



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

August 27, 1999

Mr. R. P. Necci - Vice President  
Nuclear Oversight and Regulatory Affairs  
c/o Mr. David A. Smith  
Northeast Nuclear Energy Company  
P. O. Box 128  
Waterford, CT 06385

SUBJECT: ENVIRONMENTAL ASSESSMENT - MILLSTONE NUCLEAR GENERATING  
STATION, UNIT NO. 3 (TAC NO. MA5137)

Dear Mr. Necci:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for an amendment dated March 19, 1999. The purpose of the amendment is to allow Millstone Unit No. 3 to rerack its spent fuel pool to maintain full core reserve capability approaching the end of its operating license. To achieve this goal, two types of additional higher density spent fuel racks are proposed to be installed into the spent fuel pool. Existing spent fuel racks will remain in the pool, but are reanalyzed to only accept fuel lower in reactivity than they are presently licensed to accept.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

A handwritten signature in cursive script, appearing to read "John A. Nakoski".

John A. Nakoski, Senior Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-423

Enclosure: Environmental Assessment

cc w/encl: See next page

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ORIGINAL SIGNED BY:  
 John A. Nakoski, Senior Project Manager, Section 2  
 Project Directorate I  
 Division of Licensing Project Management  
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Unit 3

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**August 31, 1999**

MEMORANDUM TO: Rules and Directives Branch  
Division of Administrative Services  
Office of Administration

FROM: Office of Nuclear Reactor Regulation

SUBJECT: **NORTHEAST NUCLEAR ENERGY CO. - MILLSTONE NUCLEAR POWER  
UNIT 3**

One signed original of the *Federal Register* Notice identified below is attached for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (**Five**) of the Notice are enclosed for your use.

- Notice of Receipt of Application for Construction Permit(s) and Operating License(s).
- Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for submission of Views on Antitrust matters.
- Notice of Consideration of Issuance of Amendment to Facility Operating License. (Call with 30-day insert date).
- Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.
- Notice of Availability of NRC Draft/Final Environmental Statement.
- Notice of Limited Work Authorization.
- Notice of Availability of Safety Evaluation Report.
- Notice of Issuance of Construction Permit(s).
- Notice of Issuance of Facility Operating License(s) or Amendment(s).
- Order.
- Exemption.
- Notice of Granting Exemption.
- Environmental Assessment.
- Notice of Preparation of Environmental Assessment.
- Receipt of Petition for Director's Decision Under 10 CFR 2.206.
- Issuance of Final Director's Decision Under 10 CFR 2.206.
- Other: \_\_\_\_\_

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DOCKET NO. **50-423**

Attachment(s): As stated

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Contact: **J. Nakoski**  
Telephone: **415-1278**

DOCUMENT NAME: MA5137.WPD

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UNITED STATES NUCLEAR REGULATORY COMMISSION  
NORTHEAST NUCLEAR ENERGY COMPANY (NNECO), ET AL.,  
DOCKET NO. 50-423, MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3,  
ENVIRONMENTAL ASSESSMENT AND FINDING OF  
NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. NPF-49, issued to Northeast Nuclear Energy Company, et al. (the licensee), for operation of the Millstone Nuclear Power Station, Unit No. 3 (MP3) located in New London County, Connecticut.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action is in response to the licensee's application dated March 19, 1999, requesting an amendment to the operating license for MP3 to support the rerack of its spent fuel pool to maintain the capability to fully offload the core from the reactor as the unit approaches the end of its operating license. To achieve this goal, the licensee plans to install two types of additional higher density spent fuel racks into the spent fuel pool. Existing spent fuel racks will remain in the pool in their current configuration, but are reanalyzed to only accept fuel lower in reactivity than they are presently licensed to accept. The proposed additional racks will have a closer assembly to assembly spacing to increase fuel storage capacity. The number of fuel assemblies that can be stored in the spent fuel pool would be increased from 756 assemblies to 1,860 assemblies (an increase of 1,104).

The Need for the Proposed Action:

An increase in spent fuel storage capacity is needed to maintain the capability for a full core off-load. Loss of full core off-load capability will occur as a result of refueling outage 6 (RFO 6), that started on May 1, 1999. The licensee plans to install an additional 15 high

density storage racks (with the capacity to store 1,104 fuel assemblies) following RFO 6 (14 will be installed between RFO 6 and RFO 7, with the last one to be installed later if it is necessary), while keeping the existing racks in place. The additional capacity will ensure the capability for a full core off-load as the unit approaches the end of its operating license (November 25, 2025).

#### Environmental Impacts of the Proposed Action:

##### Radioactive Waste Treatment

MP3 uses waste treatment systems designed to collect and process gaseous, liquid, and solid waste that might contain radioactive material. These radioactive waste treatment systems were evaluated in the Final Environmental Statement (FES) dated December 1984. The proposed spent fuel pool expansion will not involve any change in the radioactive waste treatment systems described in the FES.

##### Gaseous Radioactive Wastes

Gaseous releases from the fuel storage area are combined with other plant exhausts. Normally, the contribution from the fuel storage area is negligible compared to the other releases and no significant increases are expected as a result of the expanded storage capacity.

##### Solid Radioactive Wastes

No significant increase in the volume of solid radioactive waste is expected from operating with the expanded storage capacity. The necessity for pool filtration resin replacement is determined primarily by the requirements for water clarity, and the resin is normally changed about once a year. During reracking operations, a small amount of additional resins may be generated by the pool cleanup system on a one-time basis.

### Personnel Doses

During normal operations, personnel working in the fuel storage area are exposed to radiation from the spent fuel pool. Radiological conditions are dominated by the most recent batch of discharged spent fuel. The radioactive inventory of the older fuel is insignificant compared to that from the recent offload. Analysis shows that the rerack will not significantly change radiological conditions. Therefore, the rack expansion project falls within the existing design basis of MP3's Spent Fuel Pool.

All of the operations involved in reracking will utilize detailed procedures prepared with full consideration of ALARA [as low as is reasonably achievable] principles. Similar operations have been performed in a number of facilities in the past, and there is every reason to believe that reracking can be safely and efficiently accomplished at MP3, with low radiation exposure to personnel. Total dose for the reracking operation is estimated to be between 2 and 5 person-rem. While individual task efforts and doses may differ from those estimated, the total is believed to be a reasonable estimate for planning purposes. Divers will be used where necessary, and the estimated person-rem burden includes an estimate for their possible dose. The existing radiation protection program at MP3 is adequate for the reracking operations. Where there is a potential for significant airborne activity, continuous air monitors will be in operation. Personnel will wear protective clothing as required and, if necessary, respiratory protective equipment. Activities will be governed by a Radiation Work Permit, and personnel monitoring equipment will be issued to each individual. As a minimum, this will include thermoluminescent dosimeters (TLDs) and self-reading dosimeters. Additional personnel monitoring equipment (i.e., extremity TLDs or multiple TLDs) may be utilized as required. Work, personnel traffic, and the movement of equipment will be monitored and controlled to minimize contamination and to assure that dose is maintained ALARA.

4

On the basis of its review of the licensee's proposal, the NRC staff concludes that the MP3 spent fuel pool reracking operation can be performed in a manner that will ensure that doses to workers will be maintained ALARA. The estimated dose of 2 to 5 person-rem to perform the proposed spent fuel pool reracking operation is a small fraction of the annual collective dose accrued at MP3.

### Accident Considerations

The licensee has evaluated the consequences of an accidental drop of a fuel assembly in the spent fuel pool and the consequences of an accidental drop of a fuel pool gate onto racks. The results show that such accidents will not distort the racks sufficiently to impair their functionality. The analysis indicates no radiological consequences from these postulated accidents. The consequences of a design basis seismic event have been evaluated and found acceptable. The proposed additional racks and existing racks have been analyzed in their new configuration and found safe and impact-free during seismic motion, save for the baseplate-to-baseplate impacts of the proposed additional racks that are shown to cause no damage to the racks' cells or Boral (used for criticality control). The structural capability of the pool walls and basemat will not be exceeded under the loads. Thus, the consequences of a seismic event are not significantly increased. The criticality consequences of a misloading/drop of a fuel assembly during fuel movement have been evaluated. The minimum subcriticality margin,  $k_{\text{eff}}$  less than or equal to 0.95, will continue to be maintained because of the proposed pool water soluble boron related requirements. The consequences of an accidental drop of a rack module into the pool during placement have been evaluated. The analysis confirmed that very limited damage to the liner could occur. Expected damage from this accident is repairable. Any small seepage occurring is well within makeup capability, and is mitigated by emergency operating procedures. The consequences of a spent fuel cask drop into the pool have not been

considered in this submittal since the licensee is not currently licensed to move a fuel cask into the MP3 cask pit area.

Radiological concerns due to fuel damage are not an issue, since the fuel handling design basis accident considers the worst case condition of a falling assembly (a fuel assembly falling onto another fuel assembly). This design basis accident remains unchanged. Fuel assembly damage subsequent to a fuel assembly drop is primarily influenced by the weight and design of the fuel assembly, the drop height (determines the kinetic energy upon impact), and the orientation of the falling assembly. Since none of these parameters are changed under the proposed modification, the results of the previously analyzed and NRC-accepted design basis accident bound the radiological consequences of accidents analyzed for the spent fuel pool rerack.

In summary, the proposed action will not increase the probability or consequences of accidents, no changes are being made to radioactive waste treatment systems or in the types of any radioactive effluents that may be released offsite, and the proposed action will not result in a significant increase in occupational or offsite radiation exposure. Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential nonradiological impacts, the proposed action does not involve any historic sites. The proposed action does not affect nonradiological plant effluents and has no other nonradiological environmental impacts. Therefore, there are no significant nonradiological environmental impacts associated with the proposed action.

Accordingly, the Commission concludes that there are no significant environmental impacts associated with this action.

Alternatives to the Proposed Action:

#### Shipping Fuel to a Permanent Federal Fuel Storage/Disposal Facility

Shipment of spent fuel to a high-level radioactive storage facility is an alternative to increasing the onsite spent fuel storage capacity. However, the U.S. Department of Energy's (DOE's) high-level radioactive waste repository is not expected to begin receiving spent fuel until approximately 2010, at the earliest. In October 1996, the Administration did commit DOE to begin storing waste at a centralized location by January 31, 1998. However, no location has been identified and an interim federal storage facility has yet to be identified in advance of a decision on a permanent repository. Therefore, shipping spent fuel to the DOE repository is not considered an alternative to increased onsite spent fuel storage capacity at this time.

#### Shipping Fuel to a Reprocessing Facility

Reprocessing of spent fuel from the MP3 is not a viable alternative since there are no operating commercial reprocessing facilities in the United States. Therefore, spent fuel would have to be shipped to an overseas facility for reprocessing. However, this approach has never been used and it would require approval by the Department of State as well as other entities. Additionally, the cost of spent fuel reprocessing is not offset by the salvage value of the residual uranium; reprocessing represents an added cost.

#### Shipping Fuel to Another Utility, Site, or the Millstone Units 1 or 2 Spent Fuel Pool for Storage

The shipment of fuel to another utility or transferring MP3 spent fuel to the Millstone Units 1 or 2 spent fuel pool for storage could provide short-term relief from the storage problem at MP3. The Nuclear Waste Policy Act of 1982 and 10 CFR Part 53, however, clearly place the responsibility for the interim storage of spent fuel with each owner or operator of a nuclear plant. The Millstone Units 1 and 2 spent fuel pools have been designed with the capacity to accommodate each of those units and, therefore, transferring spent fuel from MP3 to either of these pools would create fuel storage capacity problems with those units. The shipment of fuel

to another site or transferring it to Millstone Units 1 or 2 is not an acceptable alternative because of increased fuel handling risks and additional occupational radiation exposure, as well as the fact that no additional storage capacity would be created.

#### Alternative Creation of Additional Storage Capacity

Alternative technologies that would create additional storage capacity include rod consolidation, dry cask storage, modular vault dry storage, and constructing a new pool. Rod consolidation involves disassembling the spent fuel assemblies and storing the fuel rods from two or more assemblies in a stainless steel canister that can be stored in the spent fuel racks. Industry experience with rod consolidation is currently limited, primarily due to concerns for potential gap activity release due to rod breakage, the potential for increased fuel cladding corrosion due to some of the protective oxide layer being scraped off, and because the prolonged consolidation activity could interfere with ongoing plant operations. Dry cask storage is a method of transferring spent fuel, after storage in the pool for several years, to high capacity casks with passive heat dissipation features. After loading, the casks are stored outdoors on a seismically qualified concrete pad. Concerns for dry cask storage include the potential for fuel or cask handling accidents, potential fuel clad rupture due to high temperatures, the need for special security provisions, and high costs. Vault storage consists of storing spent fuel in shielded stainless steel cylinders in a horizontal configuration in a reinforced concrete vault. The concrete vault provides missile and earthquake protection and radiation shielding. Due to large space requirements, a vault secured area for MP3 would likely have to be located outside the secured perimeter of the plant site. Concerns for vault dry storage include security, land consumption, eventual decommissioning of the new vault, the potential for fuel or clad rupture due to high temperatures, and high cost. The alternative of

constructing and licensing a new fuel pool is not practical for MP3 because such an effort would require many years (i.e., 10 years) to complete and would be the most expensive alternative.

The alternative technologies that could create additional storage capacity involve additional fuel handling with attendant opportunity for a fuel handling accident, involve higher cumulative dose to workers effecting the fuel transfers, require additional security measures, are significantly more expensive, and would not result in a significant improvement in environmental impacts compared to the proposed reracking modifications.

#### Reduction of Spent Fuel Generation

Generally, improved usage of the fuel and/or operation at a reduced power level would be an alternative that would decrease the amount of fuel being stored in the pool and thus increase the amount of time before full core off-load capacity is lost. With extended burnup of fuel assemblies, the fuel cycle would be extended and fewer offloads would be necessary. This is not an alternative for resolving the loss of full-core offload capability that occurred as a result of MP3 refueling outage that began on May 1, 1999, because the spent fuel transferred to the pool for storage during this outage eliminated the licensee's ability to conduct a full core offload. Operating the plant at a reduced power level would not make effective use of available resources, and would cause unnecessary economic hardship on the licensee and its customers. Therefore, reducing the amount of spent fuel generated by increasing burnup further or reducing power is not considered a practical alternative.

#### The No-Action Alternative

As an alternative to the proposed action, the staff considered denial of the proposed action. Denial of the exemption would result in no change in current environmental impacts. The environmental impacts of the proposed exemption and this alternative are similar.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the "Final Environmental Statement Related to the Operation of Millstone Nuclear Power Station, Unit No. 3," dated December 1984 (NUREG-1064).

Agencies and Persons Contacted:

In accordance with its stated policy, on June 21, 1999, the staff consulted with the Connecticut State official, Mr. Gary McCahill of the Department of Environmental Protection, regarding the environmental impact of the proposed action. The State official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated March 19, 1999, which is available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public

document rooms located at the Learning Resources Center, Three Rivers Community-  
Technical College, 574 New London Turnpike, Norwich, Connecticut, and the Waterford  
Library, ATTN: Vince Juliano, 49 Rope Ferry Road, Waterford, Connecticut.

Dated at Rockville, Maryland, this 27th day of August 1999.

FOR THE NUCLEAR REGULATORY COMMISSION



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