PSNH PUBLIC SERVICE
Company of New Hampshire

SEABROOK STATION
Engineering Office:
1671 Worcester Road
Framingham, Massachusetts 01701
(617) - 872 - 8100

November 2, 1982

SBN- 350
T.F. B7.1.2

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

Attention: Mr. George W. Knighton, Chief
Licensing Branch 3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) USNRC Letter, dated February 12, 1982, "Request for Additional Information", F. J. Miraglia to W. C. Tallman
(c) PSNH Letter, dated March 12, 1982, "Responses to 410 Series RAIs; (Auxiliary Systems Branch)", J. DeVincentis to F. J. Miraglia
(d) PSNH Letter, dated July 27, 1982, "Revised Responses to 410 Series RAIs; (Auxiliary Systems Branch)", J. DeVincentis to F. J. Miraglia
(e) PSNH Letter, dated August 27, 1982, "Amendment 46 to March 30, 1973, Application to Construct and Operate Seabrook Station Unit 1 and Unit 2", W. P. Johnson to F. J. Miraglia

Subject: Revised Response to RAI 410.25; (Auxiliary Systems Branch)

Dear Sir:

In Reference (d) we submitted a revised response to Auxiliary Systems Branch Request for Additional Information (RAI 410.25). This revised response was subsequently incorporated into the FSAR [OL Application Amendment 46; Reference (e)].

We are again revising our response to RAI 410.25 and the corresponding FSAR Section 9.2.5.3c per discussions with the Auxiliary Systems Branch Reviewer (Mr. Raj Anand).

We have enclosed the following information for Auxiliary Systems Branch Review:

1. Revised response to RAI 410.25, Part (1).

B001

2. Revised FSAR Section 9.2.5.3c.

3. A list of referenced drawings of tunnel cross-sections and routings from tunnels to intake structure to pump house.

4. One Service Water Pump curve.

5. Service Water System - Yard Plan (UE&C Drawing No. 9763-F-202500).

Items 1 and 2 from above will be included in Amendment 48 to the OL Application.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

David A. Maidrand

J. DeVincentis *fr*
Project Manager

ALL/fsf

1. PCCW supply and return containment isolation valves - both inside and outside containment - valve position indication,

2. RCP seal cavity temperatures, and

3. RCP motor bearing and stator temperatures.

In addition, two Class 1E transmitters will be provided to redundantly monitor the combined flow from the upper and lower bearing oil coolers and the motor air coolers for each pair of RCPs (total of four instruments). These safety-related transmitters will provide flow indication on demand and actuate low flow alarms in the control room. Independent alarms will be provided on the annunciator and the video alarm system. 46

Operating procedures will be provided for a loss of component cooling water and seal injection to the reactor coolant pumps and/or motors. Included in these operating procedures will be the provision to trip the reactor if component cooling water flow, as indicated by the instrumentation discussed above, is lost to the reactor coolant pump motors, and cannot be restored within 10 minutes. The reactor coolant pumps will also be tripped following the reactor trip. Since both of these operations are performed at the main control board, these evolutions can be performed within the 10-minute time frame. 46

RAI 410.25 (9.2.5)

(1) The ultimate heat sink cooling tower basins are only provided with a seven day water supply. No permanent makeup system is provided. It is our position, in accordance with Regulatory Guide 1.27, that the ultimate heat sink must have a continuous capability to maintain the plant in a safe shutdown condition for at least 30 days. Therefore provide data showing the maximum makeup water demand of the cooling tower throughout the 7-30 day period.

Provide a detailed description of the (plan) to use portable pumping equipment to furnish makeup water to the cooling tower in the event of total blockage of both ocean tunnels. Describe the capabilities of these portable pumps to provide continuous makeup water from natural water sources following depletion of the cooling tower basin. In this description consider the source of power for the portable pumps and the time for erection of the equipment including the restrictions to freedom of movement following a seismic event of sufficient magnitude to block both ocean tunnels. Describe the locations at which makeup water could be taken from natural sources, the low tide water levels or the fresh water capacities available at these locations, the length of portable pipe used and pump suction conditions imposed while pumping from these 45

remote locations. Verify that a sufficient length of portable pipe is stored to reach a reliable water source and that the system could be erected over the terrain selected in the required time.

(2) FSAR Section 9.2.5.3 indicates that even after an SSE, use of the cooling tower as the ultimate heat sink would only be necessitated by 95 percent blockage of a circulating water tunnel. Discuss whether the underground 42" SSW intake pipes that convey the water from the transition structures to the service and circulating water pumphouse could be damaged by erosion as a result of failure of the circulating water system and describe any design provisions to mitigate this damage. Also discuss the effects of suspended sediment on the operability of the system for at least 30 days.

(3) FSAR Section 9.2.5.3 states that the entire ultimate heat sink cooling tower structure is designed to withstand tornado missiles. FSAR Section 1.8 under Regulatory Guide 1.117 and Section 3.5 contradict this statement. Clarify this apparent discrepancy.

RESPONSE:

(1) FSAR Subsection 9.2.5.3c. has been revised in Amendment 45 to reference a new Figure 9.2-9 on maximum makeup water demand of the cooling tower. This Subsection was further revised in Amendment 46 [redacted] 46

(2) In the unlikely event of an SSE which resulted in damage to the circulating water system of sufficient severity to, in turn, cause damage to the 42" service water supply lines to the pumphouse and subsequent loss of suction to the service water pumps, the cooling tower would be automatically actuated to serve as the ultimate heat sink. Hence, any suspended sediment resulting from the break in these lines would have no effect on the operability of the system. 46

(3) This discrepancy will be greatly clarified if the reference to Section 3.3.2 (apparently a typographical error) is changed to read "See Section 3.5.2" in the last paragraph of Section 9.2.5.3b. The last paragraph of Section 3.5.2 contains information which clarifies the missile protection provided. The entire structure is designed to withstand tornado generated missiles as qualified by the exceptions of Section 3.5.2.

RAI 410.26 (9.2.5)

Table 9.2-12 states that the ultimate heat sink cooling tower design wet bulb temperature is 75°F. Provide the basis for this number and the design dry bulb temperature and demonstrate that it is sufficiently conservative to conform with Regulatory Position 1 of Regulatory Guide 1.27 with regard to design meteorological conditions.

and Amendment 48 to provide a description of the alternative means of furnishing makeup water to the cooling tower in the event of tunnel blockage

RAI 410-21 45

c. Tower Makeup Water

See Attachment A

Sufficient tower makeup water is stored in the tower basin for seven days of operation during accident conditions. During this time period, provisions can be made to transport additional makeup water to the site. If necessary, water can be pumped into the tower basin from any one of many (within 5000') nearby Brown's River or Hampton Harbor locations. Two diesel-driven portable pumps along with sufficient hose (50-100' lengths of 4" ID rubber-lined polyester flexible hose and associated couplings) are provided for this purpose. One pump and 2500' of hose are stored in each of the two cooling tower switchgear rooms. Each pump is of the self-priming type and of sufficient capacity and head to deliver 300 gpm through the full 5000' of hose. If required, and prior to seven days, a pump can be moved to the nearest appropriate water source. Sufficient time is available to contract helicopter service to move a pump should a pumping location with limited access be required.

The dose to station personnel filling the basin after 5 days is minimal. Direct radiation from the containment is less than 1×10^{-3} mr/hr. 46

The level of the cloud dose is acceptable, and can be minimized or completely avoided by taking water from sources upwind of the containment or by taking water from the pumphouse.

Delete

Two additional and more convenient sources of makeup water are also available onsite (assuming city water is not available). In the unlikely event that the intake tunnel is completely blocked, the pumphouse bay could be flooded by transferring to the discharge tunnel. Makeup water could then be easily pumped from the pumphouse to the tower basin. Assuming both tunnels are restricted due to a seismic occurrence, seepage through the tunnel blockage of less than 300 gpm (after 7 days) would satisfy tower makeup requirements in accordance with Regulatory Guide 1.27. A curve of maximum makeup water demand for the cooling tower throughout the 7-30 day period is shown on Figure 9.2-9.

Cooling tower makeup water is required to account for losses of tower coolant due to evaporation, drift losses, and tower blowdown. Of these, evaporative losses consume the largest portion of the required makeup water, and drift losses are relatively negligible. 45

Drift losses of 0.03% of the tower circulating water flow rate have been conservatively assumed for the tower. Sufficient makeup water is provided in the tower basin to account for this loss. Evaporative losses from the tower are based on the integrated heat loads listed in Table 9.2-14. These losses were calculated using

analytical methods accounting for both the latent heat of vaporization of the coolant and sensible heat transfer from the coolant to the air assuming saturated exit air. To assure adequate makeup supply, the basin capacity was also calculated using an alternate method which conservatively neglects sensible heat transfer and assumes all of the heat transferred is used to evaporate tower coolant. This assures that sufficient makeup water is available in the tower basin for seven days of tower operation and that minimum cooling tower pump submergence requirements are satisfied at all times.

ATTACHMENT "A"

(page 9.2-23)

Sufficient tower make-up water is stored in the tower basin for seven days of operation during accident conditions. Following the seven day period and assuming city water is not available, any one of the four service water pumps that are installed in each plant unit may be used to transfer make-up water from the pumphouse bay to the cooling tower basin. In the unlikely event that water at 80°F or less is not available from the intake tunnel, an event that is only possible if a large seismic disturbance occurs when the tunnel flows are reversed during heat treatment operations, a portable pumping system is used to provide the make-up water. Assuming the in-take tunnel is restricted due to a seismic occurrence, seepage through the tunnel blockage of 300 GPM (after 7 days) would satisfy tower make-up requirements in accordance with Regulatory Guide 1.27.

The safety grade service water system can conveniently be used to transfer pump house water to the tower basin. After one of the service water pumps (SWP) is started the cooling tower pump (CTP), which is operating in parallel with the SWP, is tripped. Then, service water flows through the primary component coolers and the diesel generator coolers before it is discharged through the tower sprays into the basin. The service water flow rate at the 80°F temperature is sufficient to remove the accident condition heat from the coolers. Near the completion of the make-up pumping cycle when either the tower basin becomes full or the pump house water level reaches minimum, one of the CTPs must be returned to service before the SWP is tripped. Except during the periodic tunnel heat treating operation, the service water pump house bays are connected to the intake tunnel transition structure, which at low tide contains 750,000 gallons above the level required for pump NPSH. Sixty-five minutes of service water system pumping on a forty-one hour interval is required to transfer the pump house water to the tower basin. With extended tower operation the plant cooling load will decrease, the tower make-up requirements will decrease, and because the 300 GPM tunnel inleakage will exceed the make-up requirements, the tower basin will become filled. After basin filling, the time interval between service water make-up cycles can be extended.

In addition to the service water pumping system, a portable tower makeup pump is maintained on the site. It is capable of providing make-up water to the tower basin from the nearby Browns River or Hampton Harbor, It consists of 4-inch ID rubber-lined polyester flexible hose in 50-100 foot lengths, associated hose couplings and a portable diesel-driven pump that is self priming within 26 feet of water level. The seven-day period that the tower can operate without makeup water provides sufficient time to move the pump into position, lay the hose and make the system ready for operation .

from the pumphouse bay (at any temperature) or

several locations being accessable by road

SERVICE WATER PUMPHOUSE, TUNNEL

AND PIPE ROUTING DRAWING LIST

A. SW + CW PUMPHOUSE BAY

FSAR Fig. 1.2-46 Plan & Section
1.2-47 Plan Below Grade
1.2-48 Sections, General Arrg't.

B. PIPE ROUTING SW PUMPHOUSE TO TUNNEL TRANSITION STRUCTURES

FSAR Fig. 9.2-1, Sh.1 P&I Diagram

(shown schematically only in FSAR. See detailed Routing Plan UE&C Dwg. 9763-F-202500)

C. TUNNEL STRUCTURES

FSAR Fig. 1.2-52 General Plan
1.2-53 Profile
1.2-54 Ocean Intake Structure

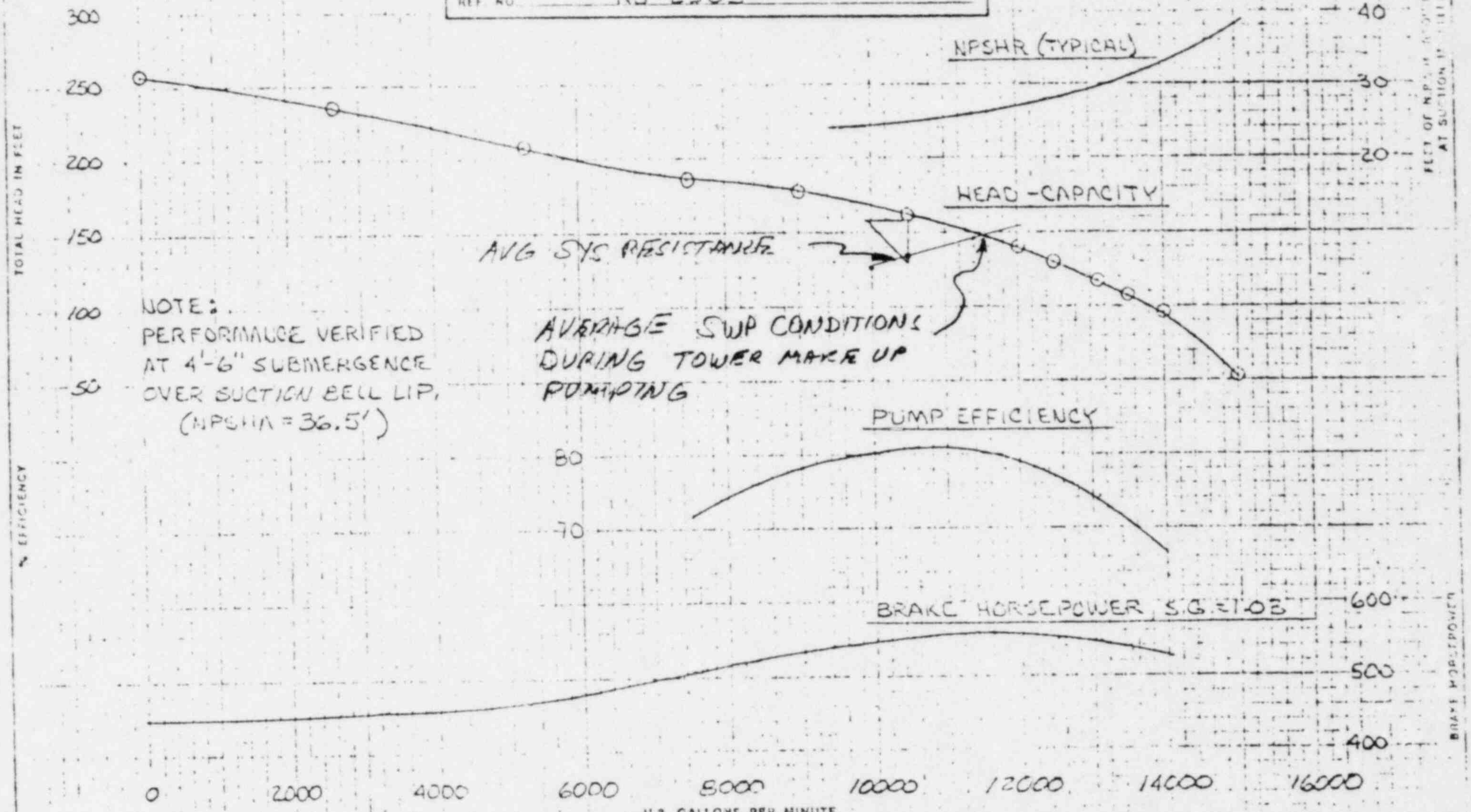
D. COOLING TOWER

FSAR Fig. 1.2-56 General Arrangement

CERTIFIED BY: S. C. Nicholls
DATE: 7/26/76

CUSTOMER: UNITED ENGINEERS & CONSTRUCTORS
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
TAG 1-SW-P-41B, MOTOR NODE N-82
REF. NO. NG-2522

54" SUBMERGENCE REQ'D OVER BELL TO PREVENT VORTEXES BASED ON SUMP DESIGN PER HYDRAULIC INSTITUTE STDS



THE CAPACITY, HEAD AND EFFICIENCY GUARANTEE IS FOR THE DESIGNATED POINT ONLY. IT IS BASED ON SHOP TESTS WHEN HANDLING CLEAR, FRESH WATER AT A TEMPERATURE OF NOT OVER 85° F. AND UNDER SUCTION CONDITIONS AS SPECIFIED IN THE CONTRACT.

IMPELLER: ST. STL. DIA: 22 3/4"
BOWLS: ST. STL.
LIQUID: SEA WATER
SP. GR: 1.03
DATE: 7-26-76

Johnston Pump Company
Glendora, California 91740
ESTABLISHED 1909

TURBINE PUMP PERFORMANCE
2 STAGE 30DC PUMP
892 RPM
CURVE NO. [illegible]

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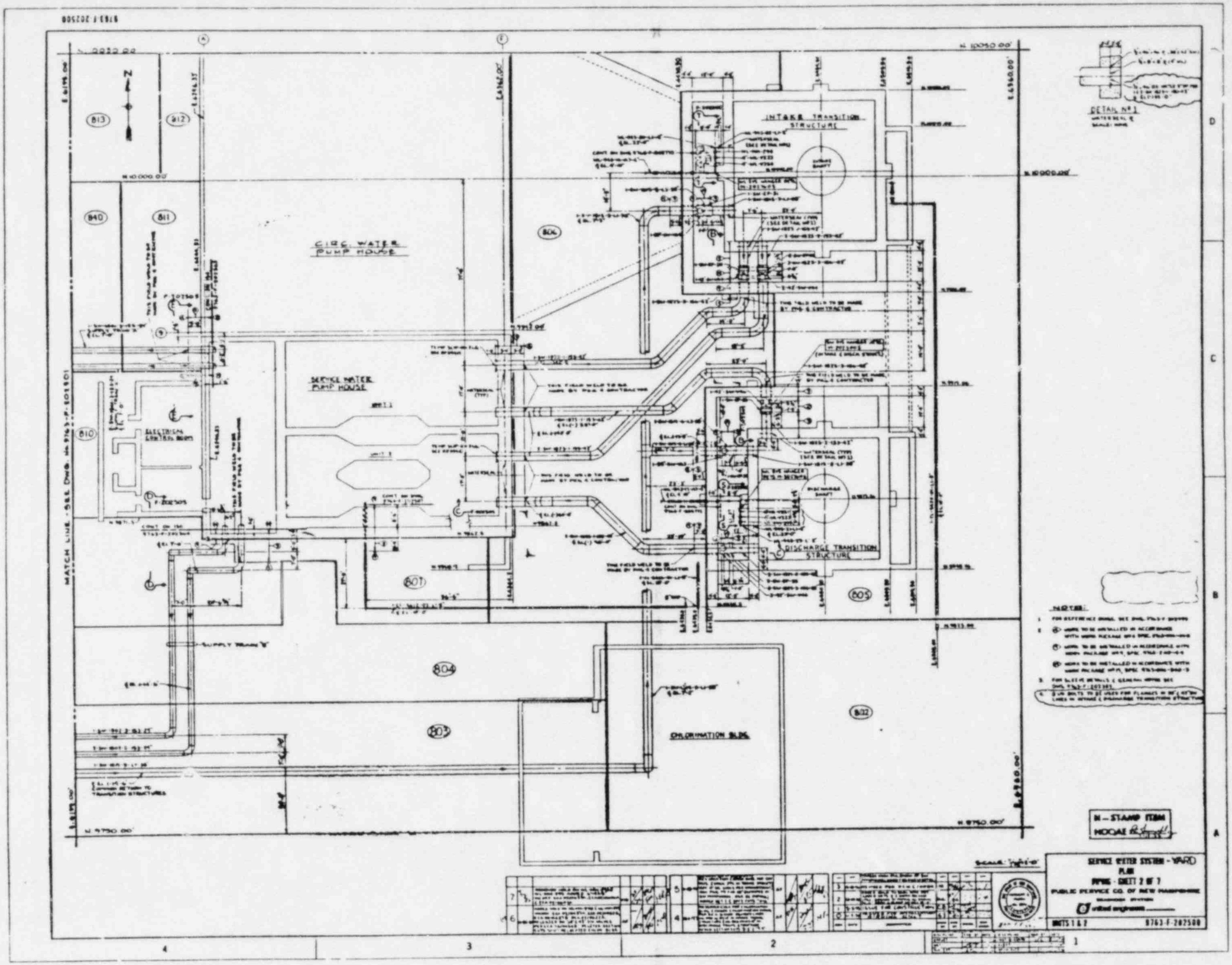
PAGE 6 OF 8



INTAKE TRANSITION STRUCTURE
DISCHARGE TRANSITION STRUCTURE
CIRC. WATER PUMP HOUSE
SERVICE WATER PUMP HOUSE
ELECTRICAL CONTROL ROOM
CHLORINATION BLDG.
DETAIL NO 1
NOTES:
N-STAMP ITEM
SERVICE WATER SYSTEM - YARD
PLAN
PIPING - SHEET 2 OF 7
PUBLIC SERVICE CO. OF NEW HAMPSHIRE
UNITS 1 & 2
9763-F-202500
MATCH LINE - SEE DWG. No. 9763-F-805101
N 10050.00'
N 10000.00'
N 9750.00'
E 6960.00'
E 6780.00'
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