September 7, 2006

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-001

Gentlemen:

In the Matter of) Docket No. 50-259
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 1 – RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) - GENERIC LETTER (GL) 98-04, POTENTIAL FOR DEGRADATION OF THE EMERGENCY CORE COOLING SYSTEM AND THE CONTAINMENT SPRAY SYSTEM AFTER A LOSS-OF-COOLANT ACCIDENT BECAUSE OF CONSTRUCTION AND PROTECTIVE COATING DEFICIENCIES AND FOREIGN MATERIAL IN CONTAINMENT (TAC NO. MC3159)

By letter dated May 11, 2004, TVA submitted to the NRC a response to GL 98-04, “Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-Of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment.” This letter confirmed that the BFN Unit 1 program is consistent with the Units 2 and 3 program.

In a letter dated August 6, 2006, the NRC noted that a response to the letter’s enclosed RAI is needed before the NRC staff can complete the review.

The enclosure to this letter contains the specific NRC requests for additional information and the corresponding TVA responses.

No new regulatory commitments have been made in this submittal.

If you have any questions regarding this letter, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 7th day of September, 2006.

Sincerely,

Original signed by:

William D. Crouch
Manager of Licensing
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Enclosure

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 1

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) - GENERIC LETTER (GL) 98-04, POTENTIAL FOR DEGRADATION OF THE EMERGENCY CORE COOLING SYSTEM AND THE CONTAINMENT SPRAY SYSTEM AFTER A LOSS-OF-COOLANT ACCIDENT BECAUSE OF CONSTRUCTION AND PROTECTIVE COATING DEFICIENCIES AND FOREIGN MATERIAL IN CONTAINMENT

By letter dated May 11, 2004, TVA submitted to the NRC a response to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-Of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment."

In a letter dated August 6, 2006, the NRC noted that a response to the enclosed RAI is needed before the NRC staff can complete the review.

This enclosure contains the specific NRC requests for additional information and the corresponding TVA responses.

NRC Request 1

Please discuss the scope of the coating inspection performed at the Browns Ferry Nuclear plant (BFN), Unit 1, in response to Generic Letter 98-04. Please discuss the criteria used to determine the inspection scope and how you have accounted for the period of extended shutdown. Please provide the inspection results in sufficient details to enable the NRC staff to make its safety findings. Some of the details should include the types of coating degradation identified, sizes, causes, repairs, etc.

TVA Response to NRC Request 1

As discussed in Reference 3, the Browns Ferry Nuclear Performance Plan (Reference 1) describes the Containment Coating Special Program which focuses on qualified coatings. Reference 2 indicated TVA's intention to complete the Special Programs for Unit 1 in accordance with the implementation precedent and criteria used to restart Unit 3. TVA's Containment Coating Program includes an element to identify and quantify unqualified coating.

Due to the extended outage and in order to satisfy TVA's Containment Coating Program, to ensure the quality of the containment coating systems, and to establish a reasonable confidence the coatings will provide long term service, BFN Unit 1 is performing, to the extent practicable, a 100% visual inspection of the primary containment coatings. See the response to Request 2 below for a more detailed description of remedial action taken in the repair of the primary containment coatings.

When completed, this inspection will have included:

a. the interior and exterior of the torus pressure retaining and structural components;

b. the interior and exterior of the vent header and downcomers;

c. the torus to drywell vacuum breakers;

d. the main steam relief valve (MSRV) tailpipes and T-quenchers;

e. the exterior of the torus spray headers;

f. the drywell vent pipes and expansion joints;

g. the interior surfaces of the drywell liner;

h. to the extent practicable, the coatings on all components and structures in the drywell that were not replaced or recoated; and

i. the interior of the emergency core cooling system (ECCS) suction header (uncoated).

The inspections have identified rust, cracking, blistering, peeling, delamination, incipient rust, and mechanical damage. The inspections revealed the torus coating was generally in good condition considering the length of time the torus had been in layup. There were isolated areas of coatings failures such as surface rust, blistering, and peeling. The extent of failures can be characterized as less than 10%. The drywell coating is in generally good condition. Isolated incidents of incipient rust, blistering, peeling, and mechanical damage were identified. Additionally, rust was found in the area of the floor to liner plate moisture seal. The moisture seal was removed, the rust was cleaned up, the coating was restored, and the moisture seal was replaced.

Additionally, the inspections have identified coatings on nonferrous components and stainless steel. Unqualified coatings are being removed to the extent practicable.

NRC Request 2

Your response stated that when localized areas of degraded coatings are identified, they are evaluated and subsequently repaired as necessary. Please discuss (1) the criteria used to determine what constitutes "localized areas of degraded coating" and the corrective actions that are followed, (2) what corrective actions are taken if the "localized" criteria is exceeded, (3) identify what major (exceed localized limits) coating work has been or needs to be performed, (4) identify the reason (cause of failure), extent and coating system chosen for any major coating work and (5) discuss the criteria when repair or replacement would not be necessary, how repairs are scheduled and include prioritization of repair work.

TVA Response to NRC Request 2

TVA drained the Unit 1 torus in the summer of 2003. In September 2004, TVA made the decision to sandblast and recoat the entire immersion area of the torus. The new coating was inspected by Quality Control in accordance with applicable coating procedures and found to be acceptable. The torus coating above the immersion area was repaired as necessary, and inspected and determined acceptable by Quality Control, in accordance with applicable coating procedures.

BFN Unit 1 has completed a 100% repair of the torus coatings (items a. through e. from the response to Request 1 above). BFN procedures allow the repair of localized areas of degradation (i.e., less than two square inches) using minimal surface preparation (solvent cleaning and/or hand sanding) and application of the approved Service Level I coating system applied per approved procedures. Larger repair areas were prepped to Steel Structure Painting Council / National Association of Corrosion Engineers Standards, SP-10 (near-white blast cleaning) or SP-11 (power tool cleaning to bare metal), feather edged into sound coating and repaired with the approved Service Level I coating system applied per approved procedures. The vapor spaces were repaired with Ameron Vyguard 78 (formerly Valspar 78). The immersion space was 100% recoated with Keeler and Long 6548/7107, which is DBA tested and approved for immersion applications. The surface prep for the immersion area was SP-5 (white metal blast cleaning).

The drywell (items f. through h. from the response to Request 1 above) was 100% inspected and coatings will be repaired per approved procedures. These procedures allow repair by full restoration or in some instances scraping away the failed coating back to sound coating and monitoring the areas of degradation during subsequent outage inspections. This

technique is acceptable since the containment is inerted with nitrogen gas during operation, creating an environment which is not conducive to corrosion.

The drywell liner was inspected and will be repaired consistent with approved plant procedures. A large portion of the drywell structural steel has been replaced. All new steel and other components such as hangers and pipe supports have been coated with a Service Level I coating system per approved plant procedures. Interior surfaces such as the floor and the sacrificial shield wall have been inspected. The scrape "back to sound coating" method, as defined in MAI-5.3 (Reference 5) was used to the extent practicable to correct identified problems.

The ECCS suction ring header (item i. from the response to Request 1 above) and the systems which communicate with the torus have been mechanically cleaned to the extent practicable and flushed to remove rust and scale. The ECCS ring header was inspected internally utilizing a remotely controlled robotic device equipped with a camera to verify cleanliness and material condition.

The types and extent of coatings failures in the BFN Unit 1 containment are consistent with the age and the period of time which elapsed since BFN Unit 1 was shutdown with no periodic inspection and maintenance. Therefore, prior to BFN Unit 1 Restart, as discussed in detail in this document, the following tasks have been or will be completed:

- Have completed the following:
  - 100% inspection of the entire containment;
  - 100% recoat of the immersion area of the torus, including interior and exterior of the downcomers in the immersion area;
  - 100% repair of the torus vapor space; and
  - 100% inspection of the vent header and downcomers, repairing as necessary.
- Will perform a 100% inspection of the drywell, repairing as necessary.

As discussed in Reference 2, the BFN Unit 1 Containment Coating Program including the inspection, repair and coating will be completed prior to BFN Unit 1 Restart.

NRC Request 3

Please discuss how containment coatings are evaluated for acceptability when degraded areas are identified (this is not intended to be discussion regarding qualification) and how the extent of coating degradation in these areas is determined.

TVA Response to NRC Request 3

During the restart project for BFN Unit 1, the established criteria for repair is any indication of rust, cracking, blistering, peeling, delamination, incipient rust or mechanical damage. Other than superficial stains, 100% of the areas of coating degradation in the torus vapor region, including the interior and exterior portions of the vent header, were repaired per approved procedures. The immersion zone of the torus, including the interior and exterior portions of the vent header in the immersion region, was completely recoated per approved procedures using a Service Level I coating system approved for immersion duty. As discussed in the response to Request 2 above, the approved procedures have provisions for "scrape back to sound coating and monitor", and this method of repair requires engineering approval. This technique, used on a limited basis in the drywell, is acceptable since the containment is inerted with nitrogen gas during operation, creating an environment which is not conducive to corrosion.

NRC Request 4

Your response stated that the coating inspection included the exposed components and surfaces inside the primary containment. Please discuss the coating inspection, including scope, periodicity, method of inspection, etc., associated with components that are not exposed, i.e., submerged portions of the torus.

TVA Response to NRC Request 4

The BFN Containment Coating Program definition of exposed coatings includes all coatings directly exposed to the containment environment and not contained in a manner which negates the possibility of the coating, should it fail, being transported to the ECCS suction strainers. This includes the coatings in the immersion area. Furthermore, the immersion zone of the Unit 1 torus was 100% recoated with an approved Service Level I coating system applied per approved procedures. As stated in Reference 3, BFN has procedures in place which require visual inspection of containment coatings in the drywell and torus vapor region each outage, inspection of the immersion zone every other outage, and periodic desludging based on sludge

generation rate to ensure accumulated sludge in the torus does not exceed the assumed value in the strainer plugging calculation.

NRC Request 5

Your response stated that you had a certain limit on the amount of unqualified coating. Please discuss how degraded or unqualified coatings are assessed for impact on the emergency sump. Please include in the discussion how degraded or unqualified coatings in unexposed areas are addressed when assessing impact on the sump.

TVA Response to NRC Request 5

As discussed in References 3 and 4, the ECCS strainer sizing calculation assumes specific quantities of coating chips contribute to ECCS strainer blockage. This quantity consists of the total of unqualified coating which meets the criteria for contributing to strainer blockage and a quantity of qualified coatings from the zone of influence of the jet impingement of the postulated pipe breaks. The quantity of unqualified coating which would contribute to strainer blockage allowed in the drywell and torus is limited to the quantity assumed in the strainer blockage calculation.

See the discussion on exposed/unexposed coatings in response to Request 4 above.

NRC Request 6

Please provide a description of any physical testing (e.g. adhesion) performed at BFN1. Include the results of any such testing.

TVA Response to NRC Request 6

A VT-3 visual inspection was performed by qualified inspectors of the entire primary containment pressure boundary. Additionally, adhesion tests at selected locations in the drywell were performed by qualified individuals and witnessed by Quality Control (QC) inspectors.

As delineated in NRC Inspection Report 2005-06 (Reference 5), NRC inspectors examined the completed coatings in the immersion zone of the torus. They independently examined the completed coatings and performed testing to independently determine the thickness of the completed coatings at approximately 3000 locations by use of several dry film thickness gauges. This Inspection Report concluded “the licensee’s program for

restoration of coatings in the Unit 1 torus complied with NRC requirements."

REFERENCES

1. TVA letter, S. A. White to NRC, "Browns Ferry Nuclear Plant (BFN)-Nuclear Performance Plan, Revision 2," dated October 24, 1988
2. TVA letter, T. E. Abney to NRC, "Browns Ferry Nuclear Plant (BFN)-Unit 1-Regulatory Framework for the Restart of Unit 1," dated December 13, 2002
3. TVA letter, T. E. Abney to NRC, "Browns Ferry Nuclear Plant (BFN) Unit 1-Response to NRC Generic Letter (GL) 98-04, Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," dated May 11, 2004
4. TVA letter, T. E. Abney to NRC, "Browns Ferry Nuclear Plant (BFN)-NRC Bulletin 96-03, Potential Plugging of Emergency Core Cooling Suction (ECCS) Strainers by Debris in Boiling-Water Reactors (TAC NOs. M96135, M96136, M96137) dated July 25, 1997
5. NRC letter to TVA, dated May 16, 2005, Browns Ferry Nuclear Plant Unit 1 Recovery - NRC Integrated Inspection Report 05000259/2005006