UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 4, 2016

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 - REQUEST FOR ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST REGARDING EXTENDED POWER UPRATE (CAC NOS. MF6741, MF6742, AND MF6743)

Dear Mr. Shea:

By letter dated September 21, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15282A152), as supplemented by letters dated November 13, December 15, and December 18, 2015 (ADAMS Accession Nos. ML15317A361, ML15351A113, and ML15355A413, respectively), Tennessee Valley Authority (TVA, the licensee) submitted a license amendment request (LAR) for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. The proposed amendment would increase the authorized maximum steady-state reactor core power level for each unit from 3,458 megawatts thermal (MWt) to 3,952 MWt. This LAR represents an increase of approximately 20 percent above the original licensed thermal power level of 3,293 MWt, and an increase of approximately 14.3 percent above the current licensed thermal power level of 3,458 MWt.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's submittals and determined that additional information is needed. On February 10, 2016, the NRC staff forwarded, by electronic mail, a draft request for additional information (RAI) to TVA. On February 17, March 8, and March 28, 2016, the NRC staff held conference calls to provide the licensee with an opportunity to clarify any portion of the draft RAIs and discuss the timeframe for which TVA may provide the requested information. As agreed by NRC and TVA staff, TVA will respond to the RAIs in the enclosure to this letter by April 22, 2016.

If you have any questions, please contact me at 301-415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

Farideh E Saba

Farideh E. Saba, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260, and 50-296

Enclosure:
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST REGARDING EXTENDED POWER UPRATE

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

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

By letter dated September 21, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15282A152), as supplemented by letters dated November 13, December 15, and December 18, 2015 (ADAMS Accession Nos. ML15317A361, ML15351A113, and ML15355A413, respectively), Tennessee Valley Authority (TVA, the licensee) submitted a license amendment request (LAR) for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The proposed amendment would increase the authorized maximum steady-state reactor core power level for each unit from 3,458 megawatts thermal (MWt) to 3,952 MWt. This LAR represents an increase of approximately 20 percent above the original licensed thermal power level of 3,293 MWt, and an increase of approximately 14.3 percent above the current licensed thermal power level of 3,458 MWt.

The U.S. Nuclear Regulatory Commission (NRC) staff from the Environmental Review and Project Management Branch (RERP) in the Division of License Renewal, Office of Nuclear Reactor Regulation, reviewed the information the licensee provided and determined that the following request for additional information (RAI) is required in order to complete the evaluation.

General

RERP-GE-RAI 1

The NRC issued a final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) related to the BFN, Units 1, 2, and 3 previously proposed extended power uprate (EPU) LARs in February 2007 (ADAMS Accession No. ML070190246). Describe any new and significant information regarding an impact on the human environment because of the currently proposed EPU LAR dated September 21, 2015, and its supplements. Also, describe any environmental impact that has arisen since the publication of the final EA and FONSI in February 2007.

RERP-GE-RAI 2

By letter dated December 18, 2015, TVA submitted to the NRC copies of an Interconnection System Impact Study and a Transmission System Stability Evaluation as the supplements to the proposed EPU. The Interconnection System Impact Study concludes that the proposed EPU will require the replacement of six breaker failure relays at BFN, the installation of 774 megavolt-ampere reactive (MVAR) of capacitors at four locations throughout the TVA transmission system, and the construction of a Limestone-East Point 500-kilovolt (kV) transmission line.

For each of these three upgrades, describe the affected environment, environmental consequences of and any mitigating actions related to construction and implementation of the upgrades for each environmental resource that would be affected. The environmental resources that may be affected and should be described include: land use, visual resources, air quality, noise, geologic environment, surface water resources, groundwater resources, terrestrial resources, aquatic resources, special status species and habitats, historic and cultural resources, socioeconomics, environmental justice, human health, and waste management. For each upgrade, please also describe the projected timeline for completion of the upgrade, whether the upgrade will require the use of construction equipment, the amount of natural habitats that would be disturbed (if applicable), the amount of offsite land that would be disturbed (if applicable), and descriptions of any best-management practices, procedures, or other guidelines that workers would follow to minimize impacts to cultural resources or sensitive species and habitats, if present. For the new 500-kV transmission line, describe the length of the new line, the anticipated origin and terminus of the line, the planned regional study area, possible routes for the line and preferred alternative (if known at this time), and whether the new line would share an existing right-of-way or require a new right-of-way.

RERP-GE-RAI 3

On page 12 of the Interconnection System Impact Study, TVA estimates that transmission-related upgrades and modifications would be completed 7 to 10 years after TVA receives authorization to begin work. Given this timeline and assuming the EPU is approved, would BFN be able to operate at EPU levels prior to the transmission upgrades being completed? If not, provide revised estimates of when each unit would begin operating at EPU levels, including revisions to the EPU outage schedules, if applicable.

RERP-GE-RAI 4

Will TVA be conducting its own environmental review, pursuant to National Environmental Policy Act (NEPA) for the proposed transmission line construction and other transmission system upgrades? If so, describe TVA's projected timeline for the NEPA review and whether TVA anticipates issuing an environmental assessment (EA), environmental impact statement (EIS) or supplement to a previous EA or EIS.

Visual Resources (VR)

RERP-VR-RAI 1

The NRC's 2005 final supplemental environmental impact statement (SEIS) for license renewal of BFN (ADAMS Accession No. ML051730443) describes the BFN viewshed as the following: "There are no homes within foreground viewing distance to the north and east. Adjacent to the site however, is a small residential development located to the northwest. Another residential development is located across Wheeler Reservoir to the southwest, and the Mallard Creek public use area is directly across the reservoir. These developments have at least partial views of the plant site. A berm, graded during the initial construction of the plant and containing approximately 2.5 million cubic meter (3.3 million cubic yard) of earth excavated to make cooling

water channels, lies adjacent to the cooling tower complex and blocks views of the northern and eastern plant area (TVA 2003a)."

Confirm that this description continues to accurately depict the BFN viewshed.

Noise (NO)

RERP-NO-RAI 1

Section 7.1.5 of the Supplemental Environmental Report (ER) summarizes a 2012 environmental sound pressure level assessment that found the ambient noise level in the Paradise Shores community located 1,500 feet from the BFN property boundary to be 59.7 decibels in the absence of cooling tower operation and 61.9 decibels with six cooling towers in operation. Previously, a 2001 background noise survey (described on page 8 of NRC's 2007 Final EA and page 2-67 (Section 2.2.8.4) of NRC's 2005 license renewal SEIS) found that the noise level in the Paradise Shores community with six cooling towers operating was 52 decibels. Explain the increase in background noise levels between the 2001 and 2011 assessments.

Surface Water Resources (SW)

RERP-SW-RAI 1

TVA indicates in Sections 7.1.6 and 7.2.3 of the Supplemental ER that the proposed EPU would not increase temperature or flow rates of discharged water beyond permitted National Pollutant Discharge Elimination System (NPDES) limits. Clarify whether implementation of the EPU will change the volume or quality of effluents discharged to the Tennessee River, including usage of cooling water treatment chemicals. If so, quantify the changes in discharge characteristics and specify whether an NPDES permit modification will be required or whether notification to Alabama Department of Environmental Management (ADEM) has been made. Additionally, provide relevant documentation of correspondence to/from the State.

RERP-SW-RAI 2

Provide a copy of BFN's current ADEM-issued NPDES permit and most recent NPDES permit renewal application.

RERP-SW-RAI 3

In Section 7.2-3 of the Supplemental ER, TVA summarizes modeling results that compare plant operation at the existing 105 percent original licensed thermal power (OLTP) versus 120 percent OLTP that include projected impacts on water temperature, cooling tower (helper mode) operations, and other parameters. To clarify and to provide context for some of the results presented, provide a summary of the actual hours of cooling tower operation as well as derate hours experienced over the last 5 years of operations.

RERP-SW-RAI 4

TVA indicates in Section 7.2.2 of the Supplemental ER that the proposed EPU will not impact the current volume of water withdrawn from the Tennessee River. Clarify and confirm whether TVA projects any incremental increase in the volume of water withdrawn from the Tennessee River upon implementation of the EPU. If any increase is projected, quantify the increase.

RERP-SW-RAI 5

Provide the volume (in million gallons per day (mgd)) of surface water withdrawn annually by BFN from the Tennessee River (covering the last 5 years). Provide copies of relevant reports submitted to the State.

RERP-SW-RAI 6

Provide a copy of BFN's current Alabama Department of Economic and Community Affairs Water Withdrawal/Use Permit.

Aquatic Resources (AQ)

RERP-AQ-RAI 1

Section 2.1.3 of the NRC's 2005 license renewal SEIS states that when the intake forebay gates are in a full-open position and the plant is operating in either open or helper modes, the average flow velocity through the openings is about 0.2 meters per second (m/s) (0.6 feet per second (fps)) for the operation of one unit, 0.34 m/s (1.1 fps) for the operation of two units, and 0.52 m/s (1.7 fps) for the operation of all three units. Confirm that these flow rates would continue to describe the inflow of cooling water under EPU conditions.

RERP-AQ-RAI 2

Provide copies of the following references cited in the Supplemental ER:

a. TVA. 2010. Fish impingement at Browns Ferry Nuclear Plant, September 2007 through September 2009. TVA Environmental Stewardship and Policy.

b. TVA. 2012a. Biological Monitoring of the Tennessee River Near Browns Ferry Nuclear Plant Discharge, Autumn 2011: TVA Biological and Water Resources, Chattanooga, Tennessee.

c. TVA. 2012b. Entrainment of Ichthyoplankton at Browns Ferry Nuclear Plant During 2008–2009. Knoxville, Tennessee: TVA Biological and Water Resources.

d. TVA. 2013. Biological Monitoring of the Tennessee River Near Browns Ferry Nuclear Plant Discharge, Autumn 2013.

e. TVA. 2014. Biological Monitoring of the Tennessee River Near Browns Ferry Nuclear Power Plant Discharge, Autumn 2014. Knoxville, Tennessee: River and Reservoir Compliance Monitoring Program.

Protected Species and Habitats (PS)

RERP-PS-RAI 1

In an Information for Planning and Conservation Report dated February 1, 2016 (ADAMS Accession No. ML16032A044), the U.S. Fish and Wildlife Service identified a number of federally listed species that are not addressed in the Supplemental ER. Provide any available information on potential habitat, occurrence, or sightings of the following species as well as an assessment of impacts of the proposed EPU on each species, as applicable.

a. black warrior waterdog (*Necturus alabamensis*)

b. Alabama moccasinshell (*Medionidus acutissimus*)

c. cracking pearlymussel (*Hemistena lata*)

d. dark pigtoe (*Pleurobema furvum*)

e. fanshell (*Cyprogenia stegaria*)

f. littlewing pearlymussel (*Pegias fabula*)

g. orangenacre mucket (*Lampsilis perovalis*)

h. ovate clubshell (*Pleurobema perovatum*)

i. sheepnose mussel (*Plethobasus cyphyus*)

j. snuffbox mussel (*Epioblasma triquetra*)

k. triangular kidneyshell (*Ptychobranchus greenii*)

l. Alabama streak-sorus fern (*Thelypteris pilosa* var. *alabamensis*)

m. boulder darter (*Etheostoma wapiti*)

n. rush darter (*Etheostoma phytophilum*)

o. slackwater darter (*Etheostoma boschungi*)

p. fleshy-fruit gladecress (*Leavenworthia crassa*)

q. Kral's water-plantain (*Sagittaria secundifolia*)

r. leafy prairie-clover (*Dalea foliosa*)

s. lyrate bladderpod (*Lesquerella lyrata*)

t. Price's potato-bean (*Apios priceana*)

u. flattened musk turtle (*Sternotherus depressus*)

If you have any questions, please contact me at 301-415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

/RA/

Farideh E. Saba, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
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