

NRC PDR



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

February 22, 1980

Docket No. 50-213

Mr. W. G. Council, Vice President
Nuclear Engineering and Operations
Connecticut Yankee Atomic Power Company
Post Office Box 270
Hartford, Connecticut 06101

Dear Mr. Council:

We have been reviewing your submittals related to the Haddam Neck Plant, Fire Protection Program. These submittals are listed with their status in Enclosure 1.

The results of our evaluation are attached as Enclosures 2, 3 and 4. Enclosure 2 presents our evaluation of issues that are complete. Enclosure 3 presents our evaluation of issues for which we need additional information. Enclosure 4 presents our evaluation of those issues which we find not acceptable and indicates requirements that would resolve the issue.

We request that you respond with the requested information and commitments within 30 days of the date of this letter. If you do not plan to meet these requirements, you should request a meeting within the same 30 days.

Sincerely,

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:

- 1. List of Submittals & Status
- 2. Evaluation of Supplement Items (Complete)
- 3. Evaluation of Supplement Items (Require Additional Info.)
- 4. Evaluation of Supplement Items (Unacceptable)
- 5. Consultant's Calculations

cc w/enclosures:
See next page

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Mr. W. G. Council

-2-

February 22, 1980

cc

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Hartford, Connecticut 06103

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Board of Selectmen
Town Hall
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Connecticut Energy Agency
ATTN: Assistant Director
Research and Policy
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Department of Planning and
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Director, Technical Assessment
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ENCLOSURE 1

HADDAM NECT PLANT - FIRE PROTECTION SER SUPPLEMENT
LIST OF SUBMITTALS AND STATUS OF THE ASSOCIATED ISSUES

<u>SER Section</u>	<u>Subject Issue</u>	<u>Submittal</u>	<u>Status</u>
3.1.1	Fire Detection Systems	4/11/79, 5/18/79	C
3.1.2	Fire Water Supply	4/11/79, 5/18/79, 10/9/79	C
3.1.3	Yard Hydrants	4/11/79, 5/18/79	C
3.1.4	Hose Stations		R*
3.1.5	Water Suppression Systems	4/11/79, 5/18/79, 10/9/79	C
3.1.6	Gas Suppression System	4/11/79, 5/18/79	C
3.1.7	Portable Extinguishers	4/11/79, 5/18/79	C
3.1.11	Ventilation Equipment	4/11/79, 5/9/79, 10/9/79	C
3.1.18	Control of Combustibles	4/11/79, 10/9/79	R*
3.2.1	Alternate Shutdown Capability		I
3.2.2	Smoke Detection System Tests	7/31/79, 10/9/79	R
2.2.3	Cable Fire Barrier Penetration Test Data	7/31/79, 10/9/79	R

C - Complete

I - Incomplete - Alternate shutdown system evaluation and design review have been incorporated into the Systematic Evaluation Program.

R - Requirement

* - The licensee has not been notified of this position previously

ENCLOSURE 2

HADDAM NECK - FIRE PROTECTION EVALUATION
OF SUPPLEMENT ITEMS THAT ARE ACCEPTABLE

By letters of April 11, 1979, May 18, 1979 and October 9, 1979, you provided certain design criteria as requested by our Fire Protection SER of October 3, 1978 for the following proposed modifications: 3.1.1 Fire Detection Systems, 3.1.2 Fire Water Supply, 3.1.3 Yard Hydrants, 3.1.5 Water Suppression Systems, 3.1.6 Gas Suppression Systems, 3.1.7 Portable Extinguishers and 3.1.11 Ventilation Equipment. We have reviewed these criteria and find that; an adequate number and type of fire detectors will be installed in the containment for the cable trays at the elevation above the containment penetrations and in the area of the reactor coolant pumps, an acceptable additional connection and additional sectional valves will be provided from the fire pumps to the underground yard loop main, sectional valves will be appropriately provided in the fire main to permit isolation of hydrants, water suppression systems will be added which will acceptably protect the equipment designated for additional protection, an adequate automatic local application Halon suppression will be added and a carbon dioxide system will be appropriately modified as stated in the SER, an acceptable large wheeled fire extinguisher unit will be provided near the cable penetration area in the containment, and portable ventilation equipment will be appropriately provided. On this basis we find that the design of these modifications provides the protection we intended in preparing our SER. Accordingly we find the design criteria for these modifications to be acceptable.

ENCLOSURE 3

HADDAM NECK PLANT - FIRE PROTECTION EVALUATION OF SUPPLEMENT ITEMS THAT REQUIRE ADDITIONAL INFORMATION

3.2 Smoke Detection System Tests (3.2.2)

Our SER note that in-situ tests would be conducted with a suitable smoke generation device to verify that a fire would be promptly detected by installed smoke detectors and that ventilation air flow patterns in the area do not significantly reduce or prevent detection response. Bench tests would be conducted to verify that smoke detectors would provide prompt response and have adequate sensitivity to the products of combustion for the combustibles in the area where smoke detectors are installed. If any fire detection systems are found to be inadequate, appropriate modifications will be made to provide adequate performance.

By letter dated July 31, 1979, the licensee indicated that various concepts had been reviewed and that use of a technique developed by NUTECH Corporation for siting of fire detectors showed some merit. The licensee evaluated NUTECH's technique in a demonstration test held at the Yankee Rowe Nuclear Plant on August 23 and 24, 1979. The licensee concluded that although NUTECH's concepts have advanced the state-of-the-art, more testing or qualification would be necessary to provide assurance of acceptability.

We have also evaluated the NUTECH tests and have concluded that the method does not satisfy the staff requirement; the test requirement is beyond present state-of-the-art technology. In addition, the NUTECH test report contains major deficiencies which detract from the credibility of the test method, such as inconsistencies in the interpretation and presentation of data, the use of unexplained rationale which require additional in-plant testing to improve the derived test results.

The licensee is therefore relieved of any schedule or commitment with this requirement until acceptance criteria can be developed that can be applied with the present day technology.

However, the licensee has not provided any information on the requirement to conduct bench tests of smoke detectors for verification of prompt response and sensitivity to products of combustion in the area where installed. Therefore, we will require that this be done to comply with the requirements of our previously issued SER.

3.3 Cable Fire Barrier Penetration Test Data (3.2.3)

We noted in our SER that test data would be provided to demonstrate the adequacy of electrical cable fire barrier penetrations.

The licensee provided information on the cable fire barrier penetrations by letters dated July 31 and Oct 9, 1979. The data contained in the letter of July 31, 1979 indicated that the penetrations are sealed with Dow Corning

Cable Fire Barrier Penetration Test Data (3.2.3) Cont'd

Q3-6548 medium density Silicone RTV Foam. The installer certifies the materials used to the ASTM-E-119 Fire Endurance Test and indicates that they have been installed as three hour fire seals.

We have reviewed the test data, the certifications and any exceptions. The exceptions documented in the licensee's letter of October 9, 1979, meets our requirements as indicated in our previously issued SER, Section 3.1.14 item 4, which indicates a one hour rating for the switchgear room zone S-8. We have reviewed the combustible loading for this room contained in the licensee's fire hazards analysis. The loading is not sufficient to breach a one hour rated barrier seal.

We find that the certifications provided demonstrate the adequacy of the cable fire barrier penetrations except that they do not show that a pressure differential across the seal (with the higher pressure on the exposed side) that is equivalent to the maximum pressure differential a fire barrier is expected to experience has no effect on the performance of the penetration seal. Subject to such a demonstration we find these seals acceptable.

ENCLOSURE 4

HADDAM NECK PLANT - FIRE PROTECTION EVALUATION OF SUPPLEMENT ITEMS FOR WHICH THE LICENSEE'S PROPOSAL IS UNACCEPTABLE

3.1.4 Hose Stations (Additional Feed From Yard Loop)

During our evaluation of the fire protection suppression systems in the Turbine Building we noted that there was only a single feed from the yard loop to the automatic systems ring header and only a single feed from the automatic systems ring header to the hose stations ring header. Therefore, a break in the underground feed impairs all the automatic and manual suppression systems protecting safety-related areas or areas exposing safety-related areas. To provide a more reliable fire suppression system, an additional feed from the yard loop to both the ring headers, with appropriate isolation valves is necessary. This arrangement should assure that either feed can supply the water demand of both the ring header and that a break in any one feed would not result in the simultaneous loss of function of both ring headers.

The licensee agreed to provide the feed as described in SER item 3.1.4 "An additional feed from the yard loop will be provided for the turbine building hose stations which can be isolated to provide a feed independent of automatic water suppression systems in the area (5.11)."

To meet this commitment, the licensee installed a 4-inch feed from the yard loop to the turbine building ring header. This does not satisfy the commitment. The modification provides two feeds, however, the 4 inch feed does not provide adequate capacity for providing maximum water demand of both the hose station and automatic systems ring headers.

We find that the proposed modification is not acceptable. Our consultant's calculation regarding the capacity of the proposed feed is enclosed. We, therefore, request that a new feed with adequate isolation valving to preclude a single break from affecting both ring headers be installed prior to a return to power from the 1980 refueling outage. We also request a commitment to perform this modification and a description of a new feed design.

3.1.18 Control of Combustibles (Reactor Coolant Pump Oil Collection System)

Our SER (item 3.1.18) noted that an oil collection system would be provided for each of the reactor coolant pumps.

By letters dated April 11, and October 9, 1979 the licensee submitted details of the design for the reactor coolant pump lube oil collection system.

We have reviewed the licensee's submittals and have evaluated his design against the present staff criteria provided by the proposed Appendix R to 10 CFR 50. The licensee design is acceptable in all respects except that it does not meet the seismic design criteria noted below:

To provide adequate protection for a design basis Safe Shutdown Earthquake (SSE), one of the following should be provided:

1. The lube oil system components whose failure could result in leakage should be designed to withstand an SSE without leakage and the dropping of oil collection system components during an SSE should not cause loss of operability of safety-related equipment: or
2. The oil collection system should be designed to withstand an SSE and continue to be able to collect and drain leakage that may occur during an SSE. In this case the oil collection system should be adequate to collect oil from any external lube oil piping not designed to withstand an SSE in addition to leakage from points identified above.

If an automatic fire suppression system is selected, either the automatic and manual fire suppression system or the lube oil system components whose failure could result in leakage should be designed to withstand the SSE.

We require that licensee comply with the above criteria.

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.

Upton, New York 11973

Department of Nuclear Energy

(516) 345-2144

December 27, 1979

Mr. Robert L. Ferguson
Plant Systems Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Haddam Neck Fire Protection Review, Item 3.1.4(5).

Dear Bob:

As I stated in my letter to you on December 20, 1979 the four-inch connection from the service building was inadequate to supply the required water pressure and demand for the turbine building fire protection water in case of a break in the main water feed from the loop.

Attached is a copy of Mr. Antonetti's calculations verifying this fact.

Respectfully yours,

Robert E. Hall

Robert E. Hall, Group Leader
Reactor Engineering Analysis

Est. when D.

REH:EAM:sd
attachment

cc.: R. Cerbone wo/enc.
 W. Kato wo/enc.
 V. Panciera wo/enc.
 ✓ L. Derderian
 E. MacDougall



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FND 1/20/80

December 26, 1979
File No. 7722

Brookhaven National Laboratory
Associated Universities, Inc.
Building No. 130
Upton, Long Island, New York 11973

Attention: Mr. Edward A. MacDougall

RE: Haddam Neck
Fire Protection Review
Additional Fire Water Feed
Turbine Building

Gentlemen:

Reference your letter of December 20, 1979 requesting water requirements for the Turbine Building sprinkler protection at Haddam Neck Nuclear Power Plant.

The fire hazard analysis submitted by the Utility indicates a water demand for the Turbine Building sprinkler system as 2,000 gpm with an additional 900 gpm for the oil receiver and cooler deluge system. The combined demand is 2900 gpm with an approximate pressure of 100 psig as indicated in FHA fire hazard analysis.

Using the 2000 gpm @ 100 psi as the water demand for the sprinkler systems in the turbine building, the friction loss in the 4-inch alternate feed from the Service Building to the turbine manifold sprinkler system is determined by Hazen-Williams Formula:

$$f_1 = \frac{4524 G^{1.85}}{C^{1.85} d^{4.87}}$$

where G = rate of flow, gpm
C = Hazen-Williams pipe coefficient
d = internal diameter of pipe, inches
f₁ = loss, psi/1000 ft.

---continued

Dec. 26, 1979

Inserting the appropriate number the formula is

$$f_1 = \frac{4524 (2000)^{1.85}}{(120)^{1.85} (4)^{4.87}}$$

$$f_1 = 964 \text{ psi/1000 ft. of pipe.}$$

The 4-inch pipe has an equivalent length of pipe of 400 feet. Therefore, the friction loss for 2000 gpm with a C factor of 120 is 386 psi. The fire pumps are rated for 2500 gpm @ 115 psi. These pumps cannot meet the pressure requirements.


In conclusion, the 4-inch alternate feed from the Service Building to the turbine manifold sprinkler systems can not supply the water demand requirements for the turbine building.

If you have any questions, please call me.

Very truly yours,

GAGE-BABCOCK & ASSOCIATES, INC.

Mario A. Antonetti

Mario A. Antonetti, P.E. 

MAA/ims