Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

May 23, 2001

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket No. 50-260
Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 2, CYCLE 11 REFUELING OUTAGE SUMMARY

This letter provides a summary of the major activities performed at BFN during the scheduled Unit 2, Cycle 11 refueling outage. On March 18, 2001, TVA concluded Unit 2 Cycle 11 power operation and initiated the Cycle 11 refueling outage. Initial criticality for Cycle 12 operation was achieved on April 22, 2001, at 1446 hours Central Daylight Time (CDT). Unit 2 was connected electrically to the grid (close breaker) on April 25, 2001, at 1943 hours CDT and achieved 100 percent power at approximately 1547 hours CDT on April 29, 2001.

During the refueling outage, TVA performed numerous major modifications and maintenance activities to support continued safe and reliable operation of Unit 2. Highlights of the outage are discussed below.

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The following modifications were made to enhance nuclear safety:

- Installed a Mitigation Monitoring System (MMS) associated with a Noble Metal Injection system. Noble Metal Injection will function with previously installed Hydrogen Water Chemistry (HWC) to further reduce intergranular stress corrosion cracking (IGSCC) in the reactor vessel. The MMS was installed to monitor the amount of noble metals on the interior surface of the vessel during operation.

- Replaced the Unit 2 Reactor Core Isolation Cooling (RCIC) system main steam outboard primary containment isolation valve. This valve was susceptible to thermal binding and was replaced with a double-disk gate design. The valve design also provides a reduction in local leak rate. Additionally, the valve stem design reduces motor operated valve testing setup time, thus enhancing BFN's program for reducing dose to as low as reasonably achievable (ALARA).

- Modified the RCIC system pump inboard injection valve. This valve, a double disc gate valve, is potentially susceptible to thermal binding. During power operation, high pressure reactor fluid enters the valve bonnet. Following a loss of downstream reactor pressure event, the reactor fluid trapped inside the valve bonnet could create opening thrust demands on the operator that are substantially higher than the normal requirements. By drilling a small hole (¼ inch) in the feedwater side of the valve face, any entrapped water in the bonnet is allowed to drain during a loss of reactor pressure event. Hence, the valve can be opened with normal thrust load on the operator.

- Replaced the High Pressure Coolant Injection (HPCI) system outboard steam isolation valve. This valve which was potentially susceptible to thermal binding, was replaced with a double disk gate valve. This valve design also provides a reduction in local leak rate. Additionally, the valve stem design also reduces motor operated valve setup time thus, enhancing ALARA.

- Implemented main steam line seismic ruggedness modifications. These modifications ensure that an alternate path to the Main Condenser is available for treatment of any fission products following a design basis loss of coolant accident.

- Replaced the Radwaste System primary containment isolation valves in the drywell floor drain sump discharge lines. The replacement valves, which are ball valves, provide better shutoff characteristics than the previously installed valves. These

valves will also provide a reduction in the local leak rate found during testing activities.

The following modifications were made to increase plant reliability:

- Added discharge isolation valves to the electro-hydraulic control (EHC) pump discharge lines. This will allow isolation of the operating pump for maintenance activities while the alternate pump is in service.

- Modified the reactor feed pump turbine hydraulic oil control system. Installed a differential pressure indicator that will provide early indication of the need to change the hydraulic system oil filters.

- Upgraded the Unit 2 Main Turbine EHC system with a fault tolerant digital control system. The EHC system had aged and produced a dispropionate number of spurious turbine transients. Additionally, due to obsolescence, the system parts were becoming unavailable. The digital EHC system eliminates single failure trips, which supports the scram reduction program.

- Refurbished the Unit 2 Main Generator. This effort included, rewinding the stator, and upgrading the annunciators for the Stator Cooling Water and Hydrogen systems. The new annunciator system interfaces with the plant Integrated Computer providing continuous monitoring and trending of the stator providing early detection of problems with the generator.

- Upgraded Main Transformers 2A and 2B cooling system. Replaced the existing seven transformer oil coolers and the cooler fans with those of higher capacity. Added an eighth oil cooler and cooler fan to each transformer. Replaced the control logic circuitry for the transformer cooling system. Previously, during full power operation at summer ambient temperatures, the transformers required supplemental cooling to maintain winding temperature below 90 degrees C. This upgrade will allow operation of the transformers during summer ambient temperatures without supplemental cooling.

- Lowered the Reactor Water Level Low-Level reactor scram setpoint. The lowering of the setpoint will reduce the likelihood of unnecessary reactor scrams associated with Engineered Safeguard Feature actuations by increasing the operating range between the normal reactor water level and the reactor scram trip setpoint.

The following modification was implemented as part of BFN's ALARA program:

- Cut, capped, and welded the Drywell Service Air system and Demineralized Water system connection drywell penetrations. These connections are not used during power operation and have limited use during outages. This modification eliminated the need to leak rate test the penetrations.

Implemented the following modifications to replace obsolete equipment:

- Replaced the Containment Atmospheric Dilution system valves that supply nitrogen to the drywell and suppression chamber. The previous valves were not reliable in local leak rate testing.

- Replaced the level switches in both the RCIC and HPCI steam line condensate pots.

- Replaced the suppression pool analog temperature indicator with a digital indicator.

- Replaced the Unit 2 Reactor Feedwater Pump start-up bypass control valve.

- Replaced the Control Rod Position Indication System power supplies.

Implemented the following modifications in support of the scram reduction program:

- Replaced the main turbine thrust bearing wear detection and the turbine low bearing oil pressure trip pressure switches. Each switch was replaced with 3 switches arranged in a two-out-of-three logic scheme. This will reduce the likelihood for spurious turbine trips and subsequent reactor scrams.

- Revised the trip logic on the 500 KV Main Transformer 2A, 2B, and 2C on Unit Station Transformers 2A and 2B and the Unit 1 and 2 spare Main Transformer. Previously, an additional Sudden Pressure Relay (SPR) was added in series to the transformer to the trip logic providing a two-out-of-two actuation logic. The revised logic added auxiliary relays to the transfer trip logic such that actuation of one-out-of-two SPRs provides an alarm function, and actuation of two-out-of-two SPRs trips the transformer.

TVA performed approximately 1093 corrective maintenance activities, 920 preventative maintenance work activities, and 1377 post maintenance tests were completed. These included:

- motor operated valve testing (MOVATS) for 26 valves, including three valves tested during pre-outage activities
- replaced approximately 700 feet of Extraction Steam system carbon steel piping with chromium molybdenum piping
- replaced 292 fuel assemblies
- replaced 8 local power range monitor detectors
- replaced the pump seals on both the 2A and 2B Reactor Recirculation Pump system pumps
- performed inspection and overhaul of the 2A Reactor Feed Pump Turbine

Major inspection activities included:

- reactor pressure vessel internals including inspection of the beltline welds
- inservice inspection of 141 welds
- examination of 202 grids for Flow Accelerated Corrosion
- performed 33 snubber and spring can visual inspections
- performed 38 snubber functional tests
- inservice inspection of 4 stop/control/combined intermediate valves
- inservice inspection of 3 bypass and relief valves

Eleven temporary alterations, 14 operator work arounds, 42 control room deficiencies, and five disabled alarms were resolved during the outage. Also, 12 temporary leak repairs were replaced with permanent repairs, six oil leaks were repaired, and ten catch devices were removed.

During the Unit 2 Cycle 11 outage, all eight Main Steam Isolation Valves (MSIV) passed the initial as-found local leak rate test. This is the first outage that all eight Unit 2 valves passed the as found test. A combination of modifications to the valves implemented in past outages and a revised Technical Specification leak rate limit allowed BFN to achieve this performance.

The Unit 2 Cycle 11 refueling outage was completed in approximately 38 days and 10 hours. The scope of the activities completed during the outage were such that BFN Unit 2 can be operated safely and reliably for 24 months during Cycle 12 operation.

In accordance with NRC RIS 200-05, only one paper copy of this document is being sent to the NRC Document Control Desk. There are no commitments contained in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

T. E. Abney
Manager of Licensing
and industry Affairs

cc: See page 7

(Via NRC Electronic Distribution):

cc: Mr. William O. Long, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. Paul E. Fredrickson, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, S. W., Suite 23T85
Atlanta, Georgia 30303

NRC Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611