November 30, 2000

Mr. Mark Reddemann
Site Vice President
Kewaunee and Point Beach Nuclear Plants
Nuclear Management Company, LLC
6610 Nuclear Road
Two Rivers, WI 54241

SUBJECT: KEWAUNEE NUCLEAR POWER PLANT - ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT OF THE SPENT FUEL POOL MODIFICATION (TAC NO. MA7278)

Dear Mr. Reddemann:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for a license amendment dated November 18, 1999, as supplemented on August 7, 2000. The proposed amendment would revise the technical specifications for the Kewaunee Nuclear Power Plant to increase the capacity of the spent fuel pools from 990 to 1,205 fuel assemblies.

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

Sincerely,

/RA/

John G. Lamb, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-305

Enclosure: Environmental Assessment

cc w/encl: See next page

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UNITED STATES NUCLEAR REGULATORY COMMISSION

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-305

KEWAUNEE NUCLEAR POWER PLANT

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of an amendment to Facility Operating License No. DPR-43 issued to the Nuclear Management Company, LLC (NMC or the licensee), for operation of the Kewaunee Nuclear Power Plant (KNPP or Kewaunee), located in Kewaunee County, Wisconsin.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would increase the number of fuel assemblies that can be stored in the Kewaunee spent fuel pools (SFPs) from 990 fuel assemblies to 1,205 fuel assemblies, an increase of 215 fuel assemblies, by installing 215 new spent fuel storage racks in the new north canal pool. In addition, the new spent fuel storage racks will use Boral as the neutron absorber material.

The proposed action is in accordance with the licensee's application for amendment dated November 18, 1999, as supplemented by letter dated August 7, 2000.

The Need for the Proposed Action:

KNPP is a pressurized water reactor (PWR) which commenced commercial operation in 1974, and its current operating license will expire in December 2013. Initially, KNPP was designed to

accommodate 168 spent fuel assemblies (SFAs). The last phase of re-racking the SFP at KNPP was completed in 1987, which provided for the current storage capacity of 990 SFAs. Currently, KNPP has two storage pools. The larger south pool contains racks with a storage capacity for 720 SFAs, and the smaller north pool contains racks with a storage capacity for 270 SFAs. There are presently 718 SFAs stored in the south pool and 106 SFAs stored in the north pool. As a result of the present unavailability of an off-site spent fuel storage facility and the current rate of fuel discharge (approximately 40 assemblies per cycle), KNPP will currently lose full-core reserve capability after the Fall 2001 outage. The addition of the 215 storage locations in the new north canal pool will extend the full-core reserve capability until after the 2009 outage, and increase the total capacity to 1205 SFAs.

The proposed action is needed to provide additional spent fuel storage capacity to extend the full-core reserve capability beyond the Fall 2001 outage.

Environmental Impacts of the Proposed Action:

Radioactive Wastes

The Kewaunee Nuclear Power Plant 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 1972. The proposed SFP expansion will not involve any change in the waste treatment systems described in the FES.

Radioactive Material Released into the Atmosphere

The expanded fuel storage capacity obtained by installing new fuel racks into the transfer canal is not expected to affect the release of radioactive gases from the SFP. Gaseous fission products such as Krypton-85 and Iodine-131 are produced by the fuel in the core during reactor operation. A small percentage of these fission gases are released to the reactor coolant from the small number of fuel assemblies which are expected to develop leaks

during reactor operation. During refueling operations, some of these fission products enter the SFP and are subsequently released into the air of the spent fuel building. Gaseous releases from the fuel storage area are combined with other plant exhausts. If radio-iodine levels become too high, the air can be diverted to charcoal filters for the removal of radio-iodine before release to the environment. Normally, the radioactive gas contribution from the fuel storage area is negligible compared to the gaseous releases from other areas of the plant. Since the frequency of refueling (and therefore the number of freshly off loaded spent fuel assemblies stored in the SFP at any one time) will not increase, there will be no increase in the amounts of these types of fission products released to the atmosphere as a result of the increased SFP fuel storage capacity.

Tritium gases contained in the SFP are produced from two sources. The first source is the tritium from the reactor coolant system (RCS), which is a result of neutron capture in the reactor core by Boron-10. Tritium produced in this manner can only enter the spent fuel pool during refueling outages when the SFP and the RCS are interconnected. Since the proposed amendment does not increase the frequency of refueling outages, this source of tritium does not change. The second source of tritium is a result of neutron capture by Boron-10 in the SFP water. The decay neutron flux from the old fuel in the SFP is considerably smaller than the neutron flux in the core of an operating reactor. Due to the small neutron flux associated with the fuel to be stored in the new racks, the effect on tritium production will be insignificant. Therefore, the release of tritium from the storage of additional spent fuel assemblies in the transfer canal will be insignificant.

In addition, the plant radiological effluent Technical Specifications, which are not being changed by this action, restrict the total releases of gaseous activity from the plant (including the SFP).

Solid Radioactive Wastes

Independent of the proposed modification, the concentration of radionuclides in the SFP is controlled by the filters and demineralizer of the SFP purification system as well as by the decay of short-lived isotopes. Spent resins are generated by the processing of SFP water through the SFP purification system. Both spent resins and filters are disposed of as solid radioactive waste. Since the frequency of refueling outages is unchanged by the proposed action, the activity in the SFP is not expected to increase significantly above its current value. Thus, the radioactivity collected on the spent fuel resins and filters is not expected to significantly increase above its current value as a result of the storage capacity increase. The cumulative amount of radioactivity collected on the spent fuel resins over time will increase slightly with an increase in the amount of spent fuel that is added to the SFP; however, this increase is expected to be insignificant.

The licensee will use a vacuum to clean the floor of the fuel transfer canal following the drying of the canal prior to installing the new fuel racks. Vacuuming of the canal floor will remove any extraneous debris and crud. Filter bags from the vacuum will be disposed of as solid radioactive waste. Depending on the waste characterization of these filters, the licensee will dispose of them utilizing shielded canisters and high integrity containers which will then be stored onsite or shipped for burial accordingly. However, this amount of solid radioactive waste is expected to be negligible in comparison with other sources of solid radioactive wastes generated at the plant (it is expected that the total volume of low level radioactive waste generated due to this project will be less than 50 cubic feet).

Therefore, the staff does not expect that the additional fuel storage capacity made possible by the addition of fuel racks in the north portion of the Kewaunee fuel transfer canal will result in a significant change in the generation of solid radwaste at the Kewaunee Nuclear Power Plant.

Liquid Radioactive Wastes

The SFP ion exchanger resins that are part of the SFP water cleanup system remove soluble radioactive materials from the SFP water. When the resins are changed out, the small amount of resin sluice water which is released is processed by the liquid radwaste system before any water is discharged to Lake Michigan. The resin in the spent fuel pool demineralizer is typically replaced every 12 to 15 months. It is possible that fuel movement may stir up a small amount of settled contamination during loading of the fuel into the new racks. However, it is expected that this will have an insignificant effect on the frequency of resin change out. Therefore, the installation of the new fuel racks is not expected to increase the amount of liquid radioactive wastes generated at the Kewaunee Nuclear Power Plant.

In addition, the plant radiological effluent Technical Specifications, which are not being changed by this action, restrict the total releases of activity in liquids from the plant.

Radiological Impact Assessment

Radiation protection personnel will provide constant coverage, including dose monitoring, for the majority of the work. Since this license amendment does not involve the removal of any spent fuel racks, the licensee does not plan on using divers for this project. However, if it becomes necessary to utilize divers to remove any interferences which may impede the installation of the new fuel racks, the licensee will equip each diver with radiation detectors with remote, above surface, readouts which will be continuously monitored by Radiation Protection personnel. The total occupational dose to plant workers as a result of the SFP expansion operation is estimated to be between 0.7 and 1.3 person-rem. This dose estimate is lower than doses for SFP modifications performed at other plants. The upcoming SFP rack installation will follow detailed procedures prepared with full consideration of as low as reasonably achievable (ALARA) principles.

On the basis of our review of the licensee's proposal, the staff concludes that the KNPP SFP expansion can be performed in a manner that will ensure that doses to workers will be maintained as low as is reasonably achievable and within the limits of 10 CFR Part 20. The estimated dose of 0.7 to 1.3 person-rem to perform the proposed SFP expansion operation is a small fraction of the annual collective dose accrued at the Kewaunee Nuclear Power Plant.

Furthermore, as stated previously, the concentration of radionuclides in the SFP is not expected to increase beyond its present value as a result of the proposed action. Therefore, doses to workers are not expected to increase above their current values. However, since additional spent fuel will be added to the SFP, cumulative doses over time may increase slightly, although this increase is expected to be insignificant with annual doses remaining below regulatory limits.

Accident Considerations

The licensee evaluated criticality safety calculations for normal conditions, criticality safety calculations for accident conditions, long-term reactivity changes, calculation of the transient decay heat load in the SFPs, calculation of the resulting maximum SFPs bulk temperature, calculation of the time-to-boil after a loss of forced cooling or makeup water capability, rack seismic/structural evaluations, rack fatigue analysis, SFP structural evaluation, bearing pad analysis, and liner integrity analysis, shallow drop event, deep drop event, and object drop event. The proposed modification increases the spent fuel storage capacity, but it does not change the frequency or probability or method for handling spent fuel assemblies.

The proposed expansion of the SFP will not affect any of the assumptions or inputs used in evaluating the dose consequences of a fuel handling accident and therefore will not result in an increase in the doses from a postulated fuel handling accident.

Environmental Impact Conclusions

The proposed action will not significantly increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public exposure. Therefore, 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. It does not affect nonradiological plant effluents and has no other environmental impacts. Therefore, there are no significant nonradiological environmental impacts associated with the proposed action.

Accordingly, the NRC 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. To date, 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 the spent fuel to the DOE repository is not considered an alternative to increased onsite fuel storage capacity at this time.

Shipping Fuel to a Reprocessing Facility

Reprocessing of spent fuel from Kewaunee 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 the Fuel Offsite to another Utility, another NMC Site, or Private Fuel Storage Facility

The shipment of fuel to another utility or transferring fuel to another of the licensee's facilities would provide short-term relief from the problems at Kewaunee. The Nuclear Waste Policy Act of 1982, Subtitle B, Section 131(a)(1), however, clearly places the responsibility for the interim storage of spent fuel with each owner or operator of a nuclear plant. The SFPs at the other reactor sites were designed with capacity to accommodate spent fuel from those particular sites. Therefore, transferring spent fuel from Kewaunee to other sites would create storage capacity problems at those locations. The shipment of spent fuel to another site or transferring it to another NMC site 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.

The shipment of fuel to a private fuel storage facility is an alternative to increasing the onsite spent fuel storage capacity. However, a private fuel storage facility is not licensed at this time. Therefore, shipping the spent fuel to a private fuel storage facility is not considered an alternative to increased onsite fuel storage capacity at this time.

Alternatives Creating 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 into 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 need for special security provisions and high cost. 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. 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 new spent fuel pools is not practical for Kewaunee because such an effort would require about 10 years to complete and would be an expensive alternative.

The alternative technologies that could create additional storage capacity involve additional fuel handling with an attendant opportunity for a fuel handling accident, involve higher cumulative dose to workers affecting the fuel transfers, require additional security measures that 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 SFPs and thus, increase the amount of time before the maximum storage capacities of the SFPs are reached. With extended burnup of fuel assemblies, the fuel cycle would be extended and fewer off-loads would be necessary. This is not an alternative for resolving the loss of full core off-load capability that will occur as a result of the Kewaunee refueling outage scheduled for the Fall 2001, because the spent fuel to be transferred to the pool for storage has almost completed its

operating history in the core. In addition, 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:

Also, the NRC staff considered denial of the proposed action (i.e., the “no-action” alternative). Denial of the application would result in no significant change in current environmental impacts. The environmental impacts of the proposed action and the alternative actions are similar.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for Kewaunee.

Agencies and Persons Contacted:

In accordance with its stated policy, on October 12, 2000, the NRC staff consulted with the Wisconsin State official, S. Jenkins of the Wisconsin Public Service Commission, 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 NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC 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 November 18, 1999, as supplemented by letter dated August 7, 2000, which are available for public inspection at the NRC's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible

electronically from the ADAMS Public Library component on the NRC Web site,

http:\\www.nrc.gov (the Electronic Reading Room).

Dated at Rockville, Maryland, this 30 th day of November, 2000.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Claudia M. Craig, Section Chief, Section 1
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Division of Licensing Project Management
Office of Nuclear Reactor Regulation