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

June 13, 2000

U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket No. 50-296
Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3, CYCLE 9 REFUELING OUTAGE SUMMARY

This letter provides a summary of the major activities performed at BFN during the scheduled Unit 3, Cycle 9 refueling outage. On April 15, 2000, TVA concluded Unit 3 Cycle 9 power operation and initiated the Cycle 9 refueling outage. Initial criticality for Cycle 10 operation was achieved on May 3, 2000, at 0440 hours Central Daylight Time (CDT). Unit 3 was connected electrically to the grid (close breaker) on May 3, 2000, at 1902 hours CDT and achieved 100 percent power at approximately 1502 hours CDT on May 6, 2000.

During the refueling outage, TVA performed numerous major modifications and maintenance activities to support continued safe and reliable operation of Unit 3 for 24 months.

The following modifications were made to enhance nuclear safety:

- Implemented Hydrogen Water Chemistry to reduce Intergranular Stress Corrosion Cracking (IGSCC) on the reactor. The introduction of hydrogen into the feedwater

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will raise the concentration of hydrogen in the reactor coolant. The oxygen that results from radiolytic decomposition will combine with the hydrogen and form water, thus, reducing the oxygen concentration, and limiting IGSCC.

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

- Enabled the Oscillation Power Range Monitoring (OPRM) system trip function. A modification implemented during the Unit 3 Cycle 8 refueling outage installed the OPRM system using the General Electric Nuclear Measurement, Analysis, and Control (NUMAC) equipment. During Cycle 9 Operation, the OPRM operated in the indicate only mode. Enabling the OPRM system trip function completes BFN's commitment to implement the long-term solution for core stability on Unit 3.

- Replaced the Unit 3 Reactor Core Isolation Cooling (RCIC) system main steam inboard primary containment isolation valve. These valves are susceptible to thermal binding and were 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 ALARA.

- Replaced the Unit 3 Reactor Core Isolation Cooling (RCIC) system main steam exhaust containment isolation check valve with lift check valve for added reliability.

- Modified the RCIC system pump inboard injection valve by drilling a small hole (¼ inch) in the feedwater side of the 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 valve bonnet could create opening thrust demands on the operator substantially higher than the normal requirements. Drilling a hole in valve face allows any entrapped water in the bonnet to drain during a loss of

reactor pressure event. Hence, the valve can be opened with normal thrust load on the operator.

- Replaced the existing O-ring/clip combination on both the inner and outer Reactor Pressure Vessel (RPV) seals with a Helicoflex O-ring and retainer clip combination. This modification has stopped head leakage on Unit 2 (installed in Spring 1999) and appears to have the same affect on Unit 3.

- Installed tie-in piping and shutoff valves in the Drywell Control Air (DWCA) system and Containment Inerting (CI) system to allow for future installation of a source of nitrogen from the CI system to the DWCA system. TVA intends to replace the drywell control air compressor with a nitrogen source.

- Installed isolation valves and a bypass line around the Residual Heat Removal (RHR) pump seal injection water heat exchangers. This modification increases the reliability and availability of the RHR pumps by allowing maintenance and inspection of the seal injection heat exchangers without removing the RHR pumps from service. The installation was completed without breaching the containment boundary.

- Implemented main steam line ruggedness modifications that ensure that an alternate path to the Main Condenser is available following a design basis loss of power/loss of coolant accident.

The following modification was made as part of the implementation of a 24 month fuel cycle:

- Replaced ten electrical/mechanical time delay relays with solid state electronic time delay relays. Six of the relays are associated with Automatic Depressurization System initiation and seal-in function and four relays are associated with the Core Spray system pump start sequencing logic.

The following modification was implemented as part of BFN's program to reduce worker dose to as low as reasonably achievable (ALARA):

Rerouted the Source Range Monitor and Intermediate Range Monitor cables such that they no longer pass through the Control Rod Drive (CRD) under vessel platform structure.

- Prior to the completion of the modification, these cables had to be disconnected and moved each time the under vessel maintenance was performed.

Implemented the following modifications to replace obsolete equipment:

- Replaced the Unit 3 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:

- Modified the Unit 3 Main Generator protection circuitry to eliminate a single point failure that could potentially cause an unnecessary generator trip. The circuit for the generator overcurrent relay was modified to block a potential invalid trip signal that could be generated upon opening of the potential transformer fuse.

- Replaced the sudden pressure relays (SPR) on 500 KV Main Transformers 3A, 3B, and 3C and on Unit Station Transformers 3A and 3B. Also, added a SPR in series with each existing relay providing a two out of two relay actuation logic.

The following modification was made to increase plant reliability:

- Added a permissive contact to the Reactor Feed Water Heater Control system control logic. This modification adds verification of high level to the high pressure heater isolation logic thus eliminating spurious isolations.

Approximately 1459 corrective maintenance (347 Pre-Outage), 850 preventative maintenance work activities and 2107 post maintenance (347 Pre-Outage) tests were completed during the outage. These included:

- motor operated valve testing (18 MOVATS) on 19 valves, including two valves tested during pre-outage activities

- replaced approximately fourteen 4KV circuit breakers

- replaced 1050 feet of Extraction Steam system carbon steel piping with chromium molybdenum piping.
- performed the ten year overhaul of the Reactor Core Isolation Cooling system pump and turbine
- replaced the pump seals on both the 3A and 3B Reactor Recirculation Pump system pumps
- performed inspection and overhaul of the 3A feed pump turbine

Major inspection activities included:

- reactor pressure vessel internals
- inservice inspection of 32 welds
- examination of 161 grids for Flow Accelerated Corrosion
- performed 271 snubber and spring can visual inspections
- performed 84 snubber functional tests
- inservice inspection of 3 stop/control/combined intermediate valves
- inservice inspection of 3 bypass and relief valves
- inspected Main Turbine Low Pressure Turbine C

Several open programmatic issues were resolved during the outage. These included closing of nine temporary alterations, seven operator work arounds, 32 control room deficiencies, and seven disabled alarms. Also, six leak repairs were replaced with permanent repairs, four oil leaks were repaired, and six catch devices were removed. This enabled BFN to restart Unit 3 with no open programmatic issues.

On February 11, 2000, TVA received the NRC Safety Evaluation for the BFN Unit 3 American Society for Mechanical Engineers Code Relief for Risk Informed Inservice Inspection of Piping (RI ISI). During the Cycle 9 refueling outage, TVA implemented the RI ISI

program for Unit 3. The ASME Section XI ISI program is flexible in the scheduling of inspections. This allows TVA the option to relocate certain inspections into the next scheduled refueling outage. Consequently, TVA cannot quantify a direct savings in cost and radiation during the Cycle 9 outage. However, TVA estimates that the implementation of the RI ISI program TVA affords a savings of approximately $385,000 and six REM per outage during the current interval.

During the Unit 3 Cycle 9 outage, all eight Main Steam Isolation Valves (MSIV) passed the initial as-found local leak rate test. Testing determined the as-found MSIV leakrate was less than 11.5 standard cubic feet per hour. This is the first outage that all eight valves passed the initial test. Modifications to the valves that allowed BFN to achieve this performance were initiated several years ago and have been implemented in past outages.

The Unit 3 Cycle 9 refueling outage was completed in approximately 18 days and two hours. The scope of the activities completed during the outage were such that BFN Unit 3 can be operated safely and reliably for 24 months during Cycle 10 operation.

There are no commitments contained in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

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