

May 19, 1989

Mr. Oliver D. Kingsley, Jr.  
Senior Vice President, Nuclear Power  
Tennessee Valley Authority  
6N 38A Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

Dear Mr. Kingsley:

We have enclosed a copy of the Environmental Assessment associated with your October 28, 1988 amendment application as supplemented by letter dated March 24, 1989. The proposed amendments would extend the license expiration dates from May 10, 2007 to December 20, 2013 for Browns Ferry Nuclear Plant, Unit 1; May 10, 2007 to June 28, 2014 for Browns Ferry Nuclear Plant, Unit 2; and July 31, 2008 to July 2, 2016 for Browns Ferry Nuclear Plant, Unit 3.

A copy of the Notice of Issuance of Environmental Assessment and Finding of No Significant Impact published in the Federal Register on May 19, 1989 is also enclosed.

Sincerely,

Original signed by  
Suzanne Black, Assistant Director  
for Projects  
TVA Projects Division  
Office of Nuclear Reactor Regulation

Enclosures:

1. Environmental Assessment
2. Federal Register Notice

cc w/enclosures:

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ENVIRONMENTAL ASSESSMENT

BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATING TO THE CHANGE IN EXPIRATION DATES OF  
FACILITY OPERATING LICENSE NOS. DPR-33, DPR-52 AND DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

DATED: May 10, 1989

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## 1.0 INTRODUCTION

The United States Nuclear Regulatory Commission (the staff) is considering the issuance of a proposed amendment which would extend the expiration dates of the Browns Ferry Nuclear Plant (BFN) Facility Operating License DPR-33 (Unit 1) from May 10, 2007 to December 20, 2013, for the Facility Operating License DPR-52 (Unit 2) from May 10, 2007 to June 28, 2014, and for the Facility Operating License DPR-68 (Unit 3) from July 31, 2008 to July 2, 2016. BFN, Units 1, 2 and 3 are operated by the Tennessee Valley Authority (the licensee) and are located in Limestone County, Alabama.

## 2.0 IDENTIFICATION OF THE PROPOSED ACTION

The current license terms for the BFN, Units 1 and 2 expire on May 10, 2007, and for Unit 3 on July 31, 2008. Accounting for the time that was required for plant construction, this represents an effective operating license of approximately 33 years and five months for Unit 1, and 31 years and eleven months for Units 2 and 3. The licensee's application dated October 24, 1988 requests an extension of the expiration dates so that the fixed period of the licenses would be 40 years from the date of the operating license issuance for all three units.

## 3.0 THE NEED FOR THE PROPOSED ACTION

The granting of the proposed license amendment would allow the licensee to operate Unit 1 for six years and seven months, and Units 2 and 3 for eight years

and one month beyond the currently approved expiration dates. Without issuance of the proposed license amendments, BFN, Units 1, 2 and 3 would be shut down after the currently approved license durations.

#### 4.0 ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

The environmental review for the combined construction and operation phase of BFN was initially conducted by TVA pursuant to the lead agency agreement with AEC. On September 1, 1972, TVA issued the Final Environmental Statement (construction permit and operating license) (FES) for the Browns Ferry Nuclear Plant, Units 1, 2 and 3.

The Commission's staff has reviewed this document to determine if any significant environmental impacts, other than those previously considered, would be associated with the proposed license extensions. The results of our review are set out below.

##### 4.1 Radiological Impacts

The staff has considered potential radiological impacts for the general public in residence in the vicinity of the BFN, Units 1, 2 and 3; these impacts include potential accidents and normal radiological releases. In addition, the staff has considered the impacts of radiation exposure to workers at BFN.

#### 4.1.1 Environmental Impacts - General Public

In the FES, the licensee calculated dose commitments to the population residing around the BFN reactors to assess the impact on people from radioactive material released from the reactors. The FES does not generally use or discuss a specific period of plant operation in the evaluation, however, offsite population doses are based on the population estimates for the year 2010. According to TVA, radiological impacts to offsite individuals due to releases of radioactive liquid and gaseous wastes from the plant remain well within all applicable regulatory limits. Computed gaseous offsite doses are typically less than 10 percent of the 10 CFR 50, Appendix I, guidelines (for a three plant) of 30 millirad/year gamma and 60 millirad/year beta air dose and 45 millirem/year organ dose. Computed offsite liquid doses are typically less than 15 percent of the 10 CFR 50, Appendix I, guidelines of 9 millirem/year total body and 30 millirem/year organ dose. Radioactive effluent releases are controlled by the technical specifications in Section 3.8. These specifications implement the release limits specified in 10 CFR 20 and set performance goals based on 10 CFR 50, Appendix I. The BFN Final Safety Analysis Report (FSAR), Section 2.2.2, provides the population density distribution around the site. Population projections are based on county projections for Tennessee, Mississippi, and Alabama by the Office of Natural Resources and Economic Development. The population is estimated to increase to 62,100 in the year 2016, an increase of approximately 8 percent over the year 2008 (the Unit 3 current license term). According to the licensee in its March 24, 1989 letter,

doses calculated for offsite population in the year 2016 would be approximately 8 percent greater than those estimated for the 2008 population. However, population doses would remain less than 0.02 percent of the natural background dose to the offsite population. Therefore, the staff concludes that the higher projected population for 2016 would not change the overall conclusions of the FES concerning radiological consequences following accidents.

The staff has assessed the public risks from reactor accidents per year of operation at other reactors of comparable design and power level (and larger). In all cases, the estimated reactor accident risks of early and latent cancer fatality per year of operation have been small compared to the background cancer fatality risks to which the public is exposed and did not increase with longer periods of operation. If similar risks were estimated for BFN, Units 1, 2 and 3, we would expect a similar comparison. Therefore, the staff concludes that the proposed additional years of operation would not increase the annual public risk from reactor accidents.

#### 4.1.2 Environmental Impacts - Occupational Exposures

The staff has evaluated the licensee's dose assessment for the years 2007 to 2013, 2014, and 2016 (the additional years during which BFN, Units 1, 2 and 3, respectively, would operate) and compared it with the current BFN and overall industry occupational dose experience.

The average dose for BFN over the recent five-year period covering 1981-1985 has been approximately 737 person-rem per unit per year compared to the average

yearly exposure of 996 person-rem per unit for U.S. boiling water reactors. It should be noted that the BFN units were not operating for about a quarter of the covered period. According to TVA, this lower than average exposure is attributed to a management commitment to as-low-as-reasonably-achievable (ALARA) exposures. Exposure goals have been established for station person-rem to minimize collective doses. ALARA reviews and analyses are conducted for workplans for proposed jobs which are projected to exceed five person-rem. Steps are incorporated into the jobs to reduce dose. All proposed facility modifications receive similar reviews. Pre-job briefings are held with workers to cover dose saving measures and mock-ups are used as appropriate to train workers. Spent fuel will be stored in the spent fuel pool in lieu of shipment offsite, and in accordance with current national policy. Any expansion of onsite spent fuel storage capacity will be evaluated for radiological environmental effects by the staff at the time it is proposed.

The staff concludes that the licensee's occupational dose assessment is acceptable, and their radiation protection program is adequate to ensure that occupational radiation exposures will be maintained ALARA and in continued compliance with the requirements of 10 CFR Part 20. Therefore, the staff concludes that the environmental impacts associated with a 40-year operating license duration are not significantly different from those previously assessed.

#### 4.1.3 Environmental Impacts - Transportation of Fuel and Waste

The staff has reviewed the environmental impacts attributable to the transportation of fuel and waste to and from the BFN site including information submitted by the licensee's letter dated October 24, 1988. With respect to the normal conditions of transport and possible accidents in transport, the staff concludes that the environmental impacts are bounded by those identified in Table S-4, "Environmental Impact of Transportation of Fuel and Waste To and From One Light Water-Cooled Nuclear Power Reactor" of 10 CFR Part 51.52. The transportation of radioactive material is governed by the regulations which provide protection of the public and transport workers from radiation. This protection is achieved by a combination of standards and requirements applicable to packaging, limitations on the contents of packages and radiation levels from packages, and procedures to limit the exposure of persons under normal and accident conditions.

The additional amount of nuclear fuel and waste resulting from an extended operating period will continue to be within the limits assumed for the original licensing basis. Because of improved fuel cycle designs and longer operation between refueling outages, the total amount of spent fuel produced over a 40-year operating lifetime will be less than that originally projected by the Final Safety Analysis Report (FSAR) for BFN.

#### 4.2 Non-Radiological Impacts

The staff has re-evaluated the non-radiological impacts associated with operation of the BFN units to include the approximately seven to eight additional years of operation associated with the change in expiration of the operating licenses. Since BFN's FES was issued, a number of modifications have been made to BFN and surrounding site and facilities. These modifications, in general, had the effect of improving the reliability and safety of the plant or reducing the environmental impact of plant operation. They include:

- A. Facilities - Many modifications to the plant have been made since the original operating licenses were issued. Significant modifications are described in BFN updated Final Safety Analysis Report. Modifications made without prior NRC approval, in accordance with the provisions of 10 CFR 50.59, were reported on an annual basis to the Commission. Modifications requiring prior NRC approval were made following receipt of an NRC Safety Evaluation Report. No modification was found to affect the conclusions of the BFN FES.
- B. Land Use - Additional site buildings have been constructed and existing buildings have been expanded. The actual land area occupied by site buildings has not significantly increased, however.
- C. Thermal Effects - Thermal discharges from BFN are regulated through the National Pollutant Discharge Elimination System (NPDES) Permit. Data collected to date has indicated that the water quality and indigenous

biota of Wheeler Reservoir are protected by the thermal limits specified in the NPDES Permit. Operation of BFN will continue to be governed by the NPDES Permit with no different or greater impact.

The staff's review concludes that the proposed extensions would not cause a significant increase in the impacts to the environment and would not change any conclusions previously reached by the Commission.

#### 5.0 ALTERNATIVES TO THE PROPOSED ACTION

The principal alternative to issuance of the proposed license extensions would be to deny the applications. In this case, BFN, Units 1, 2 and 3, would shut down upon expiration of the present operating licenses.

In Section 8 of the FES, a cost-benefit analysis is presented for BFN. Included in the analysis is comparison among various options for producing an equivalent electrical power capacity. Even considering significant changes in economics of the alternatives, operation of BFN Units 1, 2 and 3 for an additional seven to eight years would only require incremental yearly costs. These costs would be substantially less than the purchase of replacement power or the installation of new electrical generating capacity. Moreover, the overall cost per year of the facility would decrease since the large initial capital outlay would be averaged over a greater number of years. In summary, the cost-benefit advantage of BFN compared to alternative electrical power generating capacity improves with the extended plant lifetime.

## 6.0 ALTERNATIVE USE OF RESOURCES

This action does not involve the use of resources not previously considered in connection with the Final Environmental Statement (construction permit and operating license) for the Browns Ferry Nuclear Plant, Units 1, 2 and 3, dated September 1, 1972.

## 7.0 AGENCIES AND PERSONS CONSULTED

The Commission's staff reviewed the licensee's request and did not consult other agencies or persons.

## 8.0 BASIS AND CONCLUSIONS FOR NOT PREPARING AN ENVIRONMENTAL IMPACT STATEMENT

The Commission has determined not to prepare an environmental impact statement for the proposed action. The staff has reviewed the proposed license amendments relative to the requirements set forth in 10 CFR Part 51. Based on this assessment, the staff concludes that there are no significant radiological or non-radiological impacts associated with the proposed action and any conclusions previously reached by the Commission are not changed. Therefore, pursuant to 10 CFR 51.31, an environmental impact statement need not be prepared for this action. Based upon this environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment.