

UNITED STATES NUCLEAR REGULATORY COMMISSIONCAROLINA POWER & LIGHT COMPANYDOCKET NO. 50-400SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1ENVIRONMENTAL ASSESSMENT AND FINDING OFNO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. NPF-63, issued to Carolina Power & Light Company (CP&L, the licensee), for operation of the Shearon Harris Nuclear Power Plant, Unit 1, (HNP) located in Wake and Chatham Counties, North Carolina.

ENVIRONMENTAL ASSESSMENTIdentification of the Proposed Action:

The proposed action would support a modification to HNP to increase the spent fuel storage capacity by adding rack modules to spent fuel pools (SFPs) 'C' and 'D' and placing the pools in service. The proposed action consists of: 1) a revision to Technical Specification (TS) 5.6 to identify pressurized water reactor (PWR) burnup restrictions, boiling water reactor (BWR) enrichment limits, pool capacities, heat load limitations and nominal center-to-center distances between fuel assemblies in the racks to be installed in SFPs 'C' and 'D'; 2) an alternative plan in accordance with the requirements of 10 CFR 50.55a to demonstrate an acceptable level of quality and safety in completion of the component cooling water (CCW) and SFPs 'C' and 'D' cooling and cleanup system piping; and 3) an unreviewed safety question for additional heat load on the CCW system.

The proposed action is in accordance with the licensee's application for amendment dated December 23, 1998, as supplemented by letters dated April 30, June 14, July 23, September 3, October 15, and October 29, 1999.

The Need for the Proposed Action:

The proposed action is needed for the licensee to provide spent fuel storage capacity for all four CP&L nuclear units (Harris, Brunswick 1 and 2, and Robinson) through the end of their current licenses.

HNP was originally planned as a four nuclear unit site and the fuel handling building (FHB) was designed and constructed with four separate pools capable of storing spent fuel. HNP Units 3 and 4 were canceled in late 1981 and HNP Unit 2 was canceled in late 1983. The FHB, all four pools (including liners), and the cooling and cleanup system to support SFPs 'A' and 'B' were completed. However, construction on SFPs 'C' and 'D' was discontinued after Unit 2 was canceled and the system was not completed. HNP, Unit 1 began operation in 1987 with SFPs 'A' and 'B' in service.

As permitted by the HNP operating license issued on January 12, 1987, CP&L has implemented a spent fuel shipping program. Spent fuel from Brunswick (2 BWR units) and Robinson (1 PWR unit) is shipped to HNP for storage in the HNP SFPs. CP&L ships fuel to HNP in order to maintain full core offload capability at Brunswick and Robinson. As a result of the operation of HNP, shipping program requirements, and the unavailability of a Department of Energy (DOE) storage facility, it will be necessary to activate SFPs 'C' and 'D' and the associated cooling and cleanup system by early in the year 2000. Activation of these pools will provide spent fuel storage capacity for all four CP&L units through the end of their current operating licenses.

### Environmental Impacts of the Proposed Action:

The Commission has completed its evaluation of the proposed action and concludes there are no significant environmental impacts. The factors considered in this determination are discussed below.

#### Radioactive Waste Treatment

HNP uses waste treatment systems designed to collect and process gaseous, liquid, and solid waste that might contain radioactive material. These radioactive waste treatment systems are discussed in the Final Environmental Statement (FES, NUREG-0972) dated October 1983, and evaluated in the Safety Evaluation Report (SER, NUREG-1083) dated November 1983. The proposal to increase the spent fuel storage capacity at HNP will not involve any change in the waste treatment systems described in the FES or SER.

#### 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. Storing spent fuel in four pools (instead of the previous two pools) will result in an increase in the SFP evaporation rate. The licensee has determined that the increased evaporation will increase the relative humidity of the fuel building atmosphere by less than 10%. This increase is within the capacity of both the normal and the Engineered Safety Feature (ESF) ventilation systems. The net result of the increased heat loss and water vapor emission to the environment will be negligible.

#### Solid Radioactive Wastes

Spent resins are generated by the processing of SFP water through the SFP purification system. These spent resins are disposed of as solid radioactive waste. The necessity for pool

filtration resin replacement is determined primarily by the requirement for water clarity, and the resin is normally expected to be changed about once a year. The licensee does not expect the resin change-out frequency of the SFP purification system to be permanently increased as a result of the expanded storage capacity. During racking operations, a small amount of additional resins may be generated by the pool cleanup system on a one-time basis.

#### Radiological Impact Assessment

For this modification the licensee plans to install region 2 (non-flux trap style) rack modules in pools 'C' and 'D' in incremental phases, on an as-needed basis. The licensee estimates that the collective dose associated with the proposed fuel rack installation is in the range of 2-3 person-rem.

All of the operations involved in racking will use detailed procedures prepared with full consideration of ALARA (as low as reasonably achievable) principles. The HNP racking project represents low radiological risk because the pools currently contain no spent fuel. The Radiation Protection Department will prepare Radiation Work Permits (RWPs) for the various jobs associated with the SFP rack installation operation. These RWPs will instruct the project personnel in the areas of protective clothing, general dose rates, contamination levels and dosimetry requirements. Personnel will wear protective clothing and will be required to wear personnel monitoring equipment including alarming dosimeters.

Since the proposed 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 use divers to remove any interferences which may impede the installation of the new spent fuel racks, the licensee will equip each diver with the appropriate monitoring equipment. The licensee will monitor and control work, personnel traffic, and equipment movement in the SFP area to minimize contamination and to assure that exposure is

maintained ALARA.

On the basis of its review of the HNP proposal, the staff concludes that the increase in spent fuel storage capacity at HNP can be accomplished in a manner that will ensure that doses to workers will be maintained ALARA.

#### Accident Considerations

In its application, the licensee evaluated the possible consequences of fuel handling accidents to determine offsite doses. The proposed SFP rack installation at HNP 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. The proposed action will not change the procedures or equipment used for, or the frequency of, fuel moves at HNP or fuel shipments from the Brunswick and Robinson plants. Therefore, the probability of a postulated fuel handling accident will not increase from that previously evaluated.

The staff has previously considered accidents whose consequences might exceed a fuel handling accident; that is, beyond design basis events. One such accident evaluated by the staff involves a structural failure of the SFP, resulting in loss of all contained cooling water followed by heatup and a zirconium cladding fire. The details of this severe accident are discussed in NUREG/CR-4982, entitled "Severe Accidents in Spent Fuel Pools in Support of Generic Issue 82." The staff also issued NUREG/CR-5176, entitled "Seismic Failure and Cask Drop Analysis of the Spent Fuel Pools at Two Representative Nuclear Power Plants." This report considers the structural integrity of the SFP and the pool response to the circumstances considered. Subsequently, the staff issued NUREG/CR-5281, "Value/Impact Analysis of Accident Preventative and Mitigative Options for Spent Fuel Pools," and NUREG-1353, "Regulatory Analysis for the Resolution of Generic Issue 82: Beyond Design Basis Accidents in

Spent Fuel Pools.” In NUREG-1353, the staff determined that no new regulatory requirements were warranted in relation to Generic Issue 82.

The staff believes that the probability of severe structural damage occurring at HNP is extremely low. This belief is based upon the Commission's requirements for the design and construction of SFPs and their contents and on the licensee's adherence to approved industry codes and standards. For example, in the HNP case, the pools are an integral part of the fuel building. The SFPs and the spent fuel storage racks are Seismic Category 1, and thus, are required to remain functional during and after a safe shutdown earthquake. In the unlikely event of a total loss of the cooling system, makeup water sources are available to replace coolant lost through evaporation or boiling. Therefore, the staff concludes that the potential for environmental impact from severe accidents is negligible.

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 offsite, and 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 nonradiological impacts, the proposed action does not involve any historic sites. It does not affect nonradiological plant effluents and has no other environmental impact. Therefore, there are no significant nonradiological environmental impacts associated with the proposed action.

Accordingly, the staff concludes that there are no significant environmental impacts associated with the proposed action.

Alternatives to the Proposed Action:

A “Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of

Spent Light Water Power Reactor Fuel," NUREG-0575, Volumes 1-3, was issued by the Commission in August 1979. The finding of the FGEIS is that the environmental costs of interim storage are essentially negligible, regardless of where such spent fuel is stored. The storage of spent fuel, as evaluated in NUREG-0575, is considered to be an interim action, not a final solution to permanent disposal. One spent fuel storage alternative considered in detail in the FGEIS is the expansion of the onsite fuel storage capacity by modification of the existing SFPs. The Commission has approved numerous applications for SFP expansion. The finding in each has been that the environmental impact of such increased storage capacity is negligible. However, since there are variations in storage design and limitations caused by spent fuel already stored in the pools, the FGEIS recommended that licensing reviews be done on a case-by-case basis, to resolve plant-specific concerns.

Specific alternatives to the proposed action are discussed below.

#### Shipment of 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, 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 wastes 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.

#### Shipment of Fuel to a Reprocessing Facility

Reprocessing of spent fuel from HNP 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. Therefore, this alternative is considered unacceptable.

#### Reduction of Spent Fuel Generation

Improved usage of fuel and/or operation at a reduced power level would decrease the amount of fuel being stored in the pool and thus increase the amount of time before full core off-load capability is lost. With extended burnup of fuel assemblies, the fuel cycle would be extended and fewer offloads would be necessary. The licensee has already increased its fuel enrichment to 5 percent and is currently operating on 18-month refueling cycles. Operating the plant at a reduced power level would not make effective use of available resources, and would cause unnecessary economic hardship on CP&L and its customers. Therefore, reducing the amount of spent fuel generated by increasing burnup further or reducing power is not considered a practical alternative.

#### Alternative Creation of Additional Storage Capacity

Alternative technologies that would create additional storage capacity include rod consolidation, dry cask storage, and modular vault dry storage. 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, increased land use, construction impacts, the need for additional 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. Concerns for vault dry storage include the need for additional security provisions, increased land use, construction impacts, eventual decommissioning of the new vault, the potential for fuel or clad rupture due to high temperatures, and high cost.

The environmental impacts of the alternative technologies discussed above and the proposed action are similar.

#### The No-Action Alternative

As an alternative to the proposed action, the 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.

#### Alternative Use of Resources:

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

#### Agencies and Persons Consulted:

In accordance with its stated policy, on December 2 and 3, 1999, the staff consulted with North Carolina State officials, Mr. Richard M. Fry and Mr. Johnny James of the North Carolina Department of Environment and Natural Resources, regarding the environmental impact of the proposed action. The State officials stated that they had no objection to the

finding. However, they requested that the staff hold a public meeting in Raleigh, North Carolina to discuss the license amendment review process, the results of the review for HNP's proposed amendment, and the analysis that led to this environmental assessment finding.

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 December 23, 1998, as supplemented by letters dated April 30, June 14, July 23, September 3, October 15, and October 29, 1999, which are available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC.

Dated at Rockville, Maryland, this 15<sup>th</sup> day of ~~December~~ 1999.

FOR THE NUCLEAR REGULATORY COMMISSION



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