October 17, 2005

Mr. Christopher M. Crane, President
and Chief Executive Officer
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, Illinois 60555

SUBJECT: CLINTON POWER STATION UNIT 1- ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT OF THE SPENT FUEL POOL MODIFICATION (TAC NO. MC4202)

Dear Mr. Crane:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for an amendment dated August 18, 2004, as supplemented on May 13 and 25, June 14, and August 17, 2005. The proposed amendment would revise Technical Specification 4.3, "Fuel Storage," for Clinton Power Station, Unit 1, to reflect the increased fuel storage capacity in the spent fuel pool and the addition of fuel storage capacity in the fuel cask storage pool. The proposed expansion will increase the total storage capacity from 2,512 to 4,159 fuel assemblies.

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

Sincerely,

/RA/

Kahtan N. Jabbour, Sr. Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-461

Enclosure: Environmental Assessment

cc w/encl: See next page

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Clinton Power Station, Unit 1

cc:

Senior Vice President - Nuclear Services
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Vice President of Operations - Mid-West
Boiling Water Reactors
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Vice President - Licensing and
Regulatory Affairs
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Manager Licensing - Dresden, Quad Cities,
and Clinton
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Regulatory Assurance Manager - Clinton
AmerGen Energy Company, LLC
Clinton Power Station
RR3, Box 228
Clinton, IL 61727-9351

Director - Licensing and Regulatory Affairs
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Document Control Desk-Licensing
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Site Vice President - Clinton Power Station
AmerGen Energy Company, LLC
Clinton Power Station
RR 3, Box 228
Clinton, IL 61727-9351

Clinton Power Station Plant Manager
AmerGen Energy Company, LLC
Clinton Power Station
RR 3, Box 228
Clinton, IL 61727-9351

Resident Inspector
U.S. Nuclear Regulatory Commission
RR #3, Box 229A
Clinton, IL 61727

Chief Operating Officer
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Associate General Counsel
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

R. T. Hill
Licensing Services Manager
General Electric Company
175 Curtner Avenue, M/C 481
San Jose, CA 95125

Chairman of DeWitt County
c/o County Clerk's Office
DeWitt County Courthouse
Clinton, IL 61727

cc:

J. W. Blattner
Project Manager
Sargent & Lundy Engineers
55 East Monroe Street
Chicago, IL 60603

Illinois Emergency Management
Agency
Division of Disaster Assistance &
Preparedness
110 East Adams Street
Springfield, IL 62701-1109

7590-01-P

UNITED STATES NUCLEAR REGULATORY COMMISSION

AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-461

CLINTON POWER STATION, UNIT 1

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. NPF-62 issued to AmerGen Energy Company, LLC (AmerGen or the licensee), for operation of Clinton Power Station, Unit 1 (CPS), located in DeWitt County, Illinois. Therefore, as required by 10 CFR 51.21, the NRC is issuing this environmental assessment and finding of no significant impact.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would revise Technical Specification 4.3, "Fuel Assemblies," for CPS to reflect the increased fuel storage capacity in the spent fuel pool (SFP) and the addition of fuel storage capacity in the fuel cask storage pool. The proposed expansion will increase the total storage capacity from 2,512 to 4,159 fuel assemblies.

The proposed action is in accordance with the licensee's application dated August 18, 2004, as supplemented on May 13 and 25, June 14, and August 17, 2005.

The Need for the Proposed Action:

The loss of full core discharge capability at CPS is projected to occur during the February 2006 refueling outage, based on current projections. To maintain spent fuel storage capability, AmerGen would like to expand SFP storage capacity. The proposed action would

result in the increased fuel storage capacity in the SFP and the addition of fuel storage capacity in the fuel cask storage pool. The proposed expansion will increase the total storage capacity from 2,512 to 4,159 fuel assemblies. The additional capacity is expected to allow operation without loss of full-core discharge capability until the year 2016.

Environmental Impacts of the Proposed Action:

Radioactive Waste Treatment

CPS 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) for CPS, Unit 1, dated May 1982. The proposed changes to the SFP will not involve any change in the waste treatment systems described in the FES.

Gaseous Radioactive Wastes

The increase in the number of spent fuel assemblies stored in the SFP will potentially result in an increase in the radioactive gasses evolving from the pool. However, the level of gaseous radioactivity in the pool water is dominated by the most recent reactor core offload to the pool, not the fuel already stored in the pool. Therefore, the storage of additional aged spent fuel assemblies in the pool will have a minimal contribution to radioactivity in the pool. The overall release of radioactive gases from CPS will remain within the limits of Title 10, *Code of Federal Regulations* (10 CFR), Section 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 pool re-racking operations, small

amounts of additional waste resin may be generated by the pools' cleanup systems on a one-time basis. Additional solid radioactive waste will consist of the existing contaminated fuel storage racks. The old existing fuel storage racks will be washed down prior to being removed from the pool to remove as much contamination as possible. Then the racks will be shipped to a volume reduction facility for processing and subsequent disposal at a burial site. 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

All operations involved in the fuel rack installations will follow detailed procedures prepared in accordance with as low as reasonably achievable (ALARA) principles. Personnel performing the re-racking operation will be given pre-job briefings to ensure awareness of job responsibilities and necessary precautions. Radiation protection personnel at CPS will monitor and control work, personnel traffic, and equipment movement in the SFP area to minimize contamination and assure that exposures are maintained ALARA. Personnel monitoring equipment (including thermoluminescence dosimeter (TLDs)), protective clothing, and

respiratory protective equipment will be issued as required. Alarming dosimeters will be used as needed to confirm exposure and dose rates to workers.

The licensee plans to use divers in the pool to remove underwater interferences and assist in fuel storage rack removal. Procedures for controlling diving operations will comply with the guidance in Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants." During the diving operations, the licensee estimates that dose rates will average from 20 to 40 mrem/hr. Special precautions such as physical barriers or tethers will be used to prevent a diver from coming in close proximity to highly radioactive materials in the pool. The diver will be confined to a safe diving area within the pool, which will be clearly delineated in the pre-job brief as well as physically marked in the pool. The diver will be visually monitored, either directly or remotely, at all times during the dive. In addition, the diver will be monitored by a remote dose telemetry system. This system enables the radiation protection personnel supervising the dive to obtain the dose being delivered to the diver's body. The diver will have a hand-held probe to complete radiological surveys when entering the water.

Divers exiting the pool will be monitored for radiation and contamination, as will all items removed from the pool. Appropriate measures will be taken to minimize the spread of contamination. The existing fuel racks that are removed from the pool will be rinsed and surveyed as they break the water's surface, allowed to 'drip dry', and then placed in plastic shipping bags to contain any contamination until they are placed in shipping containers to be taken offsite for disposal.

The increased storage capacity will not affect dose rates in areas adjacent to the SFP and transfer canal. The concrete side walls of the SFP provide sufficient shielding that the maximum dose rate in adjacent areas from fuel in the SFP is calculated to be 2 mrem/hr, if the pool is completely filled with freshly offloaded fuel. The walls of the fuel cask storage pool are not as thick, and the licensee's shielding calculations indicate that filling the racks that are

proposed to be installed in the fuel cask storage pool with freshly offloaded fuel could result in dose rates of up to 26 mrem/hr in adjacent areas. This could be mitigated by filling the outer (peripheral) three rows of the storage cells with older (more decayed) fuel, thus reducing the maximum dose rate in the adjacent areas to 4.4 mrem/hr. The licensee will implement administrative controls to ensure that fuel stored in the peripheral storage cells will have been stored outside of the reactor for a minimum of 10 years, allowing sufficient decay time.

On the basis of its review of the licensee's proposal, the NRC staff concludes that the CPS SFP re-racking operations can be performed in a manner that will ensure that doses to workers will be maintained ALARA and that the generation of additional solid radioactive waste will be minimized. The staff concludes that the projected dose for the project of 7 to 14 person-rem is in the range of doses for similar modifications at other nuclear plants.

Accident Considerations

The licensee evaluated the impact of newly installed higher density storage racks in the SFP and fuel storage in the fuel cask storage pool on the current design basis accident (DBA) dose analyses, as discussed in the CPS Updated Safety Analysis Report. The DBAs that are potentially affected by the proposed change to the SFP storage capacity are the fuel handling accident (FHA) and the cask drop accident. By Amendment No. 147, dated April 3, 2002, the CPS licensing basis for the FHA was changed by a selective implementation of an alternative source term, per the provisions of 10 CFR 50.67. In support of that amendment request, AmerGen demonstrated that the radiological consequences of an FHA, either in the containment or in the fuel building, are within the offsite and control room dose acceptance criteria specified in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," and General Design Criterion 19 of 10 CFR Part 50, Appendix A, and well within the dose criteria given in 10 CFR 50.67.

The NRC staff performed a review of the licensee's analysis of the proposed action on DBA dose analyses. Adding additional spent fuel storage does not increase the amount of fuel assumed to be damaged in an FHA, and the proposed action does not significantly change the source term in the DBA; therefore, the staff finds that the current licensing basis FHA dose analysis remains applicable after the expansion of the spent fuel storage capacity. The licensee plans to install spent fuel storage racks in the fuel cask storage pool. The licensee will implement administrative controls to ensure that fuel will be removed from the racks in the fuel cask storage pool prior to any fuel cask being moved in the area. Therefore, there would be no damage to spent fuel or radiological consequences as a result of a cask drop on the empty fuel storage racks in the fuel cask storage area. Based on its review, the staff finds that the current licensing basis analysis of the cask drop accident remains bounding with respect to radiological consequences.

During removal and installation of fuel storage racks in the SFP and fuel cask storage pool, AmerGen will ensure that all work will be controlled and performed in strict accordance with specific written guidance. Any movement of fuel assemblies required to support removal and installation of racks will be performed as during normal refueling operations, and no shipping cask movement will be performed during this time frame. The licensee will determine and follow safe load paths and written procedures to ensure that no racks are carried over any portions of the existing fuel storage racks containing fuel assemblies.

Based on its review, the staff concludes that the current DBA dose analyses remain bounding for the installation of expanded spent fuel storage capacity in the SFP and fuel cask storage pool.

The proposed action will not significantly increase the probability or consequences of accidents. No changes are being made in the types of effluents that may be released off site. There is no significant increase in the amount of any effluent released off site. There is no

significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential non-radiological impacts, the proposed action does not have a potential to affect any historic sites. It does not affect non-radiological plant effluents and has no other environmental impact. Therefore, there are no significant non-radiological environmental impacts associated with the proposed action.

Accordingly, the NRC concludes that there are no significant environmental impacts associated with the proposed 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) proposed high-level radioactive waste repository is not expected to begin receiving spent fuel in the near future. 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 CPS 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 Exelon/AmerGen 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 shortage of SFP storage at CPS. However,

the Nuclear Waste Policy Act of 1982, Subtitle B, Section 131(a)(1) 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 CPS to other sites would create storage capacity problems at those locations. The shipment of spent fuel to another site or transferring it to another Exelon/AmerGen 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 time-consuming 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 SFPs is not practical for CPS 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 an FHA, 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 reduction in environmental impacts compared to the proposed re-racking 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. Therefore, reducing the amount of spent fuel generated by reducing power is not considered a practical alternative.

Impact on SFP Storage from Increasing Length of Fuel Cycle

By letter dated May 20, 2004, as supplemented May 23 and September 30, 2005, the licensee requested changes to the Technical Specification Surveillance Requirement frequencies to support 24-month fuel cycles at CPS in accordance with the guidance of Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle." Currently, this request is under review by the NRC staff. If this request is approved, CPS will experience a loss of full core discharge capability sooner. Therefore, this is not a practical alternative to the proposed action.

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 change in current environmental impacts. The environmental impacts of the proposed action and this alternative action are similar.

Alternative Use of Resources:

The action does not involve the use of any different resources than those previously considered in the FES for CPS, Unit 1, dated May 1982.

Agencies and Persons Contacted:

In accordance with its stated policy, on September 27, 2005, the NRC staff consulted with Illinois State Official, Frank Niziolek of the Illinois Emergency Management Agency, 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 August 18, 2004, as supplemented by letters dated May 13 and 25, June 14, and August 17, 2005. Documents may be examined, and/or copied for a fee, at the NRC’s Public Document Room (PDR), located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible electronically from the Agencywide Documents Access and Management System (ADAMS) Public Electronic Reading Room on the NRC Web site, http://www.nrc.gov/reading-rm/adams.html. Persons who do not have access to

ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC PDR Reference staff at 1-800-397-4209, or 301-415-4737, or send an e-mail to pdr@nrc.gov.

Dated at Rockville, Maryland, this 17th day of October, 2005.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Kahtan N. Jabbour, Sr. Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation