the limits at least once per 24 hours by analyzing the condenser condensate and steam generator blowdown for total cation conductivity.

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3/4.xxx SECONDARY WATER CHEMISTRY

Contamination of the steam generator secondary coolant can cause potential tube degradation and impair tube integrity. Generally, the most severe contamination results from condenser inleakage of caustic forming impurities that may accumulate on the secondary side of the steam generator, or on the high heat flux surfaces of the steam generator tubes can lead to the potential for intergranular stress corrosion cracking.

Monitoring of the condenser condensate by cation conductivity is an effective means of detecting condenser tube inleakage. The leakage rate can then be determined by comparing the cation concentration in the condensate with the cation concertration in the condenser cooling water. The cation conductivity of the steam generator blowdown will indicate when blowdown is required to remove the accumulation of caustic forming impurities and the scale forming solids in the steam generator. Monitoring the pH and free hydroxide level in the blowdown provides a means to initiate balance of corrective actions needed to restore the operating secondary coolant. Monitoring the total suspended solids in the blowdown will indicate when the blowdown rate should be increased to minimize the accumulation of solids and sludge buildup.

Controlling the secondary water chemistry within the specified limits will control the potential accumulation of corrosive impurities in the steam generator and minimize tube degradation. These limits provide reasonable assurance that the conditions in the steam generator will minimize the potential for tube degradation during all conditions of operation, and postulated accidents. These measures ensure the continued protection of the steam generator tubing which is an essential part of the reactor coolant pressure boundary.

TABLE 3.XX

SECONDARY WATER CHEMISTRY LIMITS

	Total Cation Conductivity µmhos/cm2 @ 25°C		pH @ 25°C	Total Suspended Solids	Free Hydroxide ppm $CaCO_3$
Water Sample Location	Steady State Limits	Transient Limits	Limits	Limits	Limits
Condenser Condensate	≤( )	≤( )	N.A.	N.A.	N.A.
Steam Generator Blowdown	≤( )	≤( )*	( )≤pH≤( )	≤( )	≤( )

* May be increased to (   ) for the first (   ) hours during startup from HOT SHUTDOWN.

TABLE 1.xx

OPERATIONAL MODES

MODE	REACTIVITY CONDITION, K_{eff}	% RATED THERMAL POWER*	AVERAGE COOLANT TEMPERATURE
1. POWER OPERATION	$\geq$ 0.99	> 5%	$\geq$ 350°F
2. STARTUP	$\geq$ 0.99	$\leq$ 5%	$\geq$ 350°F
3. HOT STANDBY	< 0.99	0	$\geq$ 350°F
4. HOT SHUTDOWN	< 0.99	0	350°F > T_{avg} > 200°F
5. COLD SHUTDOWN	< 0.99	0	$\leq$ 200°F
6. REFUELING**	$\leq$ 0.95	0	$\leq$ 140°F

* Excluding decay heat.

** Reactor vessel head unbolted or removed and fuel in the vessel.