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Docket No. 50-336

Mr. Edward J. Mroczka, Senior Vice President
Nuclear Engineering and Operations
Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

Dear Mr. Mroczka:

SUBJECT: ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

Re: Millstone Nuclear Power Station, Unit No. 2

Enclosed is a copy of an "Environmental Assessment and Finding of No Significant Impact" for your information. While much of the information in the assessment covers the full scope of your application dated May 21, 1986 which would provide for changes to the Technical Specifications to allow for storage of consolidated spent fuel at Millstone Unit 2, the assessment conclusions, thus far are limited to the initial demonstration phase of your request. No assessment of the consolidation process is considered in the Environmental Assessment.

This assessment has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/S/

D. H. Jaffe, Project Manager
Project Directorate I-4
Division of Reactor Projects I/II

Enclosure:
Environmental Assessment

cc w/enclosure
See next page

*See previous white for concurrence

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D. H. Jaffe, Project Manager
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cc:
Gerald Garfield, Esq.
Day, Berry & Howard
Counselors at Law
City Place
Hartford, Connecticut 06103-3499

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
Office of Executive Director for
Operations
631 Park Avenue
King of Prussia, Pennsylvania 19406

Mr. Charles Brinkman, Manager
Washington Nuclear Operations
C-E Power Systems
Combustion Engineering, Inc.
7910 Woodmont Avenue
Bethesda, Maryland 20814

Mr. Lawrence Bettencourt, First Selectman
Town of Waterford
Hall of Records - 200 Boston Post Road
Waterford, Connecticut 06385

Northeast Utilities Service Company
ATTN: Mr. Richard M. Kacich, Manager
Generation Facilities Licensing
Post Office Box 270
Hartford, Connecticut 06141-0270

Kevin McCarthy, Director
Radiation Control Unit
Department of Environmental
Protection
State Office Building
Hartford, Connecticut 06106

Mr. Theodore Rebelowski
U.S. NRC
P. O. Box 615
Waterford, Connecticut 06385-0615

Office of Policy & Management
ATTN: Under Secretary Energy
Division
80 Washington Street
Hartford, Connecticut 06106

Mr. Stephen E. Scace
Superintendent
Millstone Nuclear Power Station
P. O. Box 128
Waterford, Connecticut 06385

Mr. Wayne D. Romberg
Vice President, Nuclear Operations
Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

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U.S. NUCLEAR REGULATORY COMMISSION

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of changes to the Millstone Unit 2 Technical Specifications (TS), to allow storage of consolidated spent fuel, to Northeast Nuclear Energy Company, et al. (the licensee), for the Millstone Nuclear Power Station, Unit No. 2, located in New London County, Connecticut.

ENVIRONMENTAL ASSESSMENT

Identification of Proposed Action: The proposed changes to the Millstone Unit 2 TS would allow the storage of consolidated fuel in the existing spent fuel storage racks at Millstone Unit 2. The consolidated fuel would be produced by removing the fuel pins from the fuel assemblies and placing these pins in a special canister which in turn would be placed in a spent fuel rack storage location. The fuel rods from approximately two fuel assemblies would fit into a single canister.

At the present time, the Millstone Unit 2 TS limits the total number of storage locations to 1112. The actual capacity of the spent fuel storage racks is 1346 storage locations. The difference between the present authorized limit and the actual capacity results from the existence of blocking devices which prevent the use of certain storage locations. The proposed storage of

consolidated fuel would eventually result in the removal of these blocking devices and thus the licensee is also requesting an increase in the authorized number of storage locations from 1112 to 1346. From a practical standpoint, however, only 1277 locations can be used due to the need to achieve a five year decay time prior to consolidation of spent fuel.

The NRC is currently investigating Generic Issue 82, "Beyond Design Basis Accidents in Spent Fuel Pools," which addresses the issues of Zircaloy cladding fires and the propagation of a fire to older stored spent fuel assemblies, given the complete loss of water from the spent fuel pool. A preliminary evaluation of the likelihood of draining the pool and the consequences of a fire has also been performed. A draft report by Brookhaven National Laboratory (BNL), dated January 1987, has been critically reviewed by the NRC staff.

BNL has concluded that for PWR storage rack designs currently in use, referred to as "high density" racks, self-sustaining oxidation of the Zircaloy cladding, or a cladding fire, is likely to occur for fuel with decay times as long as two years. Propagation of the fire to older spent fuel assemblies with decay times up to three years was found to be likely. The initiation and propagation of a fire are dependent on the storage geometry, the rack geometry and the fuel assembly burnup characteristics; all very plant specific characteristics. The currently available models cannot account for relocation or degradation of the fuel assemblies or rack structures. An upper bound assumption of full fuel pool involvement in the fire was therefore addressed. A preliminary evaluation to assess the likelihood of the complete draining of a spent fuel pool was performed with emphasis on identifying events which were either of higher or estimated frequency of occurrence or not considered in

previous safety studies, namely WASH-1400. Beyond design basis seismic events, shipping cask drop as a result of human error and pneumatic seal failures were considered. Other events such as loss of makeup or cooling, aircraft impact and high energy missiles were found to be similar in estimated occurrence to previous studies. Since no seismic related data, pool fragility, could be located and resources did not provide for obtaining these data an estimate of the fuel pool fragility was made based on other structures which BNL considered to be representative of spent fuel pools.

The estimated likelihood of draining the pool as a result of structural failure (beyond the available makeup) of the pool was found to be on the order of 2×10^{-5} per year for seismic events and about 3×10^{-5} per year for a cask drop resulting from human error, although cask drop failure is not a concern at the present time. BNL noted that there is a large uncertainty associated with the structural failure of the pool and recommended that structural analyses be performed to assess the uncertainties in the estimates. An integration of the consequences of a cladding fire with the estimated likelihood of draining the spent fuel pool indicates that the risk, in person-rem, is not significantly influenced by the amount of fuel assumed to be involved in the release. It was noted that the calculated interdiction area, land contamination by long-lived fission products such as cesium, was significantly greater for full pool involvement.

The uncertainties in the estimated event frequencies and the estimated releases of fission products from the spent fuel to the environment are still being assessed by the staff.

The amendment under consideration would allow a demonstration of the consolidation process via the consolidation of the ten fuel assemblies, each with at least five year's decay time, currently stored in the spent fuel pool. The resulting five consolidated storage canisters would be stored in the spent fuel racks. Thus, the fuel rod consolidation amendment proposed by the licensee would increase the potential fuel pool inventory by five assemblies, compared to the 1112 fuel assemblies currently stored in the spent fuel pool. Further, the consolidated fuel contains fuel that has decayed at least five years since reactor operation compared to the remainder of the fuel in the spent fuel pool which has decayed at least six months since reactor operation. Since Generic Issue 82 is of most concern for fuel immediately discharged from the reactor, with minimal decay time, the adverse effects due to potential zircaloy fires are low. The change in risk for the demonstration of consolidation is therefore estimated to be insignificant. The fission product inventory and the likelihood of draining the water from the spent fuel storage pool, thus, are not significantly impacted by this amendment.

The Need for the Proposed Action: The proposed license amendment is necessary to improve the spent fuel storage situation at Millstone Unit 2. At the present time, the ability to off-load a reactor core into spent fuel pool storage will be lost after 1994, and spent fuel pool storage will be full in 1998. The proposed spent fuel consolidation storage capability will allow a delay until 2009 at which time the spent fuel pool storage will be full.

Environmental Impacts of the Proposed Action: The NRC staff has evaluated the radiological (off-site and on-site) and nonradiological impacts of the proposed license amendment.

OFFSITE RADIOLOGICAL IMPACT ASSESSMENT

The plant contains radioactive waste treatment systems designed to collect and process gaseous, liquid, and solid waste that might contain radioactive material. The radioactive waste treatment systems are evaluated in the Final Environmental Statement (FES) dated June 1973. There will be no change in the waste treatment systems described in Section 3.4.2 of the FES as a result of the expansion of the spent fuel storage capacity by the storage of consolidated fuel in the spent fuel storage pool.

Radioactive Material Released to the Atmosphere

With respect to releases of gaseous materials to the atmosphere, the only radioactive gas of significance which could be attributable to storing additional spent fuel assemblies for a longer period of time would be the noble gas radionuclide Krypton-85 (Kr-85). Experience has demonstrated that after spent fuel has decayed 4 to 6 months, there is no longer a significant release of fission products, including Kr-85, from stored spent fuel containing cladding defects. To determine the average annual release of Kr-85, the staff conservatively assumes that all the Kr-85 available from any defective fuel discharged to the (spent fuel pool) SFP will be released prior to the next refueling. Enlarging the storage capacity of an SFP has no effect on the calculated average annual quantities of Kr-85 released to the atmosphere each year. There may be some small change in the calculated amounts of Kr-85 due to a change in the fuel burnup; however, this is expected to be a small fraction of the total calculated annual quantities released. In addition, the staff notes that Iodine-131 releases from spent fuel assemblies to the SFP water will not be significantly increased due to the expansion of the fuel storage capacity since the Iodine-131 inventory in the fuel will decay to negligible levels between refuelings.

Most of the tritium in the SFP water results from activation of boron and lithium in the primary coolant. This phenomenon will not be affected by the proposed increased SFP storage capability. A relatively small amount of tritium is also contributed during reactor operation by fissioning of reactor fuel and subsequent diffusion of tritium through the fuel and the fuel cladding. Tritium release from the fuel essentially occurs while the fuel is hot, that is, during operations and, to a limited extent, shortly after shutdown. Thus, expanding the SFP capacity will not significantly increase the tritium activity in the SFP.

The storage of consolidated spent fuel is expected to increase the bulk SFP water temperature during normal refuelings from 122°F to 131°F. Therefore, it is expected that there will be an approximately 28% increase in the annual release of tritium and a very slight increase in iodine release from the SFP as a result of increased evaporation at the higher temperature. Most airborne releases of tritium and iodine result from evaporation of reactor coolant, which contains tritium and iodine in higher concentrations than the SFP. Therefore, even with the higher evaporation rate from the SFP, the increase in tritium and iodine released from the plant would be negligible compared to the amount normally released from the plant and that which was previously evaluated in the FES. The station Radiological Effluent Technical Specifications, which are not being changed by this action, limit the total releases of gaseous activity.

Radioactive Material Release to Receiving Waters

There will not be a significant increase in the liquid release of radionuclides from the plant as a result of the proposed modifications. Since the SFP cooling and cleanup systems operate as a closed system, only water origina-

ting from cleanup of the SFP floor and resin sluice water need be considered as potential sources of radioactivity. It is expected that neither the flow rate nor the radionuclide concentration of the floor cleanup water will change as a result of these modifications. The SFP demineralizer resin removes soluble radioactive materials from the SFP water. These resins are periodically sluiced with water to the spent resin storage tank. The amount of radioactivity on the SFP demineralizer resin may increase slightly due to the additional spent fuel in the pool, but the soluble radioactive material will be retained on the resins. Radioactive material that might be transferred from the spent resin to the sluice water will be effectively removed by the liquid radwaste system. After processing in the liquid radwaste system, the amount of radioactivity released to the environment as a result of the proposed modification would be negligible.

Solid Radioactive Wastes

The concentration of radionuclides in the pool water is controlled by the SFP cleanup system and by decay of short-lived isotopes. The activity is highest during refueling operations when reactor coolant water is introduced into the pool, and decreases as the pool water is processed through the SFP cleanup system. The increase of radioactivity, if any, due to the proposed modification will be minor because of the capability of the cleanup system to continuously remove radioactivity in the SFP water to attain acceptable levels. There will not be a significant increase in the amount of solid waste generated from the SFP cleanup system due to the proposed modification (an increase of less than one percent in total waste volume shipped from Millstone Unit 2), and thus there will be no additional environmental impact.

Public Radiation Exposure

Based on the negligible increases in radioactive effluents and waste described above, the estimated increase in doses due to the exposure of individuals and the population to radioactive releases associated with the storage of consolidated fuel in the SFP are insignificant.

ONSITE RADIOLOGICAL IMPACT ASSESSMENT/OCCUPATIONAL EXPOSURE

The occupational exposure associated with the storage of consolidated spent fuel is estimated by the licensee to be less than 1.0 person-rem per year based on the licensee's detailed breakdown of occupational dose. This dose is less than two percent of the average annual occupational dose of 500 person-rems for all plant operations. The small increase in radiation dose should not affect the licensee's ability to maintain individual occupational doses within the limits of 10 CFR Part 20, and is as low as reasonably achievable. Normal radiation control procedures as identified in the guidelines of Regulatory Guide 8.8 should preclude any significant occupational radiation exposures. Based on present and projected operations in the spent fuel pool area, the staff estimates that the proposed storage of the consolidated spent fuel should add only a small fraction to the total annual occupational radiation dose at this facility. Thus, the staff concludes that the storage of consolidated spent fuel in the modified SFP will not result in any significant increase in doses received by workers.

Nonradiological Impact Assessment

The nonradiological impacts associated with the storage of consolidated spent fuel are mostly associated with the increase in spent fuel pool temperature from 120°F to 131°F. The spent fuel pool cooling system

rejects heat to the reactor building closed cooling water (RBCCW) system. The RBCCW system, in turn, is cooled by service water (seawater). Should the total increase in spent fuel pool temperature be completely discharged to the environment via the service water system, a total of 1.2×10^6 BTU/hr would be rejected to the seawater. This compares to a total of 6.7×10^9 BTU/hr which is the total Millstone Unit 2 seawater heat rejection. Thus, there will be a small increase in the temperature of the seawater discharged to the environment.

CONCLUSION

Based on its review of the proposed storage of consolidated spent fuel assemblies at Millstone Unit 2, the staff concludes that:

1. The estimated additional radiation doses to the general public are insignificant.
2. The licensee has taken appropriate steps to ensure that occupational doses will be maintained as low as reasonably achievable and within the limits of 10 CFR Part 20.

Therefore, the staff concludes that there will be a negligible additional environmental radiological impact attributable to the storage of consolidated spent fuel at Millstone Unit 2. In addition, there will be negligible nonradiological environmental impact due to the small additional heat rejected to the environment as a result of the increase in the spent fuel pool temperature.

Alternative Use of Resources: This action involves no use of resources not previously considered in the Final Environmental Statements for the Millstone Nuclear Power Station, Unit No. 2.

Agencies and Persons Consulted: The NRC staff reviewed the licensee's request and did not consult other agencies or persons.

FINDING OF NO SIGNIFICANT IMPACT

The Commission has determined not to prepare an environmental impact statement for the proposed amendment.

Based upon the foregoing environmental assessment, we conclude that the proposed action will not have significant effect on the quality of the human environment.

For further details with respect to this action, see the application for license amendment dated May 21, 1986 which is available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, DC, and at the Waterford Public Library, 49 Rope Ferry Road, Waterford, Connecticut 06385.

Dated at Bethesda, Maryland this 27th day of May, 1987.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz, Director
Project Directorate I-4
Division of Reactor Projects I/II