February 23, 2000

Mr. Oliver D. Kingsley, President
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SUBJECT: BYRON AND BRAIDWOOD - ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT OF THE SPENT FUEL POOL MODIFICATION (TAC NOS. MA5150, MA5149, MA5070 AND MA5071)

Dear Mr. Kingsley:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendments dated March 23, 1999, as supplemented on October 21 and December 15, 1999. The proposed amendments would revise the technical specifications for Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, to support installation of new Boral high-density spent fuel racks as well as increase the capacity of the spent fuel pools from 2,870 to 2,984 fuel assemblies.

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

Sincerely,

/RA/

George F. Dick, Jr., Project Manager, Section 2
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Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-454, STN 50-455,
STN 50-456, STN 50-457

Enclosure: Environmental Assessment

cc w/encl: See next page

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7590-01-P

UNITED STATES NUCLEAR REGULATORY COMMISSION

COMMONWEALTH EDISON COMPANY

DOCKET NOS. STN 50-454, STN 50-455, STN 50-456 AND STN 50-457

BYRON STATION, UNITS 1 AND 2

BRAIDWOOD STATION, UNITS 1 AND 2

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of amendments to Facility Operating Licenses Nos. NPF-37, NPF-66, NPF-72 and NPF-77 issued to Commonwealth Edison Company (ComEd or the licensee), for operation of Byron Station, Units 1 and 2 (Byron), located in Ogle County, Illinois, and Braidwood Station, Units 1 and 2 (Braidwood), located in Will County, Illinois.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would increase the number of fuel assemblies that can be stored in the Byron and Braidwood spent fuel pools (SFPs) from 2,870 fuel assemblies per SFP to 2,984 fuel assemblies per SFP, an increase of approximately 4 percent. In addition, the new spent fuel storage racks will use Boral as the neutron absorber material, replacing the present neutron absorber material, Boraflex, which is continuing to degrade.

The proposed action is in accordance with the licensee's application for amendments dated March 23, 1999, as supplemented by letters dated October 21 and December 15, 1999.

The Need for the Proposed Action:

The existing racks utilize Boraflex as the neutron absorber material. Degradation of Boraflex has caused water chemistry and clarity problems and has also resulted in the need to rely on soluble boron in the SFPs to maintain the plants' design bases. The new spent fuel storage racks utilize Boral as the neutron absorber material, which has been used successfully at a number of plants. In replacing the SFP racks, the licensee decided not to include failed fuel cells. That change, in addition to differences in cell design between the existing and new racks, will result in the capacity of the SFP being changed from 2,864 normal fuel cells and six failed fuel cells to 2,984 normal fuel cells.

Environmental Impacts of the Proposed Action:

Radioactive Waste Treatment

Byron and Braidwood use 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 Statements (FESs) dated April 1982 (Byron) and June 1984 (Braidwood). The proposed changes to the SFP will not involve any change in the waste treatment systems described in the FESs.

Gaseous Radioactive Wastes

The storage of additional spent fuel assemblies in the pools is not expected to affect the releases of radioactive gases from the spent fuel pools. 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 is released to the reactor coolant from the small number of fuel assemblies that are expected to develop leaks during reactor operation. During refueling operations, some of these fission products enter the pools and are subsequently released into the air. Since the frequency of refueling (and, therefore, the number of freshly

offloaded spent fuel assemblies stored in the pools 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 pool fuel storage capacity.

The increased heat load on the pools from the storage of additional spent fuel assemblies will potentially result in an increase in the pools' evaporation rate. However, this increased evaporation rate is not expected to result in an increase in the amount of gaseous tritium released from the pool. The overall release of radioactive gases from Byron and Braidwood will remain a small fraction of the limits of 10 CFR 20.1301.

Solid Radioactive Wastes

Spent resins are generated by the processing of SFP water through the pools' purification system. These spent resins are disposed of as solid radioactive waste. Resin replacement is determined primarily by the requirement for water clarity and is normally done approximately once per year. No significant increase in the volume of solid radioactive waste is expected with the expanded storage capacity. During reracking operations, small amounts of additional waste resin may be generated by the pools' cleanup systems on a one-time basis. Additional solid radwaste will consist of the old spent fuel rack modules themselves, as well as any interferences of pool hardware that may have to be removed from the pool to permit installation of the new rack modules. The old racks will be washed down in preparation for packaging and shipment. Shipping containers and procedures will conform to Federal regulations as specified in 10 CFR Part 71, "Packaging and Transportation of Radioactive Material," and to the requirements of any state through which the shipment may pass, as set forth by the state department of transportation.

Liquid Radioactive Wastes

The release of radioactive liquids will not be affected directly as a result of the SFP modifications. The SFP ion exchanger resins remove soluble radioactive materials from the pool water. When the resins are replaced, the small amount of resin sluice water that is released is processed by the radwaste systems. As previously stated, the frequency of resin replacement may increase slightly during the installation of the new racks. However, the increase in the amount of radioactive liquid released to the environment as a result of the proposed SFP expansion is expected to be negligible.

Occupational Dose Consideration

Radiation protection personnel at Byron and Braidwood will monitor the doses to the workers during the SFP expansion operations. The total occupational dose to plant workers as a result of the SFP is estimated to be between 6 and 12 person-rem which includes an estimated dose for potential diver exposure, if one is needed, and estimates of person-rem exposures associated with washdown and preparation of the existing racks for shipping. The dose estimate is comparable to doses for similar SFP modifications performed at other nuclear plants. The SFP rack installations will follow detailed procedures prepared with full consideration of as low as reasonably achievable (ALARA) principles.

On the basis of its review of the licensee's proposal, the NRC staff concludes that the Byron and Braidwood SFP reracking operations can be performed in a manner that will ensure that doses to workers will be maintained ALARA. The estimated dose of 6 to 12 person-rem to perform the proposed SFP reracking operations is a small fraction of the annual collective dose accrued at Byron and Braidwood.

Accident Considerations

The licensee evaluated five spent fuel drop accidents, a spent fuel cask drop accident, and a change in the SFP water temperature. Because of the similarity between the new racks and the existing ones, and the small increase (4 percent) in the spent fuel capacity of the new racks, the consequences of the spent fuel and fuel cask drop accidents were either bounded by the previous accident analyses as incorporated in the plants' design bases or unaffected by the changeout of the SFP racks.

The change in temperature of the SFP water was evaluated for the potential increase in reactivity. Because the reactivity coefficient in the SFP is negative, a temperature increase will result in a decrease in reactivity. The initiators of this event are unaffected by the SFP rack replacement because there are no features of the design change affecting the SFP cooling system or that would prompt a SFP water temperature decrease.

As a consequence of the analyses, the NRC staff concludes that increases in the capacity of the SFPs at Byron and Braidwood will not be accompanied by an associated increase in the radiological consequences of fuel-handling accidents. The potential offsite doses will not be increased over the values given in the updated Final Safety Analysis Report.

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 Byron and Braidwood 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 or another ComEd Site

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 Byron and Braidwood. 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 Byron or Braidwood to other sites would create storage capacity problems at those locations. The shipment of spent fuel to another site or transferring it to another ComEd 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.

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 Byron and Braidwood 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. However, 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. In addition, the primary reason for the licensee reracking the SFPs is to replace the degrading Boraflex with a stable neutron absorber, Boral. The increase in fuel storage capacity is primarily the result of the differences in design between the existing and the new spent fuel racks. 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:

The NRC staff also 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 Statements for Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2.

Agencies and Persons Contacted:

In accordance with its stated policy, on December 20, 1999, the NRC staff consulted with Illinois State official, Frank Niziolec of the Illinois Department of Nuclear Safety, 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 March 23, 1999, as supplemented by letters dated October 21 and December 15, 1999, which are available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC. 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 23rd day of February 2000.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Anthony J. Mendiola, Chief, Section 2
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Office of Nuclear Reactor Regulation

February 23, 2000

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SUBJECT: BYRON AND BRAIDWOOD - ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT OF THE SPENT FUEL POOL MODIFICATION (TAC NOS. MA5150, MA5149, MA5070 AND MA5071)

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George F. Dick, Jr., Project Manager, Section 2
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Division of Licensing Project Management
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Docket Nos. STN 50-454, STN 50-455,
STN 50-456, STN 50-457

Enclosure: Environmental Assessment

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