August 26, 1982

Docket No. 50-213
LS05-82-08-062

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

Dear Mr. Counsil:

SUBJECT: SEP TOPIC IX-5, VENTILATION SYSTEMS FOR THE HADDAM NECK PLANT

Enclosed is a copy of a Safety Evaluation Report of Systematic Evaluation Program Topic IX-5, Ventilation Systems. This evaluation is based on our contractor's, The Franklin Research Center, Technical Evaluation Report (TER-C5257-415).

This assessment compares your facility, as described in Docket No. 50-213, with the criteria currently used by the regulatory staff for licensing new facilities.

This evaluation will be a basic input to the Integrated Safety Assessment for your facility. A determination of the need to actually implement modifications will be made during the Integrated Assessment. This topic assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this topic are modified before the Integrated Assessment is completed.

Sincerely,

Original signed by

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

SE04
DSU use (02)
AOD:
G. Staley

Enclosure:
As stated

cc w/enclosure:
See next page

OFFICE	SEPB	SEPB	SEPB	ORB#5	ORB#5	AD:SA:DL	
SURNAME	SBrown:bl	RHermann	WRussell	CTropf	DCrutchfield	TIppolito	
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Mr. W. G. Counsil

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TOPIC IX-5

SEP REVIEW

VENTILATION SYSTEMS

FOR THE

HADDAM NECK PLANT

SYSTEMATIC EVALUATION PROGRAM

TOPIC IX-5

HADDAM NECK PLANT

Topic: IX-5, Ventilation Systems

I. INTRODUCTION

To assure that the ventilation systems have the capability to provide a safe environment for plant personnel and for engineered safety features, it is necessary to review the design and operation of these systems. For example, the function of the spent fuel pool area ventilation system is to provide ventilation in the spent fuel pool equipment areas, to permit personnel access, and to control airborne radioactivity in the area during normal operation, anticipated operational transients, and following postulated fuel handling accidents. The function of the engineered safety feature ventilation system is to provide a suitable and controlled environment for engineered safety feature components following certain anticipated transients and design basis accidents.

II. REVIEW CRITERIA

The current criteria and guidelines used to determine if the plant systems meet the topic safety objective are those provided in Standard Review Plan (SRP) Sections 9.4.1, "Control Room Area Ventilation System," 9.4.2, "Spent Fuel Pool Area Ventilation System," 9.4.3, "Auxiliary and Radwaste Area Ventilation System," 9.4.4, "Turbine Area Ventilation System" and 9.4.5, "Engineered Safety Feature Ventilation System." In determining if plant design conforms to a safety objective, use is made, where possible, of applicable portions of previous staff reviews.

III. RELATED SAFETY TOPICS AND INTERFACES

The scope of review for this topic was limited to avoid duplication of effort since some aspects of the review were performed under related topics. The related topics and the subject matter are identified below. Each of the related topic reports contains the acceptance criteria and review guidelines for its subject matter.

II-2.A	Severe Weather Phenomena
III-1	Classification of Structures, Components and Systems (Seismic and Quality)
III-6	Seismic Design Considerations
VI-4	Containment Isolation System
VI-7.C.1	Independence of Onsite Power
VI-8	Control Room Habitability
VII-3	Systems Required for Safe Shutdown
IX-6	Station Service and Cooling Water Systems
XV-20	Radiological Consequences of Fuel Damaging Accidents (Inside and Outside Containment)

TMI III.D.3.4 Control Room Habitability

USI-A24, Qualification of Class 1E Safety-Related Equipment

IV. REVIEW GUIDELINES

In determining which systems to evaluate under this topic, the staff used the definition of "systems important to safety" provided in Regulatory Guide 1.105. The definition states that systems important to safety are those necessary to ensure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shutdown the reactor and maintain it in a safe condition, or (3) the capability to prevent, or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines of 10 CFR Part 100, "Reactor Site Criteria." This definition was used to determine which systems or portions of systems were "essential." Systems or portions of systems which perform functions important to safety were considered to be essential.

V. EVALUATION

The systems reviewed under the topic are the control room area ventilation system, fuel storage pool area ventilation system, Auxiliary and Radwaste area ventilation systems, turbine building ventilation systems, and engineered safety features ventilation systems.

A. Control Room Area Ventilation System

The function of the Control Room Area Ventilation System (CRAVS) is to provide a controlled environment for the comfort and safety of control room personnel and to assure the operability of control room components during normal operating, anticipated operational transients and design basis accident conditions.

As a result of TMI this system is being reviewed generically (TMI Item III.D.3.4, Control Room Habitability) to assure compliance with Criterion 19, "Control Room" of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50. Therefore, the CRAVS was not reviewed under this topic.

B. Spent Fuel Pool Area Ventilation System

The function of the spent fuel pool area ventilation is to maintain ventilation in the spent fuel pool equipment areas to permit personnel access and to control airborne radioactivity in the area during normal operation, anticipated operational transients, and following postulated fuel handling accidents.

Ventilation for the spent fuel building consists of two supply units, two filtered exhaust units, associated supply and exhaust ducting, and necessary controls. The normal ventilation flow paths are independent, in that exhaust unit F-16-1A exhausts the area supplied by supply unit F-26-1A and exhaust unit F-35-1A exhausts the area supplied by supply unit F-34-1A (See FRC TER-C5257-415, for a more completed system description). During

the fuel handling operation, as required by Normal Operating Procedure NOP2.15-3, exhaust unit F-35-1A which exhaust the decontamination area is shutdown, leaving only exhaust unit F-16-1A and its assoiciated charcoal filtration which exhaust the new and spent fuel area to mitigate the consequences of the fuel handling accident. Based on the FRC report it appears that the exhaust train is subject to disabling single failures. Also, power to various system components are not supplied by emergency power sources. To resolve this issue the licensee should either demonstrate that the results of a fuel handling accident, without credit for the ventilation system, are acceptable or propose corrective system modifications.

In addition to the above, Franklin indicated another concern; the dependency of the operator on a single radiation monitor for indication of the need for realignment of the charcoal filter system. However, this is not considered a problem since the charcoal filter system is correctly aligned prior to the initiation of fuel handling as required by Normal Operating Procedure 2.15-3.

C. Auxiliary Building and Radwaste Area Ventilation Systems

The auxiliary building and radwaste area ventilation systems provide ventilation for the primary auxiliary building (PAB) and the waste disposal building (WDB), respectively. The WDB contains no equipment essential to safe shutdown. The PAB houses engineered safety features including (a) the chemical and volume control systems, (b) the low pressure and high pressure pumps, and (c) the residual heat removal system.

C.1 Waste Disposal Building (WDB) Ventilation System

The waste disposal building ventilation system consists of a supply fan and exhaust ducting which employs the primary auxiliary building exhaust system. Based on the results of Franklin Research Center evaluation (C5257-415) we have determined that the WDB ventilation System is non-essential as defined in Section IV.

C.2 Primary Auxiliary Building (PAB) Ventilation System

The primary auxiliary building is provided with both supply and exhaust ventilation to ensure proper air flow direction and remove the heat generated by the various equipment. Flow paths from all supply and exhaust units are interrelated to provide one common ventilation system for the primary auxiliary building. For a more complete description of the PAB ventilation system, see either Reference A or B.

Based on the Franklin Report, the supply portion of this system is subject to a single disabling failure. That failure being of either MCC8 or Bus 6. In addition, Bus 6 supplies power to one of the two exhaust units. Thereby reducing PAB ventilation system to one component, exhaust unit F-50-1A. The licensee should evaluate the effect of this degraded PAB ventilation condition on the ability of maintaining acceptoperating conditions for vital equipment; also, the effect on plant personnel should be considered. If necessary, corrective system modifications should be provided.

D. Turbine Area Ventilation System

The turbine area ventilation system services all areas of the turbine building with the exception of the lubrication oil storage room and service boiler room. The lubricating oil storage room ventilation consists of a centrifugal exhaust air fan which removes air and fumes from the oil room as well as drawing air into the room through screened openings equipped with fire dampers. Ventilation for the service boiler room is provided by a roof ventilator. Outside supply air, and combustion air enter through open steel doors during the summer; a hooded envelope intake around the stack provides for combustion air in the winter. Based on the results of Franklin Reasearch Center evaluation (C5257-415) we have determined that the turbine area ventilation system is non-essential as defined in Section IV.

E. Engineered Safety Features Ventilation System

E.1 Cable Vault Ventilation System

The cable vault ventilation system services both the above-grade electrical equipment and subgrade cable vault. The safety equipment contained within this area consists of MCC-7, as well as various safety-related cables and associated electrical penetrations.

The ventilation system for this area is comprised of a 100% outside air supply ventilation unit F-31-1A, which consists of a particulate filter face and bypass damper and heating coil. This unit supplies approximately 4000 cfm during operation. In addition, a roof exhaust fan F-32-1A draws air from the cable vault and electrical penetration area and discharges it to atmosphere at approximately 4000 cfm. For a more complete description of the cable vault ventilation system, see either Reference A or B.

Based on the FRC evaluation this ventilation system could be subject to several disabling single failures. Therefore, the licensee should either demonstrate that the operability of vital equipment located within this area would not be affected by loss of area ventilation or propose corrective system modifications.

E.2 Auxiliary Feedwater Pump Room

The steam-driven auxiliary feedwater pumps and their associated valves and controls are contained within a separate building on the west side of the containment structure. No ventilation is presently provided. On the basis of extensive experience with this system involving periods of use during normal operation and testing, reliable operation of all equipment has been demonstrated (see Reference C). Based on this experience the staff agrees with the licensee's conclusion that no ventilation is required.

E.3 Emergency Diesel Generator Rooms

There are two emergency diesel generator rooms each of which contains an emergency diesel generator and its associated auxiliary systems, controls, and switchgear. The ventilation system for each room is comprised of an outside air intake penthouse located on the roof of each building, a 25000 cfm exhaust fan which exhaust directly outside, and an 1800 cfm transfer fan and associated duct work located in the generator switchgear to ensure adequate ventilation in this area. Each exhaust fan is started automatically upon start of the corresponding diesel generator. In addition, the power for each fan is supplied from the associated diesel generator.

As described above, the ventilation of each of these rooms is dependent on the operation of a single exhaust fan. Based on this design all forced area cooling could be lost with a single failure. The licensee has indicated such a loss could result in overheating of the diesel generator and its associated electrical and auxiliary equipment. Therefore, the licensee should either demonstrate that the loss of ventilation will not significantly affect diesel generator availability or propose corrective modifications.

E.4 Intake Structure Ventilation System

The intake structure ventilation system is addressed as a result of this building containing the service water pumps which are considered safety-related. The ventilation for the screenwell house is provided by air flow through wall louvers, as well as open doors during warm weather. The air is exhausted by a gravity roof ventilator. In the event of a power failure, several mechanisms act to prevent any rapid heat buildup. All other heat loads within the structure are secured as the plant is shutdown, service water pipes containing cool river water act as heat sinks, and the room is not airtight allowing some limited convective cooling to take place. If a system failure should occur, doors opening to the outside are available and should provide sufficient air flow even with multiple fan failures. Inspection of the intake structure at eight hour intervals provides additional protection against excessive heat buildup. It's the staff's judgment that a safety grade ventilation system is not required for this area based on heat load to building volume ratio.

E.5 Switchgear Room Ventilation System

The switchgear room ventilation system services all electrical equipment located in the switchgear room. This area contains various safety-related switchgears as well as the plant batteries. The ventilation of this area is comprised of centrifugal supply and exhaust fans F-6-1A and F-44-1A, respectively, and associated intake, exhaust and distribution duct work and dampers. For a more complete system description, see References A or B.

Based on our review of the switchgear room ventilation system it appears to be susceptable to disabling single failures either from loss of instrument air or MCC-6. To resolve this issue the licensee should either demonstrate that vital equipment located within this area would be unaffected by loss of area ventilation or propose corrective system modifications.

E.6 Cable Spreading Area Ventilation System

Ventilation for the cable spreading area is provided by the service building ventilation system. The system consists of various roof exhaust units and corresponding venting as well as associated exhaust duct work. In the advent of loss of ventilation to the cable spreading area, the licensee has indicated that sufficient open area as well as open venting is provided to preclude overheating of this area, thus ensuring reliable operation of the various safety cables located in this area. However, adequate supporting information to enable the staff to perform an independent assessment, was not provided. Therefore, the adequacy of room openings to maintain suitable service conditions will be evaluated during the Integrated Safety Assessment.

VI. CONCLUSION

The ventilation systems for the Haddam Neck plant were found to be in conformance with criteria for this topic except for the following:

A. The spent fuel pool area ventilation system is neither single failure proof or powered from emergency sources. To resolve this issue the licensee should either demonstrate that the results of a fuel handling accident without credit for area ventilation, are acceptable or propose corrective system modifications.

B. The primary auxiliary building ventilation system supply portion is not single failure proof. The licensee should evaluate the effects of degraded PAB ventilation on both equipment and personnel. If necessary corrective modifications should be provided.

C. The cable vault ventilation system is subject to several disabling failures. The licensee should either demonstrate that the operation of vital equipment located within this area would not be affected by loss of area ventilation or propose corrective system modifications.

D. The ventilation system associated with each of the emergency diesel generator rooms are subject to disabling single failures. The licensee should either demonstrate that the loss of ventilation will not significantly affect diesel generator availability or propose corrective modifications.

E. The switchgear room ventilation system is susceptible to disabling single failures. The licensee should either demonstrate that vital equipment located within this area would be unaffected by loss of area ventilation or propose corrective system modifications.

F. Supporting information to enable the staff to perform an independent assessment of the cable spreading areas, was not provided. The adequacy of room openings to maintain suitable service conditions should be evaluated.

VII. REFERENCES

A. Letter, W. G. Counsil to D. M. Crutchfield, Licensee's IX-5 Topic Assessment, dated December 14, 1981.

B. Franklin Research Center Report, "Review of the Design and Operation of Ventilation Systems for SEP Plants," Report C5257-415, dated June 21, 1982.

C. Letter, W. G. Counsil to D. M. Crutchfield, Auxiliary Feedwater Systems - Additional Short-Term Recommendation No. 2, dated September 29, 1980.