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SUBJECT: Provides summary of major activities performed at BFN during scheduled Unit 3 Cycle 8 refueling outage.

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October 23, 1998

U.S. Nuclear Regulatory Commission
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Gentlemen:

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

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 CYCLE 8 REFUELING OUTAGE SUMMARY

This letter provides a summary of the major activities performed at BFN during the scheduled Unit 3 Cycle 8 refueling outage. On September 20, 1998, Unit 3 was shutdown to complete Cycle 8 power operation and start Cycle 8 refueling outage. Initial criticality for Cycle 9 operation was achieved on October 14, 1998, at 1809 hours. Unit 3 was connected to the grid on October 15, 1998, at 1507 hours and is currently scheduled to achieve 100 percent uprated power, 3458 MWt, on October 29, 1998, following extensive post outage, power ascension testing.

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

The following modifications were made to enhance nuclear safety:

- Replaced the lower portion of the Core Spray loop 2 piping internal to the reactor vessel which had experienced intergranular stress corrosion cracking (IGSCC) with material not susceptible to IGSCC. This eliminated the need to examine this weld during subsequent refueling outages.

- Installed over pressure protection for the isolated portion of the drywell floor and equipment drain sump discharge piping inside primary containment. This eliminated the potential for over pressurizing this section of piping during a design basis accident.

- Replaced the low pressure ECCS suction strainers in the torus with larger high capacity stacked disk strainers. These will provide approximately 60 times the flow area of the previous strainers. This ensures adequate strainer capacity is maintained during a design basis accident (DBA).

- Replaced AC and DC electric motors on motor operated valves with those of higher output and revised torque switch settings. This ensures compliance with NRC Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance requirements.

- Installed advanced digital Power Range Neutron Monitoring (PRNM) system upgrade utilizing the General Electric Nuclear Measurement, Analysis, and Control (NUMAC) equipment with the Option III trip function in the indicate only mode. This installation supports TVA's long-term solution to core stability.

- Replaced High Pressure Coolant Injection (HPCI) system steam admission valve, which was susceptible to thermal binding, with a double-disc gate valve that is not susceptible to thermal binding.

- Replaced the Unit 3 Reactor Core Isolation Cooling containment isolation valves with a design which is not

susceptible to thermal binding. The double-disk design will also improve in local leak rate test performance. Additionally, the valve stem design reduces motor operated valve testing setup time, thus enhancing ALARA.

- Installed redundant pressure transmitters and switches to electrically control the opening of the 13 Main Steam relief valves. This modification provides backup to the mechanical relief function of the valves.

- Evaluated the Main Steam system piping beyond the Main Steam isolation valves for seismic ruggedness. As a result, modifications were performed which included adding/modifying pipe supports, rerouting of drain piping, and modifying turbine building grating. These modifications ensure integrity of the Main Steam system piping to the main condenser following a design basis seismic event.

The following modifications were made to enhance ALARA:

- Constructed a permanent hatch in the drywell floor steel grating. This will facilitate removal and replacement of the main steam relief valves during refueling outages.

- Installed a debris filter on main condenser waterbox 3A1 circulating water inlet pipe. Operating experience indicates the accumulation of debris in the waterbox reduces thermal performance of the condenser requiring periodic cleaning. The installation of the filter provides a means of removing the debris prior to entering the waterbox, thus minimizing required manual cleaning at reactor power and reducing accumulated radiation dose.

The following modifications were made to increase plant reliability:

- Several improvements were made in the Reactor Water Recirculation control system which will improve system performance and reliability. These included:

  - Installation of a digital speed control system on the reactor water recirculation motor generator set. The

system utilizes a proportional-integral control system to control the reactor water recirculation motor generator output.

- Installed three new operator initiated runbacks. An upper power runback at approximately 90 percent steam flow, a mid-power runback at approximately 83 percent steam flow, and a 55 percent core flow runback.

- Upgraded the Fisher Porter jet pump flow transmitters to Rosemount Smart Transmitters. The upgrade will improve transmitter accuracy and allow for easier calibration.

- Modifications to the Reactor Water Cleanup system to improve reliability included:

  - Installed flow limiting orifices in the discharge piping. This will prevent pump run-out and subsequent trip during pump starts.

  - Revised the low flow pump trip time delay setpoint from seven (7) seconds to thirty (30) seconds.

  - Replaced the wedge gate design containment isolation valves with a double-disc gate design. The double-disk design is not susceptible to thermal binding. Also, to facilitate Appendix J testing, permanent test connections were installed.

- Implemented the following modifications to support the scram reduction program:

  - Established an alternate power supply source to various circuits in the Off-Gas system. A power sensing relay was installed that upon loss of power will automatically transfer affected circuits to an alternate power supply.

  - Removed Off-Gas system high temperature and high pressure isolation signals. High temperature or pressure is now an alarm function only.

Approximately 620 corrective maintenance and 800 preventative maintenance work activities were completed during the outage. These included:

- motor operated valve testing (26 MOVATS)
- fuel sipping
- replacement of 292 fuel assemblies including removal of leaking assemblies
- replacement the 13 main steam relief valves with valves reset 30 psi higher to accommodate power uprate conditions
- replacement of 8 control rod blades

Major inspection activities included:

- reactor pressure vessel internals
- inservice inspection of approximately 211 primary welds, including 80 IGSCC welds
- Flow Accelerated Corrosion, 165 grids examined
- approximately 31 snubber and spring can inspections
- stop/control/containment isolation valves
- bypass and relief valves
- high pressure turbine

Open programmatic deficiencies were resolved during the outage. These included closing of two temporary alterations, six operator work arounds, thirty-four control room deficiencies, and five disabled alarms. Also, two temporary leak repairs were replaced with permanent repairs, seventeen oil leaks were repaired, and six radwaste catch devices were removed. This enabled BFN to restart Unit 3 with no open programmatic deficiencies.

During the outage, TVA successfully utilized the recently installed Alternate Decay Heat Removal system to aid in cooling of the Unit 3 spent fuel pool and reactor cavity.

As previously noted, BFN Unit 3 was returned to service with an uprated power output of 3458 MWt. This represents an increase in thermal power of 165 MWt over the original licensed output for Unit 3. On September 8, 1998, TVA received amendments to the Units 2 and 3 licenses allowing implementation of a 5 percent increase in thermal reactor power. Implementation of this amendment on Unit 3 will result in an increase in electrical output of approximately 55 MWe.

The Unit 3 Cycle 8 refueling outage was completed in approximately 25 days without sustaining a loss-time accident. The scope of the activities completed during the outage were such that BFN Unit 3 can be operated safely and reliably during Cycle 9 operation.

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

cc: Mr. Harold O. Christensen, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
61 Forsyth Street, S. W.
Suite 23T85
Atlanta, Georgia 30303

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

Mr. Albert W. De Agazio, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. L. Raghavan, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852