UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

February 12, 2004

Tennessee Valley Authority
ATTN: Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT UNIT 1 RECOVERY - NRC INTEGRATED INSPECTION REPORT 05000259/2003011

Dear Mr. Scalice:

On January 17, 2004, the US Nuclear Regulatory Commission (NRC) completed an inspection associated with recovery activities at your Browns Ferry 1 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on January 26, 2004, with Mr. John Rupert and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, this report documents one Severity Level IV violation of NRC requirements that resulted from the failure to perform Quality Control inspections. However, the NRC is treating this finding as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. If you contest the NCV in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Stephen J. Cahill, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket No. 50-259
License No. DPR-33

Enclosure: NRC Integrated Inspection Report 05000259/2003011
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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|---|---|
| Docket No: | 50-259 |
| License No: | DPR-33 |
| Report No: | 05000259/2003011 |
| Licensee: | Tennessee Valley Authority (TVA) |
| Facility: | Browns Ferry Nuclear Plant, Unit 1 |
| Location: | Corner of Shaw and Nuclear Plant Roads<br>Athens, AL 35611 |
| Dates: | October 19, 2003 - January 17, 2004 |
| Inspectors: | W. Bearden, Senior Resident Inspector, Unit 1<br>E. Christnot, Resident Inspector<br>J. Lenahan, Senior Reactor Inspector, (Section E1.2)<br>J. Fuller, Reactor Inspector, (Section E1.3) |
| Approved by: | Stephen J. Cahill, Chief<br>Reactor Project Branch 6<br>Division of Reactor Projects |

Enclosure

# EXECUTIVE SUMMARY

Browns Ferry Nuclear Plant, Unit 1
NRC Inspection Report 05000259/2003-011

This integrated inspection included aspects of licensee engineering and modification activities associated with the Unit 1 restart project. The inspection program for the Unit 1 Restart Program is described in NRC Inspection Manual Chapter 2509. Information regarding the Browns Ferry Unit 1 Recovery and NRC Inspections can be found at http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/index.html#bf1recovery. The report covered a 3-month period of resident inspection. In addition, NRC staff inspectors from the regional office conducted inspections of Unit 1 Special Programs in the areas of drywell steel and intergranular stress corrosion cracking (IGSCC).

Inspection Results - Engineering

- Review of Unit 1 modification design packages for upgrades to torus water level instrumentation, replacement of electrical cables in the reactor building, and for replacement of recirculation system piping activities, concluded that the design changes were appropriately developed, reviewed, and approved for implementation per procedural requirements (Section E1.1).

- During the review of Unit 1 drywell steel, inspectors verified samples of the following attributes complied with the requirements shown on the design drawings: member sizes, configuration, weld sizes, type, and length, connection details, and verification of correct type bolts in existing connections. No violations or deviations were identified (Section E1.2).

- The licensee's IGSCC mitigation plan and Recirculation Pipe Replacement Project was meeting commitments established by Regulatory Framework Letters and the prevailing Boiling Water Reactor (BWR) technical guidance (Section E1.3).

- A Severity Level IV Non-Cited Violation for failure to perform required safe-end annulus cleanliness inspections was identified during the current inspection. The error resulted from poor judgement, ineffective communications, and a lack of understanding of expectations (Section E1.3).

- The licensee completed the first phase of the program for inspection of electrical cables subject to harsh environments. Comprehensive risk assessments were performed prior to performing these intrusive inspections. In addition, significant management oversight occurred during the inspections. The licensee's inspections resulted in the identification of unqualified cables for replacement without any significant impact on the operating units. The scope of cables involved in the licensee's reviews were considered conservative (Section E1.4).

- A review of temporary alterations did not identify any significant impact on the operability of equipment required to support operations of Units 2 and 3 (Section E1.5).

# REPORT DETAILS

Summary of Plant Status

Unit 1 has been shut down since March 19, 1985, and has remained in a long-term lay-up condition with the reactor defueled. The licensee initiated Unit 1 recovery activities to return the unit to operational condition following the TVA Board of Directors decision on May 16, 2002. Engineering and procurement activities to support replacement of plant components is ongoing. Reinstallation of plant equipment and structures was ongoing. Recovery activities include design walkdowns; replacement of drywell structural steel; replacement of reactor coolant system piping; reinstallation of balance-of-plant piping and turbine auxiliary components; and installation of new electrical penetrations, cable trays, and cable tray supports.

## III. Engineering

### E1 Conduct of Engineering

E1.1 Permanent Plant Modifications (IP 37550 and 71111.17)

a. Inspection Scope

The inspectors reviewed permanent plant modifications for electrical cable installation and replacement of recirculation system piping in the drywell. The inspectors reviewed criteria in licensee procedures SPP-9.3, Plant Modifications and Engineering Change Control; SPP-7.1, Work Control Process; SPP-8.3, Post-Modification Testing, and SPP-8.1, Conduct of Testing, to verify that the risk-significant plant modifications were developed, reviewed, and approved per the procedure requirements. The inspectors evaluated the adequacy of the modification, observed field work as noted, to verify that the design basis, licensing bases, and TS-required performance for the system had not been degraded as a result of the proposed or implemented modification.

b. Observations and Findings

b.1 Design Change Notice (DCN) 51045 - Drywell Recirculation System Piping Replacement

The inspectors reviewed the permanent plant modification to remove and replace recirculation system piping, valves, and reactor pressure vessel (RPV) safe-ends for Unit 1. The intent of this DCN was to address NRC Generic Letter 88-01, regarding mitigation of Inter-Granular Stress Corrosion Cracking (IGSCC) by removal of potentially flawed weld joints and materials from the system. The inspectors reviewed criteria in licensee procedures and modification instructions to verify that the risk-significant plant modification was developed, reviewed, and approved per the procedure requirements. In addition, the inspectors observed field work to install RPV safe-ends, reviewed completed weld inspection records, and observed preparations for welding of replacement recirc system piping.

b.2 Design Change Notice 51216 - 480-Volt Cable Replacement

The inspectors reviewed the permanent plant modification to replace 480-volt cables in the reactor building for Unit 1. The intent of this DCN was to replace these electrical cables to satisfy 10CFR50.49, environmental qualification (EQ) requirements. The inspectors reviewed criteria in licensee procedures and modification instructions to verify that the risk-significant plant modification was developed, reviewed, and approved per the procedure requirements.

b.3 Design Change Notice 51217 - 4-kV Electrical Cable Replacement

The inspectors reviewed the permanent plant modification to replace 4-kV cables in the reactor building for Unit 1. The intent of this DCN was to replace these electrical cables to satisfy 10CFR50.49, EQ requirements. The inspectors reviewed criteria in licensee procedures and modification instructions to verify that the risk-significant plant modification was developed, reviewed, and approved per the procedure requirements.

b.4 Design Change Notice 51245 - Primary Containment System

The inspectors reviewed the permanent plant modification to upgrade the torus water level instrumentation for Unit 1. The intent of this DCN was to upgrade the wide range level instruments to satisfy 10CFR50.49, EQ requirements, and 10CFR50, Appendix R requirements. The DCN covered narrow range and wide range torus level instruments. The narrow range level instruments are not required to satisfy EQ requirements but must meet Appendix R fire protection requirements. The inspectors reviewed criteria in licensee procedures and modification instructions to verify that the risk-significant plant modification was developed, reviewed, and approved per the procedure requirements.

c. Conclusions

Review of Unit 1 modification design packages for upgrades to torus water level instrumentation, replacement of electrical cables in the reactor building, and for replacement of recirculation system piping activities, concluded that the design changes were appropriately developed, reviewed, and approved for implementation per procedural requirements.

E1.2 Drywell Steel Platforms (IP 62002, 70370)

a. Inspection Scope

During investigations performed in the 1980's by the licensee and NRC related to restart of Unit 2, numerous deficiencies were identified in the design and construction of safety-related structural steel platforms. These included cracking of clip angles which connect structural members, failure to construct the platforms in accordance with design documents, deficiencies in welding (primarily undersized fillet welds), seismic design issues, and configuration management issues ( ie, failure to control addition of more loads to platforms).

The Unit 1 drywell structural steel platforms have been redesigned to correct the deficiencies. The majority of the original structural steel members have been removed and will be replaced. The modified structural platforms are intended to meet current design criteria and have a design margin for addition of future loads, if necessary.

The licensee's commitments for resolution of issues associated with the drywell structural steel platforms were stated in TVA letter dated December 13, 2002, Subject: Browns Ferry Nuclear Plant - Unit 1 - Regulatory Framework for the Restart of Unit 1. The letter references previous commitments for restart of Units 1 and 3 stated in a letter dated July 10, 1991, Subject: Regulatory Framework for the Restart of Units 1 and 3, and NRC approval of the licensee's plans in a letter dated April 1, 1992. Design criteria for design and seismic qualification of the drywell structural steel platforms were submitted to NRC in TVA letters dated June 12, 1991, June 13, 1991, and February 6, 1992. Acceptance of the licensee's design criteria for the structural steel platforms by NRC was documented in a Safety Evaluation Report dated July 13, 1992, Subject: Design Criteria for Lower Drywell Steel Platforms and Miscellaneous Steel.

The inspectors reviewed work orders issued to implement modifications to the drywell structural steel and to verify that information from field walkdowns and design drawings were correctly translated into work instructions. Documents examined included work control instructions, including quality control (QC) holdpoints, weld maps, instructions and location sketches to control installation of new structural steel bolts, and weld travelers. The inspectors also examined selected modifications to the Unit 1 elevation 584 drywell structural steel frames and platforms between azimuth 351° and 60 ° to verify that modifications were completed in accordance with Quality Assurance (QA) documentation, which included the work order packages, design drawings and documents contained in the Design Change Notice (DCN).

b. Conclusions

No violations or deviations were identified. During the walkdown inspection, the inspectors verified samples of the following attributes complied with the requirements shown on the design drawings: member sizes, configuration, weld sizes, type, and length, connection details, and verification of correct type bolts in existing connections.

E1.3 Inter-Granular Stress Corrosion Cracking (IGSCC) - Welding of Replacement Recirculation System Piping, General Welding Inspection (IP 55050)

a. Inspection Scope

As discussed in Section 3.6 of NUREG 1232, Safety Evaluation Report on The Browns Ferry Nuclear Performance Plan (BFNPP), and in Section III.7.0 of the BFNPP, inter-granular stress corrosion cracking (IGSCC) was identified in a number of stainless steel piping systems and reactor vessel (RV) safe ends during nondestructive examination (NDE) of these systems in response to NRC Generic Letter 88-01.

As stated in NUREG-1232, Volume 3, the NRC staff concluded that the IGSCC program defined in Section III.7.0 of the BFNPP was acceptable. Specific Commitments that Browns Ferry has made with respect to IGSCC mitigation actions for all three units are summarized in Table III-7, IGSCC Mitigation Actions, of the BFNPP. These commitments included the implementation of a Hydrogen Water Chemistry (HWC) control program, replacement of core spray piping, removal of head spray piping, stress improvement to reduce residual weld stresses, and inspection, replacement, or application of corrosion-resistant cladding or application of leak detection to inaccessible welds. The BFNPP also committed to use seamless type 316 Nuclear Grade (NG) stainless steel pipe for replacement of the Reactor Recirculation System piping.

As detailed in TVA Browns Ferry Unit 1 Regulatory Framework Letters December 13, 2002 and February 28, 2003, and Letter of Response to Request for Supplemental Information on the Regulatory Framework for the Restart of Unit 1, dated June 11, 2003, the applicable Codes for the recirculation piping replacements are: (1) ASME Section XI, 1995 Edition, 1996 Addenda, and (2) ASME Section III, Class 1, 1995 Edition, 1996 Addenda.

The inspectors reviewed the licensee’s IGSCC mitigation plan, supporting procedures, and documentation applicable to the Recirculation Pipe Replacement Project. The inspectors held discussions with licensee personnel associated with the IGSCC mitigation plan, replacement pipe and weld filler materials, weld joint design, welding process, cleanliness of weld area, welder qualifications, water chemistry controls, quality control oversight, and stress improvement processes.

b. Observations and Findings

b.1 Review of Welding Activities

The inspectors reviewed the licensee’s program for ensuring that commitments made with respect to IGSCC mitigation were satisfied. The inspectors discussed with the licensee, their response to Generic Letter (GL) 88-01, “NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping,” dated January 25, 1988. Browns Ferry Unit 1 was not required to submit a response to GL 88-01 until the completion of recirculation pipe replacement activities, as stated in the Browns Ferry Nuclear Plant (BFN) - Unit 1 - Regulatory Framework letter for the Restart of Unit 1, dated February 28, 2003. BFN committed to implement the same IGSCC mitigation actions as required for the prior restart of BFN Units 2 and 3.

For replacement of the Reactor Water Recirculation System piping, the inspectors reviewed the licensee's plan for minimizing the potential of IGSCC in the new austenitic stainless steel replacement piping. The three contributors to IGSCC include a susceptible material, residual stress in the weld area, and the chemical environment in which the material is exposed.

Browns Ferry Unit 1 is replacing the recirculation pipe with corrosion-resistant materials, and plans to use Mechanical Stress Improvement (MSIP) to reduce the potential for IGSCC. The inspectors verified that the replacement piping material and the MSIP are consistent with the NRC positions provided in GL 88-01 and prevailing BWR industry practice. Browns Ferry is following the detailed guidance for IGSCC mitigation given in Electrical Power Research Institute (EPRI) NP-6723-D, volume 1, which describes recommendations for replacing BWR recirculation piping systems to ensure optimum resistance to potential IGSCC.

In the BFNPP, the licensee committed to implement a HWC control program. In order to control the chemical environment, where the replacement piping is exposed, Browns Ferry Unit 1 intends to adopt a HWC control program similar to that employed by Browns Ferry Units 2 and 3. The inspectors verified that the licensee was following appropriate HWC guidance given in NUREG 0313, Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping, Rev. 2, June 1986.

b.2 Failure to Perform Quality Control Inspection Requirements

The inspectors reviewed licensee actions associated with Level A Problem Evaluation Report (PER) 03-017186-000. This PER identified that required nozzle/thermal sleeve annulus cleanliness inspections for safe-ends N2G and N2H were performed by the Welding Services Inc (WSI) machinist supervisor rather than a WSI Quality Level II inspector, as required by WSI work instruction WSI-BF-20.0, Procedure for Recirc Safe-end Replacement. Specifically, Step 5.6.6 of WSI-BF-20.0 required that, after the original safe-end was severed, the temporary chip dam and any machining chips were to be removed from the annulus and Quality Control (QC) was to verify "as-found" cleanliness of the thermal sleeve annulus area prior to installation of the chip barrier in the annulus. The assigned WSI inspector had a temporary medical condition preventing the individual from wearing a respirator and entering the actual work area to perform the cleanliness inspection. After informing management of this condition, the individual decided that the inspection requirements had been satisfied by the machinist supervisor's inspection of the two safe-ends. The QC inspector then signed the work instructions (Step 5.6.6) and corresponding inspection reports for both safe-ends, erroneously indicating that QC had verified cleanliness. The inspectors concluded that the contributing factors included the WSI QC prior practice of allowing craft supervision to perform these types of inspections at other utilities, and confusing guidance concerning verification contained in the WSI Nuclear Quality Assurance Program Manual.

10 CFR 50, Appendix B, Criteria V, Instructions, Procedures, and Drawings, in part, states that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. On September 4, 2003, contrary to the above, nozzle/thermal sleeve annulus cleanliness inspections for safe-ends N2G and N2H were not performed by QC as required by Step 5.6.6 of WSI-BF-20.0. Based on a review of the licensee's PER investigation results and associated corrective actions and discussions with licensee personnel, the inspectors determined that the failure by the WSI QC inspector to perform the cleanliness inspections was of low safety significance. Although the cleanliness inspections mentioned in Step 5.6.6 of WSI-BF-20.0 were required to be performed by QC personnel, these inspections were not specifically required to be performed per the applicable ASME Code. Other adequate barriers existed to prevent introduction of foreign material into the reactor pressure vessel through the nozzle/thermal sleeve annulus opening. Based on the inspections performed by the craft supervision, the licensee concluded that adequate cleanliness was maintained. The error resulted from poor judgement, ineffective communications, and a lack of understanding of expectations. A Severity Level IV Non-Cited Violation (NCV) 50-259/2003-011-01, Failure to Perform Required Safe-End Annulus Cleanliness Inspections, was identified. This violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy.

The inspectors reviewed the licensee's root cause determination and held discussions with Unit 1 management. In addition, the inspectors reviewed interim corrective actions including licensee plans for additional controls and increased contractor oversight after welding activities resumed. The inspectors concluded that the licensee's response to the condition adverse to quality was appropriate.

c. <u>Conclusions</u>

The inspectors determined that the licensee was meeting commitments established by Regulatory Framework Letters and the prevailing BWR industry practice. However, the failure to perform QC inspections required by Step 5.6.6 of WSI-BF-20.0 was identified as a Severity Level IV Non-Cited Violation (NCV) 50-259/2003-011-01, Failure to Perform Required Safe-End Annulus Cleanliness Inspections.

## E1.4 Inspections of Cables Subject to Harsh Environments (37550)

### a. Inspection Scope

The inspectors reviewed on-going activities associated with inspections of cables in harsh environment areas in Unit 1 electrical panels, boards, and junction boxes. The review evaluated the licensee's process for determining the necessity for cable replacement or qualification of existing cables. The inspector's review also included evaluation of selected technical risk assessments performed prior to intrusive inspections which could have adversely impacted an operating unit. The licensee's process for management approval of the planned inspections was reviewed and observation of ongoing activities were made as appropriate.

### b. Observations and Findings

The licensee's electrical inspections were divided into two phases. Phase 1 inspections, which occurred during this inspection period, consisted of inspections to obtain cable jacket information. Phase 2 inspections, which were about to start at the end of the inspection period, consisted of inspections of cable splices. Any unacceptable cables identified under these inspections will be added to the cable replacement scope.

Phase 1 inspections consisted of either intrusive or non-intrusive cable inspections. These inspections were performed to collect cable jacket marking data, which will be used to identify cable manufacturer and contract information. This information will be evaluated to verify that any suspect cables meet Browns Ferry equipment environmental qualification (EEQ) criteria. All non-intrusive Phase I inspections were completed prior to the start of the inspection period. Intrusive inspections involved cutting cable ties and moving cables. These activities involved some risk of adverse impact because some of these cables were in areas that support Unit 2 operation. Intrusive cable inspections started in August 2003 and were completed in December 2003. Cable jacket data were obtained at end devices if possible. The inspectors concluded that the licensee's scope was conservative due to all suspect cables being assumed to not be qualified and were to be replaced unless walkdown data confirmed that each suspect cable was qualified.

A total of 155 cables in 60 panels were scheduled to receive intrusive inspections. Prior to approval of each inspection, management was briefed on potential consequences and risk-reduction methods. In addition, the licensee developed an inspection package which incorporated the identified risk, risk mitigation plan, and appropriate operating experience considerations. For sensitive inspections, management observers were assigned. Intrusive cable inspections were completed shortly before the end of the inspection period. The licensee completed inspection of all 155 cables. These included 142 EQ cables and 13 Standby Liquid Control (SLC) cables. Of the cables inspected, 112 cables were determined to be acceptable and 43 cables were not acceptable. The next phase of cable inspections, which involves non-intrusive inspections inside cable pull boxes, started shortly before the end of the inspection period. During the future phase 2 splice inspections, all cable pull points in the suspect cable routes will be inspected for splices and, if found, the cable will be evaluated to determine if it qualifies.

If a splice exists, the cable on the other end will also be evaluated for qualification. The second phase of cable inspections is scheduled to continue until April 15, 2004.

The inspectors reviewed selected technical risk assessments and attended management briefings prior to approval of inspections. During the inspections, the inspectors attended pre-job briefings and observed ongoing inspections.

c. Conclusions

The licensee completed the first phase of the program for inspection of electrical cables subject to harsh environments. Comprehensive risk assessments were performed prior to performing these intrusive inspections and significant management oversight occurred during the inspections. The licensee's inspections resulted in the identification of unqualified cables for replacement without any significant impact on the operating units. The scope of cables involved in the licensee's reviews were considered conservative. No violations or deviations were identified during the review of the licensee's program for inspection of cables in harsh environment areas.

E1.5 Temporary Plant Modifications (IP 71111.23)

a. Inspection Scope

The inspectors reviewed licensee procedures 0-TI-405, Plant Modifications and Design Change Control; 0-TI-410, Design Change Control; SPP-9.5, Temporary Alterations, and the four open temporary modifications listed below to ensure that procedure and regulatory requirements were met. The inspectors reviewed the associated 10 CFR 50.59 screening against the system design bases documentation and reviewed selected completed work activities of the systems to verify that installation was consistent with the modification documents and Temporary Alteration Control Form (TACF). In addition, special emphasis was placed on the potential impact of these temporary modifications on operability of equipment required to support operations of Units 2 and 3.

- TACF 1-86-24-074, Remove Unit 1 torus blind flange for use in Unit 2 and temporarily replace with fabricated flange
- TACF 1-84-088-076, Remove Unit 1 personnel air lock door alarm, indicating light, lighting, and telephone circuit
- TACF 1-88-001-090, Remove rad monitors from service for RBCCW and RHRSW
- TACF 1-03-001-064, Mechanically block open valves 1-FCV-64-29 and 1-FCV-64-30 and replace containment purge HEPA filter, 1-FLT-64-0702, and tag Handswitch 1-HS-64-36 in the closed position to allow running Unit 1 containment purge air filter assembly to exhaust air from Unit 1 drywell.

b. Findings

A review of temporary alterations did not identify any significant impact on the operability of equipment required to support operations of Units 2 and 3. No violations or deviations were identified.

## E8 Miscellaneous Engineering Issues (92701)

E8.1 (CLOSED) LER 50-259/86-10: Connection of Unqualified Piping to Containment Sensing Lines Without Proper Isolation

In February 1986, design engineers identified that seismically unqualified instrument fill lines were connected to the pressure suppression chamber (torus) narrow-range water level monitor reference leg. The inspectors reviewed licensee activities associated with resolution for Unit 1. The licensee issued Design Change Notice (DCN) 51245 to implement modifications to portions of the Primary Containment System for Unit 1. DCN 51245 plans to upgrade both the narrow-range and wide-range torus level instruments, similar to the design used on Unit 3. The upgraded torus level instruments were implemented on Unit 3 and installed under DCN W17672A. Inspection and closure of this item for Unit 3 were documented in Inspection Report 50-259, 260, 296/95-38. Inspection and closure of this item for Unit 2 had previously been documented in Inspection Report 50-259, 260, 296/88-28. The inspector reviewed DCN 51245, which included the design details of the upgraded torus level instruments. Therefore, because this item is effectively being tracked in the licensee's corrective action program, is being corrected identically to the Unit 3 solution with the same process and design change, and because any implementation performance deficiencies would likely be detected by licensee oversight programs and have only minor consequences, this item meets the closure criteria established for Unit 1 recovery issues. This issue is closed for Unit 1.

E8.2 (CLOSED) IFI 50-259/84-32-02, Torus Narrow-Range Level Instrumentation Problems.

This item involves differences in indicated level between torus narrow-range level indicators greater than those allowed by Technical Specifications. The licensee has attributed this problem to height differences in the reference legs of the instrument piping for the level transmitters.

Upgraded torus level instruments were implemented on Unit 3, and installed under DCN W17672A. Inspection and closure of this item for Unit 3 had previously been documented in Inspection Reports 50-259, 260, 296/95-31 and 50-259, 260, 296/95-56. Inspection and closure of this item for Unit 2 had previously been documented in Inspection Report 50-259, 260, 296/89-20. The inspector reviewed DCN 51245 which included the design details of the upgraded torus level instruments. Therefore, because this item is effectively being tracked in the licensee's corrective action program, is being corrected identically to the Unit 3 solution with the same process and design change, and because any implementation performance deficiencies would likely be detected by licensee oversight programs and have only minor consequences, this item meets the closure criteria established for Unit 1 recovery issues. This issue is closed for Unit 1.

E8.3 (Closed) Unresolved Item (URI) 50-259/85-26-03: Interim Acceptability of Plant Operation for IE Bulletin 79-02 Requirements.

This item was opened to document safety concerns during an inspection in April, 1985, when Unit 1 was still in operation. Shortly after that, all three units at Browns Ferry were shut down. IE Bulletin 79-02 requires that all operating plants review their anchor bolts to meet a safety factor of two or greater if the long term safety factor of four or five were not met. Browns Ferry Unit 1 is undergoing modifications to meet IE Bulletin 79-02 long term design requirements before restart. The inspectors reviewed TVA Civil Design Standard DS-C1.7.1 which specifies a factor of safety of 5 for self-drilling concrete anchors and 4 for wedge bolt anchors in accordance with recommendations contained in IEB 79-02. No interim acceptability is required. Therefore, this open item does not currently apply for Unit 1 and is closed.

## V. Management Meetings

### X1 Exit Meeting Summary

On January 26, 2004, the resident inspectors presented the inspection results to Mr. John Rupert and other members of his staff, who acknowledged the findings. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

Licensee personnel

R. Acree, Welding Services Inc. (WSI) QC Supervisor
T. Abney, Nuclear Site Licensing & Industry Affairs Manager
T. Butts, SWEC Mech. Supervisor
J. Corey, U1 Radiological and Chemistry Control Manager
W. Crouch, Mechanical/Nuclear Codes Engineering Manager, Unit 1
R. Cutsinger, Civil/Structural Engineering Manager, Unit 1
R. Drake, Maintenance and Modifications Manager, Unit 1
B. Hargrove, U1 Radcon Manager
S. Johnson, TVA Welding Engineering Supervisor
R. Jones, Plant Recovery Manager, Unit 1
J. Ownby, Project Support Manager, Unit 1
J. Rupert, Vice President, Unit 1 Restart
J. Schlessel, Maintenance Manager, Unit 1
J. Symonds, Modifications Manager, Unit 1
S. Tanner, Nuclear Assurance Manager, Unit 1
J. Valente, Engineering Manager, Unit 1
T. Wiggins, WSI Manager
S. Kane, Licensing Engineer
G. Lupardus, Unit 1 Civil Design Engineer

### INSPECTION PROCEDURES USED

| | |
|---|---|
| IP 37550 | Engineering |
| IP 55050 | Nuclear Welding General Inspection Procedure |
| IP 62002 | Inspection of Structures, Passive Components, and Civil Engineering Features at Nuclear Power Plants |
| IP 70370 | Testing Piping Support and Restraint Systems |
| IP 71111.17 | Permanent Plant Modifications |
| IP 71111.23 | Temporary Plant Modifications |
| IP 92050 | Review of Quality Assurance for Extended Construction Delay |
| IP 92701 | Followup |

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

| | | |
|---|---|---|
| 50-259/2003-011-01 | NCV | Failure to Perform Required Safe-End Annulus Cleanliness Inspections (Section E1.3.b.2) |

Closed

| | | |
|---|---|---|
| 50-259/86-10 | LER | Connection of Unqualified Piping to Containment Sensing Lines Without Proper Isolation (Section E8.1) |
| 50-259/84-32-02 | IFI | Torus Narrow-Range Level Instrumentation Problems (Section E8.2) |
| 50-259/85-26-03 | URI | Interim Acceptability of Plant Operation for IE Bulletin 79-02 Requirements (Section E8.3) |

Discussed

None

## LIST OF DOCUMENTS REVIEWED

**<u>Section E1.2: Drywell Steel</u>**

<u>Procedures and Standards</u>

TVA General Engineering Specification G-89, Requirements for Structural and Miscellaneous Steel, Rev. 3, dated 4/26/94.

TVA General Engineering Specification G-29-S01, PS 4.M.4.4, ASME Section III and Non-ASME (Including AISC, ANSI B31.1 and ANSI B31.5) Bolting Material, Rev 5, dated 11/12/02.

TVA Nuclear Engineering Civil Design Standard DS-C1.7.1, General Anchorage to Concrete, Rev 9, dated 8/25/99

MAI-1.3, General requirements for Modifications, Rev. 16, dated 9/15/03.

MAI-5.2, Bolting and Structural Connections, Rev. 14, dated 6/23/03.

MAI-5.9, Fabrication and Installation of Structural and Miscellaneous Steel, Rev. 11, dated 6/16/03.

General Design Criteria Document BFN-50-C-7100, Design of Civil Structures, Rev. 13, dated 12/20/00

Drawing number 1-48E443-1, Structural Steel Drywell Floor Framing, Elev. 584' - 91/2", Rev. 6

Drawing number 1-48E443-2, Structural Steel Drywell Floor Framing at Elev. 584' - 91/2", Azimuth 351° to 82°, Rev. 6

Drawing number 1-48E443-6, Structural Steel Floor Framing at Elev. 584' - 91/2", Sections & Details, Sheet 1, Rev. 5

Drawing number 1-48E443-7, Structural Steel Floor Framing at Elev. 584' - 91/2", Sections & Details, Sheet 2, Rev. 5

Drawing number 1-48E443-8, Structural Steel Floor Framing at Elev. 584' - 91/2", Sections & Details, Sheet 3, Rev. 6

Drawing number 1-48E443-12, Structural Steel Floor Framing at Elev. 584' - 91/2", Sections & Details, Sheet 7, Rev. 2

Drawing number 1-48E443-15, Structural Steel Drywell Floor Framing, Elev. 584' - 91/2", Rev. 1

Drawing number 1-48E443-17, Structural Steel Mark and Assembly No. Listing, Elev. 584' - 91/2", Sheet 1, Rev. 2

Drawing number 1-48E443-18, Structural Steel Mark and Assembly No. Listing, Elev. 584' - 91/2", Sheet 2, Rev. 1

Drawing number 1-48E443-19, Structural Steel Mark and Assembly No. Listing, Elev. 584' - 91/2", Sheet 3, Rev. 1

Drawing number 1-48E443-20, Structural Steel Mark and Assembly No. Listing, Elev. 584' - 91/2", Sheet 4, Rev. 2

DCN 51019, Civil Drywell Lower Steel, EL 584

Work Order 02-008179-007, Re-install Drywell Steel Azimuth 30 to 60 Degrees on Elevation 584.0 Per the Marked Up Drawing

**Section E1.3 Inter-Granular Stress Corrosion Cracking (IGSCC) - Welding of Replacement Recirculation System Piping**

Procedures and Standards

MMDP-10 Rev. 4, Controlling Welding, Brazing and Soldering, 1/15/2003
MMDP-9 Rev. 0, Qualification and Certification of Personnel Performing Welding Processes, 10/19/2000
MMDP-8 Rev. 0, Controlling Welding Filler Material (WFM), 10/19/2000
MSI-0-000PRO001 Rev. 20, Cleanliness of Fluid Systems, 12/16/2002
MAI-4.2 B Rev. 20, Modification and Addition Instruction for Piping, 8/18/2003
EPRI NP-6723-D-V1, BWR Recirculation Piping System Replacement, June 1990
EPRI TR-103515, BWR Water Chemistry Guidelines, February 2000
CI-13.1 Rev.17, Chemistry Program, 9/10/2003
NUREG-0313 Rev. 2, Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping, June 1986
GL 88-01, NRC Position on IGSCC In BWR Austenitic Stainless Steel Piping, January 25, 1988
NUREG 1232 Vol. 3, Safety Evaluation Report (SER) on Tennessee Valley Authority: Browns Ferry Nuclear Performance Plan; Browns Ferry Unit 2 Restart, April 1989
NUREG 1232 Vol. 3, Supplement 1, SER, Browns Ferry Unit 2 Restart, October 1989
NUREG 1232 Vol. 3, Supplement 2, SER, Browns Ferry Unit 2 Restart, January 1991
WSI Nuclear Quality Assurance Program Manual, Rev 0

Work Orders

02-010314-009, Replace Ring Header and Riser Piping on Loop B System 068 Reactor Water Recirculation System (Incomplete)
02-010314-008, Replace Ring Header and Riser Piping on Loop A System 068 Reactor Water Recirculation System (Incomplete)
02-010314-004, Install New 28" Suction Piping from RPV Recirculation Outlet Safe End to the Recirculation Pump 1B. Install New 2" Drain, RT_Plugs, TW-68-83 and Remove and Replace 4" Decon Connection (Incomplete)
02-010314-003, Replace Recirculation Pump A Discharge Piping and Components from the Pump to the Ring Header Spool Piece.
02-010314-002, Install New Recirculation Piping Spools in the A-Loop Suction to Recirculation Pump 1A
02-010314-007, RPV RECIRC Inlet Safe Ends Loop B Nozzles N2A, N2B, N2C, N2D, and N2E

Other Documents

WSI Instruction WSI-BF-20.0, Procedure for Recirc Safe-end Replacement, Rev 2
WSI Nonconformance Report 03-031, lack of inspection signature entries on weld data sheets for N2D safe end
WSI Letter 32182-11, September 23, 2003, Actions to address Stop Work Issues
WSI Stop work order for work activities on Unit 1 safe-end installation, September 23, 2003

Problem Evaluation Reports (PERs)

03-017186-000, WSI machinist supervisor physically performed as found cleanliness inspection

**Section E1.4: Inspections of Cables Subject to Harsh Environments**

Procedures and Standards

SPP-6.1, Work Order Process Initiation, Rev 3
SPP-7.1, Work Control Process, Rev 4
0-TI-367, BFN Dual Unit Maintenance, Rev 8

Other Documents

Risk assessments for cable inspections (various)