CONNECTICUT YANKEE ATOMIC POWER COMPANY

HADDAM NECK PLANT
362 INJUN HOLLOW ROAD • EAST HAMPTON, CT 06424-3099

June 29, 1998

Docket No. 50-213
CY-98-103

Re: 10 CFR 2.206

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C 20555

Haddam Neck Plant
Response to 2.206 Petition Questions
Spent Fuel Pool Cooling Methods

The purpose of this letter is for Connecticut Yankee Atomic Power Company (CYAPCO) to reply, on behalf of the Haddam Neck Plant, to a request for additional information contained in an NRC letter dated May 28, 1998(1). Additional information was requested on the spent fuel pool cooling methods that will be used at the Haddam Neck Plant.

Attachment 1 to this letter restates the NRC question and provides CYAPCO's response.

The following is CYAPCO's commitment made within this letter. Other statements made within this letter are provided for information only.

CY-98-103-01 - CYAPCO will monitor the noise levels of the fans during the startup of the new cooling system.

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(1) Thomas L. Fredrichs letter to Russell Mellor, "Request for Information - 2.206 Petition Regarding Spent Fuel Pool Cooling Methods", dated May 28, 1998.

If there are any question regarding this submittal, please contact Mr. G. P. Van Noordennen at (860) 267-3938.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

Russell A. Mellor
Vice President - Operations and Decommissioning

Attachment

cc: H. J. Miller, NRC Administrator, Region I
T. L. Fredrichs, NRC Project Manager, Haddam Neck Plant
W. J. Raymond, NRC Senior Resident Inspector, Haddam Neck Plant
K. T. A. McCarthy, Director, CT DEP Monitoring and Radiation Division

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Attachment 1

Haddam Neck Plant

Response to 2.206 Petition Questions

Spent Fuel Pool Cooling Methods

June 1998

Question 1

Do you intend to use ventilation through open doors and roof hatches of the spent fuel building (SFB) to cool the spent fuel pool (SFP) in the event forced cooling is unavailable? If yes, answer questions 2 through 6. If no, answer question 6.

Response 1

The heat energy in the stored spent fuel is released to the SFP water continuously. Part of this energy is released to the air above the SFP by evaporation of pool water. This occurs regardless of whether or not forced cooling is operating. The amount of water that evaporates is a function of pool water temperature, air flow over the pool and the relative humidity of the air flowing over the pool. Vapor generated by evaporation of pool water is removed from the SFB by an exhaust fan that discharges to the plant stack, which is monitored for radiation.

The normal cooling systems for the SFP Island are the SFP cooling system, intermediate cooling system and spray cooling system. Each of these systems are comprised of redundant trains. In addition, the redundant trains of the SFP cooling system and the intermediate cooling system are interchangeable. The SFP cooling system, intermediate cooling system and spray cooling system provide forced cooling for the pool. All of the cooling equipment, as well as the SFB exhaust fan, can be powered from an on-site diesel powered generator, which is independent from any offsite power supply. Multiple failures of these components would have to occur to result in the normal method of forced cooling not being available.

Backup cooling to the SFP heat exchangers is available from pumps that can be used to circulate river water through a heat exchanger. One of the pumps has its own diesel engine (independent of the diesel generator and independent of the offsite power supply). An additional gasoline powered pump is also available on-site. This backup cooling can be implemented utilizing temporary hoses and fittings available on site. The capability to use the alternative cooling methods has been proceduralized at the plant for many years. During the time to implement backup cooling the pool temperature is expected to rise only a few degrees, with a negligible increase in SFP water evaporation rate.

Should all the above permanent and temporary backup forced cooling equipment become unavailable, or all available power is lost to the SFP cooling pumps, the heat energy from the fuel will cause the SFP temperature to rise until the heat removed from the SFP from evaporation is equal to the heat addition. This is calculated to occur prior to the SFP reaching 170° F and results in a maximum evaporation rate of approximately four gallons per minute. It is estimated to take approximately 55 hours to reach the existing Technical Specification pool temperature limit of 150° F, given an initial temperature in the SFP of 110° F. During this time, normal ventilation, which will continue to direct the released vapor to a monitored stack, would continue to be used, if available.

Only during an event that results in an extended loss of forced cooling, which threatens to cause fuel pool temperatures to exceed the technical specification limit of 150° F would the plant operators initiate procedures that would open the doors and the roof hatches and allow the vapor to flow directly to the atmosphere outside the building.

CYAPCO, throughout its years of operation, has never had a loss of forced cooling which threatened our capability to maintain temperatures below 150° F.

Make-up water to replenish the evaporated water is discussed in the response to question 2. Monitoring of the vapor pathway is discussed in the response to question 4.

Question 2

As the SFP water level drops, particulate material may deposit on the SFP walls. How has your dose consequence evaluation accounted for the potential release of particulate material?

Response 2

The postulation of a continuous drop in water level within the spent fuel pool is not part of the Haddam Neck Plant's design basis. CYAPCO's normal operating procedure 2.10-1 requires that the spent fuel pool level be maintained at a level of 20 feet 6.5 inches above the top of the stored fuel. Alarms are present which will notify the operators if the water level above the top of the fuel would go above 20.9 feet or below 20.4 feet. In addition, the Haddam Neck technical specifications require the SFP water level to be maintained at least 20 feet above the stored fuel. With water level so maintained, there will be no potential for the particulate matter to deposit on the spent fuel pool walls and thus, no new source of particulate activity would be released from the SFB.

There are multiple sources of makeup water available ranging from demineralized water stored in multiple tanks on-site to river water. These makeup sources are available without the use of offsite electric power supply. As discussed above, the maximum evaporation rate is calculated to be approximately four gallons per minute. A minimum of

three days supply of demineralized water is maintained on site in a seismically qualified tank. A gasoline driven pump is also available on site to deliver water to the SFP. Experience has demonstrated that portable equipment can be brought to the site within three days to replenish the demineralized water supply.

Questions 3

What are the dose consequences of cooling the SFP by ventilating the SFB through open doors and the roof hatch under normal conditions and postulated design basis events?

Response 3

Under normal conditions, with the ventilation system operating, evaporative cooling of the SFP is minimal. Cooling the SFP by opening the doors and the roof hatch is only performed if forced cooling were to be lost for an extended period of time, and only until repairs can be made.

If this unlikely event occurred, the calculated total dose at the site boundary for a fourteen day event is approximately 0.25 mrem. It is reasonable to assume that restoration of forced cooling to the SFP can be accomplished within no more than a few days, but certainly within two weeks.

Question 4

What is your procedure for monitoring and quantifying a release of radioactive materials via pathways through the open doors and roof hatch?

Response 4

CYAPCO personnel would obtain samples using RPM 2.5-12, Airborne Radioactivity Surveys. The samples would be analyzed using plant procedures CHDP 2.3-14, Operation of the Canberra Genie Gamma Spectroscopy System and CHDP 2.4-6, Tritum Analysis, to determine the specific activity of the released vapor. Total released activity would be determined using CHDP 6.4-2, Gaseous Discharge Data handling (Hand Calculation) and CHDP 6.4-4, Particulate Discharge Data Handling (Hand Calculation). Portable radiation monitors are also available for use during the unlikely event of forced cooling restoration activities.

Question 5

What action will be taken in the event that high radiation levels are detected emanating from the SFB, while the SFB is being ventilated through open doors and the roof hatch?

Response 5

High levels of radiation will not be released during this ventilation evolution since there is no mechanism for causing this type of release. Spent fuel will remain covered and cooled. The only activity that could create a significant radiation release would be a fuel handling accident (refer to the response to question number 3). No fuel handling will be conducted during this evolution since AOP 3.2-59, "Loss of Spent Fuel Cooling", requires that fuel handling be terminated until forced cooling is restored. In addition, technical specifications related to fuel handling require the fuel building ventilation to be in service. In any event, accident analyses for the fuel handling accident do not assume the ventilation system is operating during a fuel handling accident and even without credit for ventilation the offsite doses during this accident are well below the EPA Protective Action Guidelines[2] as committed to in CYAPCO's letter dated May 30, 1997[3].

Question 6

How will local noise levels be affected by the modified SFP cooling system?

Response 6

Excessive noise levels are not expected to be produced by the new cooling system. CYAPCO procured fans with reduced noise emission specifically to address this potential issue. Noise levels from the coolers located at the HNP are anticipated to be much less than others found in the industry since CYAPCO has only 4 fans. In addition, CYAPCO has procured fans that operate at a slower speed of 900 rpm versus the 1,800 rpm units that are used at other utilities. Operation at the slower speed will reduce the potential noise. CYAPCO will monitor the noise levels during startup of the new cooling system.

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(2) EPA 400-R-92-001, "Manual of Protective Actions Guides and Protective Actions for Nuclear Incidents," US EPA, 1991.

(3) CYAPCO letter CY-97-047 from T. C. Feigenbaum to U. S. Nuclear Regulatory Commission, "Defueled Emergency Plan And Request For Exemption From 10CFR50.54(q) For Offsite Response," dated May 30, 1997.