New Hampshire
Yankee

Ted C. Feigenbaum
President and
Chief Executive Officer

NYN- 91096

June 14, 1991

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

References: (a) Facility Operating License No. NPF-86, Docket No. 50-443

(b) USNRC Generic Letter 88-17 dated October 17, 1988, "Loss of Decay Heat Removal"

(c) NHY Letter NYN-90211 dated December 14, 1990, "Safety Injection Pump Operability in a Reduced Inventory Condition", T. C. Feigenbaum to USNRC

(d) NHY Letter NYN-91067 dated April 24, 1991, "Request for License Amendment: Safety Injection Pump Operability in Modes 5 and 6", T. C. Feigenbaum to USNRC

Subject: Request for Additional Information Regarding Safety Injection Pump Operability in Modes 5 and 6

Gentlemen:

New Hampshire Yankee has enclosed herein additional information in support of its license amendment request regarding the operation of a Safety Injection Pump in Modes 5 and 6 [Reference (d)]. This information is provided in response to questions from the NRC staff during a telephone call on May 13, 1991. We trust that the information will provide satisfactory responses to the staff's questions.

Should you have any questions regarding this matter, please contact Mr. James M. Peschel, Regulatory Compliance Manager, at (603) 474-9521, extension 3772.

Very truly yours,

Ted C. Feigenbaum

TCF:JMP/act

Enclosure

A001

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ENCLOSURE TO NYN-91096

Question: What is the required size of the Reactor Coolant System vent area to ensure that the Appendix G limits are not exceeded when a Safety Injection Pump is made operable in Mode 5 or Mode 6?

Response:

The minimum Reactor Coolant System vent area to ensure that the Appendix G limits are not exceeded when operating one Centrifugal Charging Pump and one Safety Injection Pump while in Mode 5 or Mode 6 with the reactor vessel head on is 2.92 square inches. This value was determined in YNSD calculation SBC 363, Revision 3, "Mid Loop Operation Analysis".

As stated in our April 24, 1991 submittal (Reference (d)) a vent area larger than that required based upon Appendix G overpressure protection requirements was conservatively specified after consideration was given to two other factors influencing mid-loop operation as discussed below:

- If operating with SG nozzle dams in place, in order to avoid potential exposure of plant personnel to reactor coolant due to postulated nozzle dam failure, it is necessary to provide a vent capable of maintaining the pressure in the RCS hot and cold legs lower than the allowable pressure differential across the nozzle dams in order to preclude failure. The 18 square inch vent area specified is sufficient to limit the pressure differential across the SG nozzle dams during the new mass addition event to 33 psig, which is less than the 56.5 psig design pressure differential of the nozzle dams which may be used at Seabrook. In the event of a loss of Residual Heat Removal (RHR) cooling during mid-loop operation, the 18 square inch vent area (as provided by removal of a single pressurizer SV) also provides adequate steam relief capacity to prevent RCS pressure from exceeding the SG nozzle dam design pressure differential assuming the plant has been shutdown for at least 48 hours. The equilibrium RCS pressure is expected to be 46 psig following a loss of RHR shutdown cooling, during mid-loop operation, 48 hours after shutdown utilizing best estimate decay heat and no makeup flow so that decay heat is removed by vaporization of saturated liquid.

- In addition to the SI pump and the CCP, gravity feed from the Refueling Water Storage Tank (RWST) to the RCS is possible at Seabrook subject to RCS (hot leg) pressure and RWST level. With an RWST level of 25%, gravity feed is possible with RCS pressures up to 32 psig. With a full RWST, gravity feed is possible up to an RCS pressure of 45 psig. The RCS pressures discussed above are substantially below the Appendix G pressure limit. A vent path larger than the 1.58 square inches specified in TS 3.4.9.3c is required to meet Appendix G limits and to allow gravity feed from the RWST. Removal of a single pressurizer SV from its flange (which provides a vent area slightly greater than the 18 square inches specified in the proposed change to TS 3.5.3.2) is the smallest vent path under consideration for this purpose. This vent path is sufficient to pass the steaming rates associated with decay heat removal via saturated steam cooling while maintaining RCS hot leg pressures $\leq$ 45 psig, for shutdown times in excess of 168 hours (7 days); and maintaining RCS hot leg pressure $\leq$ 32 psig, for shutdown times in excess of 360 hours (15 days). Gravity feed from the RWST is a backup means of providing RCS makeup and cooling. The primary method is to utilize the RHR system. If RHR were to fail the

Charging System, using the CCP, and the Safety Injection System, using the SI pump are the primary backups systems to provide additions to the RCS inventory. Gravity feed from the RWST is also available to backup these systems in the unlikely event that both the CCP and SI pumps are unavailable after a loss of RHR.

The 18 square inch vent area specified in the proposed change to TS 3.5.3.2 therefore represents a conservatively large vent area with respect to Appendix G overpressure protection requirements, and a minimum desirable vent area with respect to these other considerations. Seabrook Station procedures will include administrative controls to ensure that a vent path of at least 18 square inches is established prior to making the SI pump available to flow to the Reactor Coolant System.

Question: NUREG-1410, describes the potential for failure of seal table temporary seals during a loss of RHR cooling with the reactor vessel head tensioned. Has NHY considered the potential for temporary seal failure relative to its proposed Technical Specification change.

Response:

New Hampshire Yankee has reviewed NUREG-1410 with regard to the temporary thimble tube seals and has determined that the preparations for refueling have adequately addressed the use of temporary thimble tube seals and that no special requirements are required with regard to the proposed Technical Specification change. At Seabrook Station, the seal table and the location of the temporary thimble tube seals is 1 1/2 inches below the elevation of the reactor vessel flange. The temporary thimble tube seals are designed to withstand the static head of approximately 10 psig produced by the elevation of water (approximately 23 feet) that results when the refueling cavity is flooded.

The normal sequence of events in preparation for a refueling outage as provided in NHY Procedure OS1000.09 "Refueling Operations" requires that the incore detectors be withdrawn and the temporary seals be installed shortly before the reactor vessel head is detensioned and removed. The upcoming refueling schedule indicates that there may be a short period of time, up to one day, when the temporary seals are installed before the head is removed.

New Hampshire Yankee has recognized that during this short period of time a Safety Injection Pump could be made operable while the head is tensioned and the temporary thimble tube seals are installed. Therefore, NHY has included a precaution and a caution in procedure OS1000.09 to prevent a Safety Injection Pump from being made available while the temporary thimble tube seals are installed and the reactor vessel head is installed. Once the reactor vessel head is detensioned a significant gap of 1 to 1 1/2 inches is created between the reactor vessel and the head creating a vent area many times the 18 square inches specified in the proposed Technical Specification which obviates concerns regarding reactor coolant system pressurization.

The proposed Technical Specification change, allows a Safety Injection Pump to be made operable only after a vent area equal to or greater than 18 square inches has been established in the Reactor Coolant System. The Safety Injection Pump is intended to be made operable to support operations at a reduced inventory level (mid-loop operations) or to accommodate check valve flow testing. Both of these evolutions will be performed in Mode 5, and not while the preparations are being made to detension and remove the head.

A final consideration with regard to the potential pressurization of the Reactor Coolant System while the reactor vessel head is tensioned and the temporary thimble tube seals are installed was considered. In order for this condition to occur, the Residual Heat Removal (RHR) System would have to be assumed to be unavailable, followed by the unavailability of the Charging System and the Safety Injection System. Given the low probability of these three system's unavailability, followed by the loss of the ability to provide a gravity feed from the Refueling Water Storage Tank (RWST) to the Reactor Coolant System this hypothetical or postulated event sequence is of an extremely low probability of occurrence. Only after these sources of Reactor Coolant System makeup capability were lost would the Reactor Coolant System be able to increase in temperature and pressure. Even if this were to be a credible event under these conditions the postulated failure of a temporary thimble tube seal (or seals) would provide vent area in addition to the 18 square inches required by the proposed Technical Specification change, thus providing additional vent area for further protection against RCS overpressurization. Therefore, New Hampshire Yankee considers it to be highly unlikely that the four inventory addition systems, RHR, Charging, Safety Injection and RWST gravity feed would become unavailable during the short period of time that the temporary thimble tube seals are installed and the reactor vessel head is tensioned and instalied.