New Hampshire
Yankee

Ted C. Feigenbaum
President and
Chief Executive Officer

NYN-91110

July 15, 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

(e) NHY Letter NYN-91096 dated June 14, 1991, "Request for Additional Information Regarding Safety Inspection Pump Operability in Modes 5 and 6", T. C. Feigenbaum to USNRC

(f) USNRC Letter dated July 5, 1991, "Seabrook Proposal to Make Safety Injection (SI) Pump Operable in Modes 5 and 6 (TAC No. 79625)" G. E. Edison to T. C. Feigenbaum

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

Gentlemen:

The NRC Staff in Reference (f) requested additional information regarding the proposed license amendment to allow the operation of a Safety Injection Pump in Modes 5 and 6. The requested information is provided in Enclosure 1 as detailed answers to each of the Staff's questions.

New Hampshire Yankee requested the license amendment via Reference (d) to address the recommendations, and in particular programmed enhancement (3b), of NRC Generic Letter 88-17, [Reference (b)]. The current Technical Specification 3.5.3.2 "ECCS Subsystem - T_{avg} Equal to or Less than 200°F", does not allow a Safety Injection (SI) Pump to be

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OPERABLE and to discharge to the Reactor Coolant System (RCS) in Mode 5 and Mode 6 with the vessel head on. The requested Technical Specification change will allow one SI pump to be OPERABLE and to discharge to the RCS when the RCS has a vent area equal to or greater than 18 square inches. The use of an SI pump provides a diverse and redundant means to makeup RCS inventory in the event that the Residual Heat Removal System and the Centrifugal Charging Pumps become unavailable while the plant is operating in a reduced inventory condition. The operation of an SI pump under these conditions also allows testing of flow paths and filling of accumulators.

The 18 square inch vent is specified to ensure that the reactor vessel pressure limits of 10 CFR 50, Appendix G are not exceeded during a mass addition transient. The minimum RCS vent area required to ensure that the Appendix G limits are not exceeded when operating one Centrifugal Charging Pump and one SI pump while in Mode 5 or Mode 6 with the reactor vessel head on in 2.92 square inches. After this value was determined by calculation, a vent larger than that required based upon Appendix G overpressure protection requirements was conservatively specified after consideration was given to two other factors influencing operation in a reduced invertory condition. The additional margin was added to address a potential configuration where steam generator nozzles dams are in place and to also ensure that gravity feed from the Refueling Water Storage Tank to the RCS will occur in the unlikely event that the Residual Heat Removal, Centrifugal Charging and SI Pumps were all to become unavailable.

The 18 square inch vent area specified in the proposed change to Technical Specification 3.5.3.2 therefore represents a conservatively large vent area with respect to Appendix G overpressure protection requirements, and a 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 an SI pump available to flow to the Reactor Coolant System during Mode 5 or Mode 6 when the reactor vessel head is on the vessel.

New Hampshire Yankee (NHY) has reviewed the NRC's concern related to the overpressurization of the seal table thimble tube temporary seals. The controls that NHY will establish, as described in the Enclosure, will provide assurance that the temporary seals will not be overpressurized by requiring that the reactor vessel head be fully detensioned prior to the installation of the temporary seals. A similar requirement will ensure that during the reactor vessel reassembly process that the temporary seals are removed and the permanent RCS boundary is reestablished at the seal table prior to tensioning of the reactor vessel head.

The operation of an SI Pump in Mode 5 will not overpressurize the temporary seals because the seals will not be installed when the plant is in Mode 5. In Mode 6, the temporary seals will only be installed after the reactor vessel head is fully detensioned. Additionally the proposed Technical Specification requires that the RCS has a vent area equal to or greater than 18 square inches prior to an SI Pump being made OPERABLE.

New Hampshire Yankee has reviewed the request for a license amendment and the no significant hazards determination provided in Reference (d) and has determined that the information provided does not revise the license amendment request or the no significant hazards determination.

The first refueling outage for Seabrook Station is currently scheduled to begin on July 27, 1991 with the plant re-entering Mode 5 on September 16, 1991 at the completion of the outage. New Hampshire Yankee respectfully requests that the license amendment be issued prior to September 16, 1991.

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/ssl/act

Enclosure

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ENCLOSURE TO NYN-91110

RESPONSES TO
REQUESTS FOR ADDITIONAL INFORMATION REGARDING
SAFETY INJECTION PUMP OPERATION IN MODES 5 AND 6

1) Request: Discuss whether the seals are installed before the reactor vessel head is detensioned.

Response: The seal table temporary seals are installed during the refueling sequence to allow the moveable in core detector thimbles to be retracted and the fuel assemblies to be removed from the core. The temporary seal installation is controlled by Major Plant Evolution Procedure OS1000.09, "Refueling Operations", which established the criteria and sequencing for the installation and removal of the temporary seals. The actual removal and reinstallation of the temporary seals is accomplished according to Procedure IS1690.815, "Incore Instrumentation Thimble Withdrawal", and IS1690.816, "Incore Instrumentation Thimble Installation" respectively.

Major Plant Evolution Procedure, OS1000.09 will specify that the reactor vessel head must be fully detensioned before the Reactor Coolant System boundary is broken at the seal table and the installation of the temporary seals begins. The reactor vessel head will be determined to be fully detensioned when the nuts have been removed from the studs. At this time the head will be held in place on the reactor vessel solely by the force of gravity.

During the installation sequence for the temporary seals, Procedure IS1690.815, "Incore Instrumentation Thimble Withdrawal" will allow the installation of the temporary seals only after the reactor vessel head is fully detensioned. IS1690.815 will specify that the Reactor Coolant System boundary that will accept the temporary seals at the seal table cannot be broken until after the reactor vessel head is fully detensioned.

The removal sequence for the temporary seals will reverse the order of temporary seal manipulation and reactor vessel head tensioning. OS1000.09, "Refueling Operations" will specify that the temporary seals must be removed and the permanent Reactor Coolant System pressure boundary reestablished at the seal table prior to beginning the tensioning of the reactor vessel head. Procedure IS1590.816, "Incore Instrumentation Thimble Installation" will also specify that the temporary seals must be removed and the Reactor Coolant System pressure boundary reestablished at the seal table prior to the tensioning of the reactor vessel head.

New Hampshire Yankee has elected to establish the procedural guidance discussed above to ensure that sufficient Reactor Coolant System venting is provided, by fully detensioning the reactor vessel head, prior to beginning the temporary seal installation. This process ensures that the

plant is in Mode 6 with the reactor vessel head fully detensioned prior to temporary seal installation commencing at the seal table.

The current refueling schedule for Refueling Outage No. 1 agrees with the above description and shows the reactor vessel head detensioning being completed on August 6th with the temporary seal installation occurring on August 8th. The reassembly sequence shows the temporary seals removed and the permanent Reactor Coolant System boundary reestablished on September 12th and reactor vessel head tensioning to occur on September 16th.

2) Request: Discuss whether all "permanent" seals are broken, followed by installation of all temporary seals, or whether each seal is broken and replaced with a temporary seal, one at a time.

Response: The temporary seals will be installed in accordance with Procedure IS1690.815, "Incore Instrumentation Thimble Withdrawal," after the reactor vessel head is detensioned as discussed in the response to Request No. 1 above. The procedural guidance of IS1690.815 specifies that no more than three (3) of the Reactor Coolant System high pressure seals (i.e. "permanent" seals) will be opened with temporary seal installation in progress at any time. Procedure IS1690.816, "Incore Instrumentation Thimble Installation," will require that the reactor vessel head remains fully detensioned until the Reactor Coolant System pressure boundary is reestablished at the seal table.

3) Request: Discuss whether Public Service Company of New Hampshire intends to rely on a gap between the vessel and the head, after the head is detensioned, for RCS pressure control, and how large that gap is, what size gap is required, and how its presence is maintained.

Response: New Hampshire Yankee will revise its procedures which govern the installation of the temporary seals to establish the full detensioning of the reactor vessel head as a prerequisite for installation of the temporary seals. As discussed in the response to Request No. 1 above, when the reactor vessel head is detensioned it will be held in place on the vessel solely by the force of gravity. New Hampshire Yankee has determined by calculation that the Reactor Coolant System pressure required to lift the detensioned head from the vessel is approximately 12.6 psig.

During the cold hydrostatic testing and the hot functional testing of Seabrook Station and during the core loading process the reactor vessel was assembled and disassembled. At these times, the reactor vessel head was lifted from the reactor vessel by the internal spring forces prior to the tensioning of the reactor vessel head. The 1 to 1½ inch gap that is discussed in Reference (e) is based upon our experience and knowledge gained during the testing phase of Seabrook Station

operation. The actual size of the gap that will be present during the refueling outage when the head is fully detensioned can't be determined at this time, however, based upon our experience the gap will create a substantial vent area in the Reactor Coolant System.

The revision of the temporary seal installation processes will ensure that the Reactor Coolant System will not be overpressurized so as to potentially cause the temporary seals to fail. The Reactor vessel head will not be retensioned while the temporary seals are installed, and this will ensure that the gap is maintained and that in the worst case scenario that the Reactor vessel head will be lifted by the Reactor Coolant System pressure in the unlikely event that cooling were lost.

4) Request: Please provide the pressure at which the temporary seals would be expected to fail, whether the seals could be failed by reactor coolant system (RCS) pressure with an SI pump operable, and what the consequences would be.

Response: The June 14, 1991 submittal addressed the seal table temporary seals from the 10 CFR 50, Appendix G, perspective of ensuring the reactor vessel pressure limits are not exceeded. As stated in the request for a Technical Specification change [Reference (d)], a Safety Injection Pump would be allowed to be made available for operation in Mode 5 or Mode 6 only after a vent area equal to or greater than 18 square inches was established in the Reactor Coolant System. The minimum Reactor Coolant System vent area that is required to ensure the Appendix G limits are not exceeded in a scenario where both a Centrifugal Charging Pump and a Safety Injection Pump are operating is 2.92 square inches. As previously described in Reference (e), after the 2.92 square inches was determined by calculation, additional margin was added to address a potential situation where steam generator nozzle dams are in place, and to also ensure that gravity feed from the Refueling Water Storage Tank to the Reactor Coolant System will occur in the unlikely event that the Residual Heat Removal, Centrifugal Charging and Safety Injection Pumps were all to become unavailable. The Reactor Coolant System vent area required to ensure that the steam generator nozzle dams are not overpressurized and to ensure that gravity feed from the Refueling Water Storage Tank is not precluded is 18 square inches.

The discussion of a temporary seal failure was addressed from an Appendix G standpoint where the failure would have been caused by pressurization of the Reactor Coolant System while a Safety Injection Pump was operable in Mode 5 or 6. The discussion in Reference (e) did not consider other scenarios. However, the sequencing of temporary seal work, as described in the response to Request No. 1) above, ensures that there is sufficient Reactor Coolant System vent capability available by requiring the reactor vessel head to be fully detensioned prior to initiating the installation of the temporary seals. Therefore, the pressurization of the Reactor Coolant System by a Safety Injection

Pump with a subsequent temporary seal failure will not be an credible scenario. The precautions limiting Safety Injection Pump operation as discussed in Reference (e) are no longer required.

The temporary seals are subjected to a normal pressure of approximately 10 psig from the standing head of 23 feet of water when the refueling cavity is flooded. One of the temporary seals, of the same design that will be utilized during the refueling outage, has been informally bench tested to approximately 60 psig and exhibited leakage and not catastrophic failure at that pressure. Additionally, the temporary seals will be installed with a metal backing device so that the normal expected failure mechanism will be leakage and not a catastrophic failure of the temporary seal.

5) Request: Please discuss whether the 18 square inch vent will prevent seal failure, and at what point the vent is opened relative to the temporary seal installation process.

Response: There are three distinct and different vents that were discussed during the June 27, 1991 conference call. These vents are A) the manual vents used for normal plant depressurization, B) the vent, known as the Pressurizer 2 inch vent, required by Technical Specification 3.4.9.3.c for Reactor Coolant System overpressure protection in the event that the residual heat removal suction relief valves and the power operated relief valves required by Technical Specification 3.4.9.3.a and 3.4.9.3.b are not available, and C) the 18 square inch vent that will be established prior to making a Safety Injection Pump available in Modes 5 or 6 per the Technical Specification requested in Reference (d). The normal utilization of these vents is as follows:

A) Manual Vent - The Manual Vent utilizes two 3/4" manually operated globe valves located on the line running from the Pressurizer to the power operated relief valves (PORV). The vent is created by operating valves, RC-V449 and/or RC-V450, and may be utilized to vent the Pressurizer after the Reactor Coolant System has cooled to less than 200°F and the plant is in Mode 5. These vents ensure that the pressurizer is vented and may be used in the normal Reactor Coolant System drain down process. They are not intended to be used for depressurizing or for venting the Reactor Coolant System prior to breaking the system pressure boundary at the seal table for installation of the temporary seals. The Reactor Coolant System venting required for the temporary seal installation will be performed as described in the response to Request No. 1) above.

B) Pressurizer 2 Inch Vent - Technical Specification 3.4.9.3, "Overpressure Protection Systems", requires that whenever the plant is in Mode 4 with the temperature of any RCS cold leg less than or equal to 329°; or in MODE 5 and MODE 6 with the reactor vessel head on, that:

"At least one of the following Overpressure Protection Systems shall be OPERABLE:

a. Two residual heat removal (RHR) suction relief valves each with a setpoint of 450 psig ± 3%, or

b. Two power-operated relief valves (PORVs) with lift setpoints that vary with RCS temperature which do not exceed the limit established in Figure 3.4-4, or

c. The Reactor Coolant System (RCS) depressurized with an RCS vent of greater than or equal to 1.58 square inches."

The Cold Overpressure Mitigation System (COMS) provides protection against mass or energy additions in Modes 4, 5 and 6 as stated above. The COMS analysis is based upon the operation of one centrifugal charging pump and no safety injection pump operation. The vent area required for this protection, as determined by the COMS analysis, is 1.58 square inches. This vent capability is provided by the Residual Heat Removal (RHR) System suction relief valves or the power operated relief valves (PORVs). If the RHR suction relief valves and the PORVs are not available the 1.58 square inch Reactor Coolant System vent is obtained by opening valve RC-V468. This is a two inch valve that is located on the 6 inch line running from the Pressurizer to the PORVs and is the most commonly used vent path for Reactor Coolant System draining.

The COMS overpressure protection is not intended to be a Reactor Coolant System venting prerequisite for temporary seal installation which is addressed by the response to Request No. 1) above.

C) 18 Square Inch Vent - The 18 square inch Reactor Coolant System vent area is a specific vent requirement to ensure that the Appendix G limits and other considerations as discussed below will not be exceeded when a safety injection pump is made operable in Modes 5 or 6. As discussed in the response to Request No. 4) above, and in Reference (e), the Reactor Coolant System vent area required to ensure that the Appendix G limits are not exceeded with both a centrifugal charging pump and a safety injection pump operating is 2.92 square inches. The vent area is larger than that required by the COMS Technical Specification because the analysis is based upon the operation of both a centrifugal charging pump and a safety injection pump. The 18 square inch value was obtained after adding extra conservatism to address steam generator nozzle dams and gravity drain considerations as discussed in the response to Request No. 4 above.

The 18 square inch Reactor Coolant System vent area will be established prior to a safety injection pump being made available in Mode 5 or Mode 6 when the reactor vessel head is on. There are currently no

other considerations for the use of the 18 square inch vent and as with the manual vent and the COMS vent discussed in A) and B) above, the 18 square inch vent will not be Reactor Coolant System venting prerequisite for installation of the temporary seals.

Safety injection pumps will be operable in Modes 1, 2, and 3 in accordance with the requirements of Technical Specification 3/4.5.2, "ECCS Subsystems - T_{avg} Greater Than or Equal to 350°F. In Mode 5 and Mode 6 with the reactor vessel head on, a safety injection pump will not be made available until a Reactor Coolant System vent equal to or greater than 18 square inches is established.

The primary purposes of safety injection pump operation in Modes 5 and 6 is to support operation in a reduced inventory condition, and to perform check valve testing.