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

May 10, 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 05000259/2004006

Dear Mr. Scalice:

On April 10, 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 April 21, 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, with the commitments in your Unit 1 Recovery Program, 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, no findings or violations of significance were identified.

In accordance with 10 CFR 2.390 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: Inspection Report 05000259/2004006
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No:	50-259
License No:	DPR-33
Report No:	05000259/2004006
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Browns Ferry Nuclear Plant, Unit 1
Location:	Corner of Shaw and Nuclear Plant Roads Athens, AL 35611
Dates:	January 18 - April 10, 2004
Inspectors:	W. Bearden, Senior Resident Inspector, Unit 1 E. Christnot, Resident Inspector S. Vias, Senior Reactor Inspector, (Section E1.3, E8.6) B. Crowley, Senior Reactor Inspector, (Section E1.4) J. Fuller, Reactor Inspector, (Section E1.4) A. Nielsen, Health Physicist (Section R1.1) D. Jones, Senior Health Physicist (Section R1.3) E. Testa, Senior Health Physicist (Sections R1.2, R1.4)
Approved by:	Stephen J. Cahill, Chief Reactor Project Branch 6 Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY

Browns Ferry Nuclear Plant, Unit 1
NRC Inspection Report 05000259/2004-006

This integrated inspection included aspects of licensee engineering and modification activities associated with the Unit 1 recovery 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 inspector inspection. In addition, NRC staff inspectors from the regional office conducted inspections of Unit 1 Special Programs in the areas of seismic cable tray, conduit and HVAC supports; radiological controls; and intergranular stress corrosion cracking (IGSCC).

Inspection Results - Engineering

- Review of Unit 1 modification design packages for nine modifications concluded that the design changes were appropriately developed, reviewed, and approved for implementation per procedural requirements. (Section E1.1)

- Modification activities associated with replacement of Residual Heat Removal Service Water (RHRSW) piping and drywell electrical penetration assemblies were performed in accordance with the documented requirements. (Section E1.2)

- Design changes to upgrade to existing seismic cable trays and conduits were appropriately developed, reviewed, and approved for implementation per procedural requirements. The inspectors' review of seismic cable trays, conduit, and HVAC supports concluded that the special program activities were adequately incorporated and identified problems were being addressed. No violations or deviations were identified. (Section E1.3)

- The licensee's IGSCC mitigation plan continued to meet commitments established by Regulatory Framework letters. Recirculation and Reactor Building Closed Cooling Water piping replacement activities were meeting ASME Code and other regulatory requirements. (Section E1.4)

- The licensee's inspections of cables in harsh environment areas were substantially complete at the end of the reporting period. These inspections continued to identify 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. (Section E1.5)

- A review of a temporary alteration for an RHRSW system seal did not identify any significant impact on the operability of equipment required to support operations of Units 2 and 3. (Section E1.6)

- The licensee had made a significant commitment toward a System Cleanliness Verification Program as evident by the level of management involvement and extent of effort by engineering personnel. The program was to replace the remaining Unit 1 Equipment Lay-up Program. This licensee initiative was established to provide comprehensive inspections of systems to continue the identification of degradation or special requirements to support the Unit 1 recovery. (Section E1.7)

- The licensee's System Return to Service (SRTS) activities were performed in accordance with procedural requirements. System deficiencies were identified and appropriately addressed by the licencee's corrective action program. The licensee's decision to use experienced former operations personnel for oversight of SPOC activities was considered to be a good initiative. (Section E1.8)

Inspection Results - Plant Support

- Radiological facility conditions and housekeeping in health physics facilities, the reactor building, and on the refueling floor were observed to be good. Radioactive material was labeled appropriately, and areas were properly posted. Locked High Radiation Area (LHRA) doors were properly secured and the keys accounted for. The two internal dose assessments reviewed were adequately performed. (Section R1.1)

- Personnel dosimetry devices were appropriately worn and worker knowledge of radiation work permit (RWP) requirements was acceptable. Independent surveys confirmed postings and observation of health physics technician (HPT) use of survey instruments was satisfactory. Selected instruments were appropriately calibrated and source-checked prior to use. (Section R1.2)

- An Unresolved Item was identified regarding the adequacy of Reactor Building gaseous effluent sampling line configuration. (Section R1.3)

- The Radiological Environmental Monitoring Program (REMP) was appropriately implemented and the Meteorological Monitoring Program operation and calibration was satisfactory. The implementation of the Radiation protection program activities associated with the unconditional release of materials from the RCA was appropriate. (Section R1.4)

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. Reinstallation of plant equipment and structures continued. Recovery activities include 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. Limited system return to service (SRTS) activities were started during this reporting period.

III. Engineering

E1 Conduct of Engineering

E1.1 Design Change Packages (Inspection Procedure (IP) 37550)

a. Inspection Scope

The inspectors reviewed permanent plant modifications, recirculation system instrumentation and control (I&C) components; drywell control air system upgrades; and various electrical and I&C upgrades for the Unit 1 High Pressure Coolant Injection (HPCI) System. 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 licensee's procedure requirements.

b. Observations and Findings

b.1 Design Change Notice (DCN) 51234 - Recirculation System (System 68) Instrumentation and Control Modifications

The inspectors reviewed the permanent plant modification to refurbish and replace various I&C components of the recirculation system for Unit 1. The intent of this DCN was to refurbish various panels and instrument racks and replace obsolete control equipment with equipment of newer design. The newer design includes upgrading the existing vibration monitoring system for System 68 along with implementation of the Recirculation Pump Trip (RPT) and portions of the Anticipated Transients Without Scram (ATWS) modifications.

b.2 DCN 51205 - Drywell Control Air Modifications

The inspectors reviewed the permanent plant modification to upgrade the Drywell Control Air (DCA) System. This DCN will replace various nitrogen supply valves for drywell components to provide better reliability and to address prior Local Leak Rate

Test (LLRT) failures and provide the capability to individually test these valves by the installation of block valves and test valves. Previously, testing of any valves required isolation of multiple valves and entering a TS LCO. In addition, this DCN will provide an alternate qualified source of nitrogen from the Containment Atmosphere Dilution (CAD) System to the DCA System during a LOCA.

b.3 DCNs 51083, 51221, 51237 - HPCI System Electrical and Control Circuit Modifications

The inspectors reviewed the permanent plant modifications to upgrade the electrical and I&C circuitry for the Unit 1 HPCI System. This DCN will replace various cables, terminations, relays, and electrical controls.

b.4 DCN 51159 - Drywell Electrical Penetrations Assemblies

The inspectors reviewed the permanent plant modification to replace drywell electrical penetrations assemblies (EPAs) existing in Unit 1. The intent of this DCN was to replace three EPAs, designated as EB, EC, and EE, manufactured by Physical Sciences Corporation. These EPAs could not be qualified for 10 CFR 50.49, Environmental Qualification of Electrical Equipment, category “a” service. Therefore, these EPAs will be replaced with EPAs manufactured by Imaging and Sensing Technology (IST) Corporation Conax Nuclear. The replacement EPAs have the same IST Conax Nuclear standard design arrangement as used previously in Unit 2, with 24 feedthrough ports, and will provide the same amount of spare conductors as the similar Unit 2 EPAs.

b.5 DCN 51215 - Reactor Building 250-VDC

The inspectors reviewed the permanent plant modification to make changes to the 250-VDC system inside the reactor building. The intent of this DCN was to move the power supply for Reactor Core Isolation Cooling (RCIC) valves 1-FCV-71-3, Steam Supply Isolation, and 1-FCV-71-34, Low Flow Bypass, from the Reactor Motor Operated Valve (RMOV) 1C to RMOV Board 1B. The move was due to10 CFR 50.49, Environmental Qualification of Electrical Equipment, requirements. The DCN also was to move the power supply for RHR valve 1-FCV-74-47, a Division II valve, from RMOV 1B, a Division I board, to RMOV 1A, a Division II board.

b.6 DCN 51177 - Residual Heat Removal Service Water (RHRSW)

The inspectors reviewed the permanent plant modification to make changes to the system inside the reactor building and service water tunnel. The intent of this DCN, in conjunction with Work Order (WO) 03-001371-001, was to replace the large bore piping in loops A and C of the RHRSW; flow control valves 1-FCV-23-34, -40, -46, and -52 due to internal erosion; the Dresser coupling inside the service water tunnel in the outlet piping from RHRSW heat exchangers A and C; electrical circuits and components that do not meet the 10 CFR 50.49, Environmental Qualification, and Appendix R requirements; and instruments that are not used or are obsolete.

b.7 DCN 51100 - Control Building 250-VDC

The inspectors reviewed the permanent plant modification which authorized changes to the 250-VDC system inside the control building. The intent of this DCN was to make changes to the Reactor Motor Operated Valve (RMOV) electrical boards 1A and 1B, including the addition of loads to the boards in conjunction with DCN 51215; the replacement of fuses, thermal overloads, and circuit breakers with those of the proper capacity, as determined by calculation; and the replacement of inadequately sized power cables.

c. Conclusions

Review of Unit 1 modification design packages associated with nine DCNs concluded that the design changes were appropriately developed, reviewed, and approved for implementation per procedural requirements.

E1.2 Permanent Plant Modifications (IP 71111.17)

a. Inspection Scope

The inspectors reviewed permanent plant modifications for RHRSW and replacement of drywell electrical penetrations. The inspectors evaluated the adequacy of the modifications and observed field work to verify that the design basis, licensing bases, and TS-required performance for the system had not been degraded as a result of the modifications.

b. Observations and Findings

b.1 DCN 51177 - Residual Heat Removal Service Water

The inspectors reviewed permanent plant modification activities associated with DCN 51177 to make changes to the RHRSW system inside the reactor building. The DCN, in conjunction with Work Order (WO) 03-001371-001, was to replace the large bore piping in loops A and C of the RHRSW. The inspector observed portions of the installed piping, compared the weld numbers with the weld map, and compared the weld numbers with the QC inspections.

b.2 DCN 51159 - Drywell Electrical Penetrations Assemblies

The inspectors observed portions of the installation of the permanent plant modification to replace drywell EPAs existing in Unit 1. The intent of this DCN was to replace three EPAs, designated EB, EC, and EE, with EPAs manufactured by Conax Nuclear. The inspector observed portions of the installation of penetration EB using drawing 1-48B1800-3494, portions of the installation of penetration EC using drawing 1-48B1800-3496, and portions of the installation of penetration EE using drawing 1-48B1800-3495.

c. Conclusions

Modification activities associated with replacement of RHRSW piping and drywell EPAs were performed in accordance with the documented requirements.

E1.3 Unit 1 Restart Special Program Activities - Seismic Cable Tray, Conduit and HVAC Supports (IP 62002)

a. Inspection Scope

The inspectors held discussions with engineers in the area of seismic qualification of cable tray, conduit, and HVAC supports, specifically the implementation of Generic Letter (GL) 87-02, “Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46.” This GL was issued to implement the USI resolution which concluded that the seismic adequacy of certain equipment in operating nuclear power plants should be reviewed against seismic criteria not in use when the plant was licensed.

The inspectors also reviewed corrective action program documents related to the subject area. The inspectors performed various sorts of the data for Unit 1 having to do with the area of concern using key words of conduit, cable tray, raceway, seismic and A-46. Numerous Problem Evaluation Reports (PERs) were reviewed based on the sorts requested. Also a discussion was held with the coordinator of the Concerns Resolution group involving the above areas.

b. Observations and Findings

The inspectors reviewed the “Regulatory Framework for the Restart of Unit 1," dated December 13, 2002 (amended 2/28/03), and the Generic Implementation Procedure (GIP), which outlined the steps to be taken by Seismic Qualification Utility Group (SQUG) members. The inspectors also performed a walkdown of all levels in the Reactor Building in Unit 1 to visually observe the issues identified by the walkdown teams, identified for modifications and upgrade.

In order to perform the design verification for the as-built cable trays as described in DCN 51521, “U1 Recovery Reactor Bldg. Structural Modification Required by A-46 Evaluation,” walkdown inspections were performed by engineering personnel to document the condition, configuration, and existing loadings on the cable trays. The inspectors reviewed TVA procedure W1-BFN-0-GEN-01, Revision 1, “General Requirements for BFN Unit 1 Walkdowns,” and W1-BFN-0-EB-04, “Seismic Verification Walkdown Instruction for USI A-46 and Seismic IPEEE Programs,” which specified the requirements for performance of the walkdowns. The inspectors independently verified selected attributes on cable trays on all levels of the Reactor Building. The attributes included general configurations, maximum dimensions of members, connection details, and identification of acceptable attachments to concrete. The inspectors reviewed walkdown package numbers: BFN1-CEB-RCWY-519', BFN1-CEB-RCWY-565',

BFN1-CEB-RCWY-593', BFN1-CEB-RCWY-621', and BFN1-CEB-RCWY-639', which documented results of the completed walkdowns. The inspectors verified various existing as-built outliers identified during the walkdowns and reviewed calculations of the as-built conditions and proposed modifications.

The inspectors reviewed the requirements of USI A-46, as detailed in the GIP, which details the verification of issues into four areas: 1) Mechanical and Electrical Equipment, 2) Tanks and Heat Exchangers, 3) Essential Relays, and 4) Cable and Conduit Raceways. The inspectors held discussions with the engineering staff and reviewed the methodology and documentation of the issues including the Screening Evaluation Work Sheets (SEWS) and determined that two areas can be closed with respect to USI A-46. For 'Tanks and Heat Exchangers' and 'Essential Relays,' no outliers were identified. For 'Cable and Conduit Raceways,' the review of DCN 51521 is discussed above. No review was performed during this inspection for the area 'Mechanical and Electrical Equipment,' which is discussed in DCN 51192 and will be reviewed during future inspections.

c. Conclusions

Review of Unit 1 modification design and walkdown packages for upgrades to existing seismic cable tray and conduit activities concluded that the design changes were appropriately developed, reviewed, and approved for implementation per procedural requirements.

The inspectors' review of the site Corrective Action Program involving seismic cable trays, conduit, and HVAC supports concluded that the special program activities were adequately incorporated and identified problems were being addressed. No violations or deviations were identified.

E1.4 Intergranular Stress Corrosion Cracking (IGSCC) - Welding of Replacement Reactor Water Recirculation (RECIRC) System and Reactor Building Component Cooling Water (RBCCW) System Piping (IP 55050)

a. Inspection Scope

As part of the IGSCC Special Program, TVA is replacing the RECIRC system piping with Type 316NG material. In addition, portions of the RBCCW system piping are being replaced as part of the plant upgrade and refurbishment. The applicable Codes for this work are: (1) ASME Section XI, 1995 Edition, 1996 Addenda, and (2) ASME Section III, 1995 Edition, 1996 Addenda.

The inspectors observed completed and in-process welds and reviewed completed weld records, procedures, personnel qualification records, and material certification records, as detailed below to verify compliance with applicable requirements.

b. Observations and Findings

NRC Inspection Reports 50-259/2003-009, 50-259/2003-010, and 50-259/2003-011 previously documented other previous inspections performed in this area. During the current inspection, the inspectors observed/reviewed the following to verify compliance with the applicable Codes listed above:

- For completed RECIRC System Welds RWR-1-001-015, -011, -027, and -022, the inspectors visually inspected final weld surfaces (outside diameter (OD) only); reviewed completed Weld Data Sheets and Liquid Penetrant Inspection Reports; and reviewed final radiographic (RT) film (final RT film for weld 022 had not been accepted because of purge dam material interfering with film interpretation).

- For in-process RECIRC System Weld RWR-1-001-025, the inspectors inspected OD weld surface after approximately 1/3 weld-out.

- For in-process RECIRC System Weld RWR-1-001-024, the inspectors inspected completed weld OD surface before final surface grinding had been completed.

- For in-process RECIRC System Weld RWR-1-001-012, the inspectors visually inspected weld OD surface after the root and one or two passes had been welded.

- For completed RBCCW System Welds RBCCW-1-002-001, RBCCW-1-002-006, and RBCCW-1-003-001, the inspectors reviewed final RT film and Weld Data Sheets.

- Reviewed Detailed Welding Procedure Specifications (DWPSs) GTA88-C-2-N, Revision 0, and GT88-O-1-N, Revision 5, including applicable Procedure Qualification Records (PQRs).

- Reviewed Welder Qualification Records, including continuity records, as applicable, for the 11 welders who welded the completed RECIRC and RBCCW welds listed above.

- Reviewed Certified Material Test Reports (CMTRs) for the following heats/lots of welding material: .035" ER 308/308L Spooled Wire - Heat PT243; 1/8"&5/32" IN 308L Consumable Inserts - Lot M7832; 3/32" ER308L - Heat C4611R; 3/32" ER309 - Heat 24243; 1/8" ER309 - Heat P7930; 1/8" ER309L - Heat DM6343; 3/32" ER309L - Heat CM6422; 1/8" ER316L - Heat 33838; and 3/32" ER316L - Heat CM7312.

- Reviewed Certified Material Test Reports for 28" diameter RECIRC System Pipe Spools 68-16 and 68-43.

- Reviewed Qualification Records for seven QC Examiners (Welding and Liquid Penetrant) and three RT Examiners who performed welding and NDE examinations of the RECIRC and RBCCW System welds listed above.

During the above observations and reviews, the inspectors noted the following:

- Superficial handling marks that had not been identified by TVA were observed on RECIRC System Weld RWR-1-001-015 and adjacent base material. TVA immediately issued Problem Evaluation Report (PER) 04-001930-000 to document and resolve this condition. The inspectors considered that the safety significance of this condition was minor and would have been identified and corrected prior to completion of the pre-service inspection (PSI) for this weld.

- During visual inspection of the four completed RECIRC System welds, the inspectors noted that the weld identification had not been permanently marked on the pipes adjacent to the welds in accordance with TVA's standard practice. Although not a Code requirement, it is common practice to permanently mark pipe welds requiring RT, to aid in identifying the correct weld for RT examination and other future inspections. In addition to permanently marking the weld, drawings are used to ensure examination of the correct weld. TVA issued PER 04-001931-000 to document and resolve this condition. The four RECIRC System welds were immediately marked and all completed pipe welds requiring RT examination in other systems were inspected and found to be marked. The inspectors considered the lack of marking on the four completed RECIRC System welds to be of minor safety significance based on: (1) the condition was isolated, (2) drawings are also used to ensure RT of the correct weld, and (3) based on review of the RT film and observation of the welds, there was no evidence of RT inspection of the wrong weld.

c. Conclusions

No violations or deviations were identified during this review of the licensee's Intergranular Stress Corrosion Cracking Special Program and pipe welding activities for Unit 1.

E1.5 Inspections of Cables Subject to Harsh Environments (37550)

a. Inspection Scope

The inspectors reviewed on-going activities associated with the non-intrusive inspections of cables in harsh environment areas in Unit 1 in junction boxes and cable pull points. The Phase 2 non-intrusive inspections did not require any risk assessments prior to opening and inspecting the insides of selected junction boxes and pull points. Part of the licensee's inspections included a search for any undocumented cable splices and cable qualification information. The review evaluated the licensee's process for determining the necessity for cable replacement or qualification of existing cables.

b. Observations and Findings

The licensee's electrical inspections were divided into two phases. Phase 1 inspections, which consisted of intrusive cable inspections, consisted of inspections to obtain cable jacket information. The previous NRC inspection of the intrusive Phase 1 cable inspections was documented in NRC Inspection Report 50-259/2003-11. Any unacceptable cables identified under the Phase 1 or Phase 2 inspections will be added to the cable replacement scope by the licensee.

A total of 123 cable pull points and 61 junction boxes were opened with a total of 339 cables inspected. The following results were obtained: A total of 271 cables were qualified from the markings observed on the cables; 45 cables were already scheduled to be replaced due to other programs such as cable sizing and fire protection; 10 cables were spliced and were under evaluation at the end of the reporting period; 8 cables were not required for Unit 1 restart; and also at the end of the reporting period 5 cables, not spliced, were under evaluation due to other programs. During the non-intrusive Phase 2 inspections, the inspectors attended pre-job briefings and observed ongoing inspection activities. Phase 2 inspections were substantially complete at the end of the reporting period. A limited number of inspections still needed to be performed due to additional inspection scope increase. This was due to the potential need to include the power cables for the RHR pumps, which was under evaluation.

c. Conclusions

The licensee's inspections of cables in harsh environments were substantially complete at the end of the reporting period. These inspections continued to identify 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.

E1.6 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 temporary modifications associated with a temporary RHRSW seal to ensure that procedure and regulatory requirements were met. This temporary RHRSW seal was installed under TACF 1-03-002-023 to provide for secondary containment to support work activities associated with DCN 51177. 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 the 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.

b. Observations and Findings

A review of the temporary alteration associated with TACF 1-03-002-023 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.

E1.7 Layup and Equipment Preservation Program (IP 92050)

a. Inspection Scope

The inspectors verified that the licensee was following the prescribed program established to preserve Unit 1 safety-related equipment, which is in long term layup. The inspectors reviewed licensee procedures 0-TI-373, Plant Layup and Equipment Preservation, and CI-134, Chemistry Layup Monitoring, to verify that equipment checks and monitoring were completed at the specified frequency.

b. Observations and Findings

The inspectors observed conditions in the RHR, RCIC, Core Spray (CS), and HPCI Systems, and completed a plant and main control room walkdown of the systems to verify that valve and switch position, component tagging, and layup preservation equipment were as specified by the applicable procedure. The inspectors also reviewed a sampling of PERs to verify that equipment problems were identified and corrected as required by procedure SPP-3.1, Corrective Action Program. In addition, the inspectors discussed the equipment layup program with plant management, personnel responsible for implementing the layup program, and Unit 1 recovery personnel to assess department interface and equipment transition plans.

On March 22, 2004, the licensee decided to remove all Unit 1 systems from layup. At the end of the inspection period, layup equipment, such as dehumidifiers, was being removed from the plant. The inspectors determined that this decision was based on the need to transition to a System Cleanliness Verification Program which would better support the current modification phase of the Unit 1 restart effort. The transition was expected to take several weeks to complete. System layup tags would remain in place and be under control of the assigned system engineer until system alignments would be performed as required by the SPOC process. The inspectors reviewed various Appendix H, System Removal from Layup Forms, which documented the approval for each system removed from layup to verify that documented procedural requirements were followed.

The recently implemented System Cleanliness Verification Program will be taking the place of the previous Equipment Layup Program. Under this program, the assigned system and component engineers, along with chemistry personnel, would perform a

series of inspections of Unit 1 systems to identify any system degradation or special requirements to support Unit 1 recovery. The inspectors held discussions with the System Cleanliness Coordinator and attended several routine System Cleanliness Status Meetings to determine the adequacy of this program. The inspectors concluded that the licensee had made a significant commitment toward this new program, as evident by the level of management involvement and extent of effort by Unit 1 engineering personnel.

c. Conclusions

No violations or deviations were identified. The licensee had made a significant commitment toward the System Cleanliness Verification Program as evident by the level of management involvement and extent of effort by engineering personnel. This licensee initiative was established to provide comprehensive inspections of systems to continue the identification of degradation or special requirements to support the Unit 1 recovery.

E1.8 System Return to Service Activities (IP 37550)

a. Inspection Scope

The inspectors reviewed the licensee's system return to service (SRTS) activities for System 33, Service Air; System 39, CO2 Storage, Fire Protection, and Generator Purge; and System 79, Fuel Handling. The reviews consisted of Technical Instruction 1-TI-437, System Return to Service (SRTS) Turnover Process for Unit 1 Restart, the flow chart for the SPOC, the System Plant Acceptance Evaluation (SPAE) process, and the SRTS packages for systems 33, 39, and 79.

b. Observations and Findings

The inspectors observed that several individuals involved in oversight of SPOC activities had significant operating experience including previous Senior Reactor Operator (SRO) licensed personnel. In addition, other personnel which were former TVA non-licensed operators were involved in SPOC walkdown activities. The SRTS packages consisted of specific instructions and forms from Technical Instruction 1-TI-437 numbered 1 through 15. Among the forms were STRS Turnover Boundary, System Pre-Operability Checklist (SPOC I) and (SPOC II), Special Operating Conditions, System Plant Acceptance Evaluation (SPAE), SPOC Walkdown, and SRTS Turnover Package Closure. The inspectors observed that upon completion of the SPOC I process, the system is configured for testing under the Restart Testing Program (RTP). The inspectors also observed that upon completion of the SPOC II process, the system is ready to be turned over to the Operations Department.

The inspectors observed portions of the licensee's SRTS activities for System 39, CO2 Storage, Fire Protection, and Generator Purge, and System 79, Fuel Handling. The activities for System 39 included meetings to discuss the SRTS status, the SPOC II

checklist, and portions of the system in the plant. The activities for System 79 included meetings to discuss the SRTS status, the SPOC I checklist, and portions of the system SPOC walkdown in the plant. The SPOC I and SPOC II processes were completed for System 39. The SPOC I process was completed for System 79. The inspectors observed that for System 39, system activities had started to be turned over to the Operations Department. The inspectors also observed that for System 79, the SPOC II process, testing under the RTP, would not be started until after reactor vessel floodup.

c. Conclusions

SPOC activities were performed in accordance with procedural requirements. System deficiencies were identified and appropriately addressed by the licencee's corrective action program. The licensee's decision to use experienced former operations personnel for oversight of SPOC activities was considered to be a good initiative.

E8 Miscellaneous Engineering Issues (92701)

E8.1 (Closed) Unresolved Item (URI) 50-259/86-28-02: Scram Valve Timing for Anticipated Transient Without Scram (ATWS) Modifications.

This issue was identified during special testing on Unit 1 prior to implementation of the ATWS modifications at Browns Ferry. During 1986, a Unit 1 test of scram air header blowdown time was performed to determine design input for the ATWS design modification. The licensee found that the opening times for several scram outlet valves and scram inlet valves were significantly longer than expected for the test conditions. The data was believed to indicate the presence of some restriction in the scram air header or a problem in the scram solenoid pilot valves. The inspectors reviewed licensee activities associated with resolution for Unit 1. The licensee issued DCN 51234 to implement instrumentation and controls modifications to the Reactor Water Recirculation System for Unit 1. DCN 51234 will complete the implementation of the Recirculation Pump Trip (RPT) and portions of the ATWS modifications similar to the design used on Unit 3. The ATWS modification was implemented on Unit 3 under DCN W19321. Inspection and closure of this item for Unit 3 were documented in NRC Inspection Report 50-259, 260, 296/99-03. Inspection and closure of this item for Unit 2 had previously been documented in NRC Inspection Report 50-259, 260, 296/91-24. This item was closed for Unit 2 on the basis that scram valve timing was consistent with the system design with the ATWS modification installed. The inspector reviewed DCN 51234 which included the design details of the ATWS modification for Unit 1. In addition, control rod scram time testing will be required for all control rods prior to the Unit 1 restart. 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. Because this problem was originally identified while the unit was shutdown and

defueled and will be corrected prior to re-start, no violation of NRC requirements occurred. This issue is closed for Unit 1.

E8.2 (Closed) LER 50-259/89-03: Design of Suppression Pool Vacuum Relief System Does Not Provide Single Failure Double Isolation of Primary Containment

This LER identified the possible failure of the suppression pool vacuum relief system in the open position on the loss of its unqualified air supply. This did not meet the single failure double isolation criteria for primary containment integrity identified in GL 88-14. The inspectors reviewed licensee activities associated with resolution for Unit 1. The licensee issued DCN 51205 to upgrade the nitrogen control gas supply for the Drywell Control Air (DCA) System for Unit 1. DCN 51205 will provide an alternate qualified source of nitrogen from the Containment Atmosphere Dilution (CAD) System to the DCA System similar to the design used on Unit 3. The DCA modification was implemented on Unit 3 under DCN W17933 which modified the Control Air and CAD systems to provide a reliable backup source of nitrogen to the pneumatic valve operators on Vacuum Breaker Butterfly valves 1-FCV-064-0020 and 1-FCV-064-0021. These valves are normally supplied by and fail open on the loss of Control Air. The Control Air system is lost during a LOCA, or any other event which requires primary containment isolation. This leaves a check valve to provide primary containment isolation. The DCN installs piping to supply nitrogen from the CAD system to the valve operators when the Control Air system is unable to provide the necessary control gas. Inspection and closure of this item for Unit 3 were documented in NRC Inspection Report 50-259, 260, 296/95-22. The licensee previously addressed this issue for Unit 2 with the completion of DCN W14096A, which was documented and closed for Unit 2 in NRC Inspection Report 50-259, 260, 296/91-10. The inspector reviewed DCN 51205 which included the design details of the DCA modification for Unit 1 and verified that it corrected the problem like the previous units. 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) LER 260/91-15: High Pressure Coolant Injection System Did Not Fulfill Its Safety Function Resulting from Low Suction Pressure Condition During a Fast Startup.

During Unit 2 power ascension in July, 1991, the HPCI system tripped due to a transient low suction pressure condition. Based on information received from the vendor, the licensee learned that the system was susceptible to momentary suction pressure transients capable of tripping the HPCI turbine. Based on a recommendation from the vendor, the Unit 2 problem was resolved by installing a time delay relay in the suction pressure trip circuit. The licensee committed to installation of similar relays in Units 1 and 3 prior to the restart of those units. The inspectors reviewed licensee activities associated with resolution for Unit 1. The licensee issued DCN 51221 to perform electrical work for the HPCI system for Unit 1. DCN 51221 will replace the existing

23A-K17 relay in the HPCI system with a time-delay relay to delay the low pressure trip function for seven seconds, similar to the design used on Unit 3. The HPCI time-delay relay modification was implemented on Unit 3 under DCN W17834A. Inspection and closure of this item for Unit 3 were documented in NRC Inspection Reports 50-259, 260, 296/95-10 and 50-259, 260, 296/95-56. The licensee previously addressed this issue for Unit 2 with the completion of DCN W17015A, which was documented and closed for Unit 2 in NRC Inspection Report 50-259, 260, 296/92-11. The inspector reviewed DCN 51221 which included the design details of the HPCI time delay relay modification for Unit 1. 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.

E8.4 (Closed) LER 50-259/89-25: Design Errors in 250-VDC Electrical System Results in Unanalyzed Condition

In June 1986, design engineers identified that three conditions existed that could place the plant in an unanalyzed condition. These conditions impacted all three units. The first condition involved a single failure of any of the three main plant 250-V batteries, with a loss of offsite power and a coincident recirculation line break. This could prevent adequate core cooling because of a potential to overload an EDG. The second condition involved the loss of the main plant 250-V battery number 1, which could prevent load shedding of the 480-VAC shutdown boards. This condition, coincident with a Unit 1 accident signal, could potentially overload EDGs A, B, C, and D. The third condition involved an inability to automatically close the inboard and outboard RHR primary containment isolation valves due to the loss of the main plant 250-V battery number 1. The first condition was resolved during the Unit 2 and Unit 3 recovery efforts by changing the control power for the 480-VAC shutdown board breaker logic from the Main Battery Board Systems to the 4-KV Shutdown Battery Board Systems. To resolve the second condition, the licensee issued DCN 51216 to implement modifications to portions of the Main Battery Board Systems 1 and 3. To resolve the third condition, the licensee issued DCN 51215 to implement modifications to portions of the 250-VDC Reactor Motor Operator Valve Board Systems for Unit 1. These DCNs are similar to the design resolutions on Units 2 and 3. The design resolutions were implemented on Unit 2 and the inspection and the closure of this item for Unit 2 were documented in NRC Inspection Report 50-259,260, 296/90-03. The design resolutions were implemented on Unit 3 and the inspection and the closure of this item for Unit 3 were documented in NRC Inspection Report 50-259,260, 296/95-60. DCN 51216 will relocate power supply cables from Main Battery Board 1 to Main Battery Board 3 for the load shed panels 1-PNL-25-42A-1, 42A-2, 43A-1, and 43A-2. DCN 51215 will move the Unit 1 RHR primary containment isolation valves motive power from 250-VDC RMOV Board 1B to 250-VDC RMOV Board 1A. The inspector reviewed DCN 51216, which included the design details of the power supply cables for the load shed panels to be relocated. The inspector also reviewed DCN 51215, which included the design details

of the motive power to be relocated. Because this item is effectively being tracked in the licensee's corrective action program, is being corrected similarly to the Units 2 and 3 solutions with the same process, and because any implementation deficiencies would likely be detected by the licensee's oversight programs, and have only minor consequences, this item meets the closure criteria established for the Unit 1 recovery issues. This issue is closed for Unit 1 and does not constitute a new violation of regulatory requirements.

E8.5 (Closed) LER 50-259/94-02: Circuit Breakers Failed Trip Time Tests Because of Different Testing Equipment Used to Perform the Tests

On September 20, 1994, the licensee issued a voluntary LER because of a potential generic safety significant issue. On April 28, 1994, onsite acceptance tests were performed by the licensee on General Electric 250-VDC, 1600-amp, AKR circuit breakers equipped with type ECI trip devices. At low level current settings 1.5 times and 2 times rated current, 1600 amps and 2400 amps respectively, the trip times were longer then the vender trip times. At a higher level current test 4.5 times rated current, 7200 amps, the trip times were acceptable. A conclusive determination of why the trip times differed at low level currents could not be made. The licensee indicated that the differences in the trip times could be a result of the type of test equipment used. The test equipment used by the licensee has a clean DC output, with a small waveform, that is close to the output of a battery. The test equipment used by the vendor is a 3-phase, silicone controlled rectifier unit, with an unfiltered DC output. This type of unit produces an output waveform with significant harmonic distortion. A high value sixth harmonic pulsating current was discovered in the output of the test equipment used by the vendor. The vendor, at the request of the licensee, lowered the viscosity of the oil in the ECI trip devices. This allowed the trip times to meet acceptance criteria during subsequent testing. The inspectors determined that no further action was required. This item is closed for Unit 1.

E8.6 (Closed) URI 50-259/86-06-02: Reactor Building and Control Bay HVAC Inadequate Design.

This item involved the inadequate Reactor Building and Control Bay HVAC design and structural integrity in that they could not be assured during a seismic event. This issue was previously discussed in NRC IR 50-259, 260, 296/89-20 and closed for Unit 2 in NRC IR 50-259, 260, 296/90-08. Commitments and methodology detailed in a letter from TVA to NRC "Regulatory Framework for the Restart of Unit 1," dated December 13, 2002 (amended 2/28/03), stated that for Special Programs that TVA "...intends to implement the remaining special programs in accordance with the implementation precedent and criteria used to restart Unit 3." Also, any deviations from implementation precedents will be made in accordance with TVA's internal processes. The NRC staff has reviewed the list of special programs and TVA's proposed actions and, based on their review, concluded that the list was complete and TVA's proposed actions were acceptable. This issue is closed for Unit 1 and does not constitute a new violation of regulatory requirements..

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Access Control To Radiologically Significant Areas (IP 71121.01)

a. Inspection Scope

During the week of February 2, 2004, licensee activities for controlling worker access to radiologically significant areas and tasks associated with the Unit 1 (U1) recovery activities were evaluated. Radiation protection program guidance and implementation were evaluated against Title 10 CFR Part 20, Standards for Protection Against Radiation; Technical Specification (TS) Section 5.4, Procedures; and approved licensee procedures.

b. Observations and Findings

During facility tours, the inspectors directly observed the posting of areas and labeling of containers in the U1 reactor building. The inspectors also observed the status of LHRA doors and reviewed shift key control logs. Area postings and controls were evaluated for consistency with regulatory requirements and procedural guidance.

The inspectors evaluated implementation and effectiveness of licensee internal exposure controls. Internal dose assessments for workers associated with the U1 recovery work activities were reviewed and evaluated. The inspectors discussed techniques used for two specific internal dose assessments from 2003 with Radcon supervision.

Licensee corrective action program Problem Evaluation Reports (PERs) associated with access controls were reviewed. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee Procedure Standard Programs and Processes (SPP) SPP 3.1, Corrective Action Program, Revision 5. Licensee documents reviewed and evaluated in detail during inspection of this program area are identified in the Attachment to the report.

c. Conclusions

Radiological facility conditions and housekeeping in health physics facilities, the reactor building, and on the refueling floor were observed to be good. Radioactive material was labeled appropriately, and areas were properly posted. LHRA doors were properly secured and the keys accounted for. The two internal dose assessments reviewed were adequately performed.

R1.2 Radiation Monitoring Instrumentation and Protective Equipment (IP 71121.02)

a. Inspection Scope

Licensee activities for controlling radiation monitoring instrumentation and tasks associated with the U1 recovery activities were evaluated by the inspectors. Radiation protection program guidance and implementation were evaluated against 10 CFR 20, Subparts B, C, F, G, H, and J; TS Section 5.4, Procedures; and approved licensee procedures.

b. Observations and Findings

The inspectors directly observed implementation of administrative and physical instrument controls and usage; appraised radiation worker and HPT knowledge and proficiency of their use.

Independent dose rate measurements were conducted by the inspectors during a U1 tour. Worker knowledge of radiation worker permit (RWP) guidance for dose and dose rate alarms on the electronic dosimeters and the expected worker responses to the alarms were evaluated. Use of health physics instruments was observed and calibration records for selected instruments were reviewed. The inspectors checked and observed the workers use of selected friskers, small article monitors, and exit portals.

c. Conclusions

Personnel dosimetry devices were appropriately worn and worker knowledge of RWP requirements was acceptable. Independent surveys confirmed postings and observation of HPT use of survey instruments was satisfactory. Selected instruments were appropriately calibrated and source checked prior to use.

R1.3 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (IP 71122.01)

a. Inspection Scope

The operability, availability, and reliability of selected effluent process sampling and detection equipment were reviewed and evaluated. Inspection activities included record reviews and direct observation of equipment installation and operation. Current calibration data were reviewed for the selected process monitors.

Equipment configuration, material condition, and operation for the effluent processing, sampling, and monitoring equipment were reviewed against details documented in TS; 10 CFR Part 20; Updated Find Safety Analysis Report (UFSAR) Section 9; Offsite Dose Calculation Manual (ODCM), Revision 15; American Nuclear Standards Institute (ANSI)-N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities; ANSI-N13.10-1974, Specification and Performance of On-Site

Instrumentation for Continuously Monitoring Radioactivity in Effluents; and approved procedures listed in Section R1.3 of the report Attachment.

Effluent sampling task evolutions, and offsite dose results were evaluated against 10 CFR Part 20 requirements; Appendix I of 10 CFR Part 50, Design Criteria; TSs; the UFSAR details; the ODCM; and applicable procedures listed in Section R1.3 of the report Attachment. Laboratory QC activities were evaluated against Regulatory Guide (RG) 1.21, Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials In Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plant, June 1974; and RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment, December 1977.

b. Observations and Findings

The inspectors reviewed the most current Radioactive Effluent Report to assess report content and program implementation for consistency with TS and ODCM requirements. Changes to the current ODCM were also evaluated.

The accessible major components of the gaseous and liquid effluent processing and release systems were observed for material condition and for system configuration with respect to descriptions in the FSAR and ODCM. Material condition, operability, and alarm set points were assessed for six effluent radiation monitoring systems. The inspectors assessed whether compensatory sampling and analyses were performed as required for three effluent radiation monitors which had been declared inoperable at various times during calendar year 2003. Calibration records for four effluent radiation monitors and one count room gamma spectroscopic instrument were reviewed to assess whether required surveillances were current and whether procedurally established acceptance criteria were met. The selected process monitors were associated with liquid radwaste, RHR cooling water, main stack, and reactor building vent exhaust. The inspectors reviewed the licensee's quality control evaluations of interlaboratory comparison analytical results for samples typical of plant effluents.

The inlet sample lines to the Reactor Building Vent Effluent Radiation Monitors (1-, 2-, and 3-RM-90-250) were observed by the inspectors to have 90-degree bends rather than bends with radii five times the diameter of the sample line, as specified in ANSI N13.1-1969. The adequacy of the sampling system was assessed by Battelle Pacific Northwest Laboratories during 1991 and the results of that assessment were documented as an attachment to NRC Inspection Report 50-259, 260, 296/92-10. Battelle's report stated that the air sample transport tubes "would appear to be adequate if one accepts the licensee's position that particle sizes under sampler operation conditions will remain no larger than a couple of microns." However, licensee demonstration that the particle size of Reactor Building gaseous effluents meets the criteria used in the basis for the Battelle assessment has not been completed or resolved.

TS 5.5 required the licensee to establish, implement and maintain the ODCM. Section 5.5 of the ODCM specifies that Quality Assurance procedures shall be established, implemented and maintained for effluent and environmental monitoring, using the guidance in RG 1.21, Revision 1, June 1974. Section C.6 of RG 1.21 states, "The general principles for obtaining valid samples of airborne radioactive material, the methods and materials for gas and particle sampling, and the guides for sampling from ducts and stacks contained in ANSI N13.1-1969 are generally acceptable and provide adequate bases for the design and conduct of monitoring programs for airborne effluents." Section 4.2.2.1 of ANSI N13.1-1969 states, "A sample obtained with a delivery line and collector which do not discriminate between particles of various sizes can be evaluated accurately as to radiological significance only after knowledge of the physical and chemical properties of the airborne material is obtained. Separate study may be necessary to establish in given circumstances the size distribution and chemical nature of the airborne material. Changes in the nature of airborne materials must be anticipated with changes in operations. Characterization of the airborne constituents must be performed frequently enough to assure statistically significant information of the nature of the airborne material." The adequacy of Reactor Building gaseous effluent sampling is deemed to be an Unresolved Item (URI) pending demonstration by the licensee that the particle size of the gaseous effluents meets the criteria used in the basis for the Battelle assessment: URI 50-259/04-06-01, Licensee Demonstration of Adequacy of Reactor Building Gaseous Effluent Sampling.

c. Conclusions

A URI was identified regarding the adequacy of Reactor Building gaseous effluent sampling as prescribed in ANSI N13.1-1969, Guide to Sampling Radioactive Materials In Nuclear Facilities.

R1.4 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program (IP 71122.03)

a. Inspection Scope

The environmental monitoring program inspection consisted of direct physical observation, documentation review, and interviews with licensee personnel. Licensee procedures and activities related to the REMP were evaluated for consistency with TS and ODCM details. Licensee procedures and activities related to meteorological monitoring were evaluated for consistency with TSs; the ODCM; FSAR Section 2.3, Meteorology; and ANS/ANSI 3.11-2000, Determining Meteorological Information at Nuclear Facilities. The licensee's practices for monitoring the unconditional release of materials from the radiation controlled area (RCA) were evaluated against 10 CFR Part 20 and applicable licensee procedures.

b. Observations and Findings

During the inspection, changes to the Browns Ferry ODCM and FSAR were discussed. In addition, data documented in the Annual Environmental Operating Report for 2001 and 2002 were reviewed in detail.

The inspectors observed the routine collection of eight weekly airborne particulate and iodine samples. The observed sample collection locations were LM-1, LM-2, LM-3, LM-4, LM-7, PM-7 and PM-2, the latter of which was at the nearest population center. The inspectors observed the material condition of three river water composite samplers. Immediately downstream water sampler (TRM 293.5), upstream water sampler (TRM 306.0), and the first downstream potable surface water supply (TRM 286.5) were observed. Environmental thermoluminescent dosimeter (TLD) equipment in the immediate vicinity of the air sampling stations were also evaluated for material condition and appropriate location. Air flow calibration records were reviewed for sampler numbers LM-1, LM-3, and LM-4. Using NRC global positioning system equipment, the licensee's REMP monitoring locations were assessed against ODCM-specified descriptors.

The inspectors also reviewed the procedures from the Western Area Radiological Laboratory (WARL), which analyzes the licensee's environmental samples. During this review, the operation of the laboratory was assessed to determine the adequacy of practices, procedures and analytic capabilities. Licensee REMP-related procedures, reports, and records reviewed during the inspection are listed in Section R1.4 of the report Attachment.

The inspectors observed the physical condition of the meteorological monitoring program equipment and supporting instrumentation. The inspectors compared system-generated data to the data provided by the plant computer to various locations including the control room. The data were also compared with the inspectors' observations of wind direction and speed. The inspectors assessed system reliability and data recovery. Meteorological tower siting was evaluated for near-field obstructions, ground cover, proximity to the plant and distance from terrain that could affect the representativeness of the measurements. The inspectors reviewed the calibration data for selected meteorological tower sensors used during the previous year. Licensee meteorological monitoring-related procedures, reports, and records reviewed during the inspection are listed in Section R1.4 of the report Attachment.

Radiation protection program activities associated with the unconditional release of materials from the RCA were reviewed and evaluated. The inspectors directly observed surveys of potentially contaminated materials released from the RCA using the Small Article Monitor (SAM)-11 equipment and the release of personnel using the Personnel Contamination Monitors (PCM-1). To evaluate the appropriateness and accuracy of release survey instrumentation, radionuclides identified within recent waste stream analyses were compared against current calibration and performance check source radionuclide types. Current calibration and performance check data were reviewed and

discussed. In addition, licensee guidance to evaluate survey requirements for hard-to-detect radionuclides was reviewed and discussed.

c. Conclusions

The REMP was appropriately implemented and the Meteorological Monitoring Program operation and calibration were satisfactory. The implementation of the Radiation protection program activities associated with the unconditional release of materials from the RCA was appropriate.

V. Management Meetings

X1 Exit Meeting Summary

On April 21, 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

D. Adkins, QC Manager
T. Abney, Nuclear Site Licensing & Industry Affairs Manager
T. Butts, SWEC Mechanical 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
S. Kane, Licensing Engineer
G. Lupardus, Unit 1 Civil Design Engineer
J. Ownby, Project Support Manager, Unit 1
J. Pettitt, Pipe Replacement Task Manager
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

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 71121.01	Access Control To Radiologically Significant Areas
IP 71121.02	Radiation Monitoring Instrumentation and Protective Equipment
IP 71122.01	Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems
IP 71122.03	Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program
IP 92050	Review of Quality Assurance for Extended Construction Delay
IP 92701	Followup

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

None

Opened

50-259/04-06-01	URI	Licensee Demonstration of Adequacy of Reactor Building Gaseous Effluent Sampling (Section R1.3).

Closed

50-259/86-28-02	URI	Scram Valve Timing for Anticipated Transient Without Scram Modifications (Section E8.1).
50-259/89-03	LER	Design of Suppression Pool Vacuum Relief System Does Not Provide Single Failure Double Isolation of Primary Containment (Section E8.2).
50-260/91-15	LER	High Pressure Coolant Injection System Did Not Fulfill Its Safety Function Resulting From Low Suction Pressure Condition During a Fast Startup (Section E8.3).
50-259/89-25	LER	Design Errors in 250-VDC Electrical System Results in Unanalyzed Condition (Section E8.4).
50-259/94-02	LER	Circuit Breakers Failed Trip Time Tests Because of Different Testing Equipment Used to Perform the Tests (Section E8.5).
50-259/86-06-02	URI	Reactor Building and Control Bay HVAC Inadequate Design (Section E8.6).

Discussed

None

LIST OF DOCUMENTS REVIEWED

Section E1.1 Design Change Packages

Procedures and Standards

SPP-9.3, Plant Modifications and Engineering Change Control, Rev. 9

DCNs

DCN 51234 - Recirculation System Instrumentation and Control
DCN 51205 - Drywell Control Air
DCN 51083 - HPCI System Electrical and Control
DCN 51221 - HPCI System Electrical and Control
DCN 51237 - HPCI System Electrical and Control
DCN 51159 - Drywell Electrical Penetrations Assemblies
DCN 51215 - Reactor Building 250VDC
DCN 51177 - RHRSW
DCN 51100 - Control Building 250 VDC

Section E1.2 Plant Modifications

Procedures and Standards

SPP-9.3, Plant Modifications and Engineering Change Control, Rev. 9

DCNs

DCN 51159 - Drywell Electrical Penetrations Assemblies
DCN 51177 - RHRSW

Modifications Work Orders (WOs)

WO 03-001371-001, RHRSW large bore piping

Section E1.3 Cable Tray Supports

Procedures, Instructions and Guidance Documents
Generic Implementation Procedure (GIP) For Seismic Verification of Nuclear Plant Equipment, Revision 2A, March 1993 , Section 8, Cable and Conduit Raceway Review.
NRC Letter: GL87-02, Supplemental Response 1 (SR1), (11/19/92, 3/19/93,) TVA Letter: GL 87-02, SR1, (9/21/92,1/19/93, 10/15/93)
SER addressing special program date: USI-A-46

Records, Worksheets and Data

Walk Down Data Package BFN1-CEB-RCWY-DW, Revision 0, Cable Tray and Conduit Raceway for USI A-46 and Seismic IPEEE- Documentation for BFN Unit 1 Drywell.
Walk Down Data Package BFN1-CEB-RCWY-639, Revision 0, Cable Tray and Conduit Raceway for USI A-46 and Seismic IPEEE- Documentation for BFN Unit Reactor Building El. 639 ft.
Walk Down Data Package BFN1-CEB-RCWY-621, Revision 0, Cable Tray and Conduit Raceway for USI A-46 and Seismic IPEEE- Documentation for BFN Unit 1 Reactor Building El. 621'-3"
Walk Down Data Package BFN1-CEB-RCWY-565, Revision 0, Cable Tray and Conduit Raceway for USI A-46 and Seismic IPEEE- Documentation for BFN Unit 1 Reactor Building El. 565'
Walk Down Data Package BFN1-CEB-RCWY-519, Revision 0, Cable Tray and Conduit Raceway for USI A-46 and Seismic IPEEE- Documentation for BFN Unit 1 Reactor Building El. 519'
Walk Down Data Package BFN1-CEB-RCWY-593, Revision 0, Cable Tray and Conduit Raceway for USI A-46 and Seismic IPEEE- Documentation for BFN Unit 1 Reactor Building El. 593'
Calc. CDQ1-999-2003-0654, Composite Safe Shutdown Equipment List (SSEL) for USI A-46 and Seismic IPEEE Programs, Rev. 1.
Calc. CDQ1-999-2003-1199, Relay Safe Shutdown Equipment List (SSEL) for USI A-46 and Seismic IPEEE Programs, Rev. 1.

Section E1.4 Inter-Granular Stress Corrosion Cracking (IGSCC) - Welding of Replacement Recirculation System and RBCCW System Piping

Procedures and Standards

TVAN Standard Department Procedure MMDP-10, Controlling Welding, Brazing, and Soldering Processes, Revision 4
Nondestructive Examination Procedure N-RT-1, Radiographic Examination of Nuclear Power Plant Components, Revision 25
Inspection and Examination Procedure IEP-205, Radiographic Film Processing, Handling, and Storage of TVA Radiographs and Acceptance of Contractor Radiographs
TVA Specification 5681, BFN Plant Stainless Steel Replacement Material, ASME Section III, Class 1, Piping Assemblies, 11/7/83
GE Fabrication Specification 25A5223, Stainless Steel Pipe and Subassemblies, Class 1, Type 316NG, Revision 0
General Engineering Specification G-29B, Material Fabrication and Handling Requirements for Austenitic Stainless Steel
Detail Welding Procedure Specification (DWPS) GTA88-C-2-N, Revision 0
DWPS GT88-O-1-N, Revision 5

DCNs and Work Documents

DCN 51045A, U1 Recovery Drywell mechanical Lead System C68
DCA 51045-124
Work Orders (WOs) 02-010314-02, 02-010314-03, 02-010314-04, and 02-010314-05, Replace RECIRC Piping and Components with Stainless Steel Type 316NG Material

WO 02-012882-059, Replace RBCCW 8" Piping Inside Penetration X23
WO 02-012882-060, Replace RBCCW 8" Piping Inside Penetration X24

Other Documents

Procedure Qualification Record (PQR) GTA88-C-5
PQR GTA88-O-1
PQR GT88-O-5
PQR GT88-O-1

Section E1.5: 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

Section E1.6 Temporary Modifications

Procedures, Guidance Documents, and Manuals

0-TI-405, Plant Modifications and Design Change Control, Rev. 0
0-TI-410, Design Change Control, Rev. 1
SPP-9.5, Temporary Alterations, Rev. 6

Other Documents

TACF 1-03-002-023

Section E1.7 Layup and Equipment Preservation Program

Procedures, Guidance Documents, and Manuals

Technical Instruction 1-TI-474, Cleanliness Verification Program, Rev. 0
TI 0-TI-373, Plant Layup and Equipment Preservation, Rev. 4

Corrective Action Program (CAP) Documents

PER 03-016702-000, broken plexiglass cover on layup box
PER 04-000379-000, concerns associated about control of dehumidifiers turned off to support maintenance

Other Documents

TI 0-TI-373, Appendix H, System Removal From Layup Forms (various)

Section E1.8 System Return to Service Activities

Procedures, Guidance Documents, and Manuals

Technical Instruction 1-TI-437, System Return to Service (SRTS) Turnover Process for Unit 1 Restart, Rev. 0
0-TI-404, Unit One Separation and Recovery, Rev. 4

Section R1.1 Access Control To Radiologically Significant Areas

Procedures, Guidance Documents, and Manuals

RCI-17, Control of High Radiation Areas and Very High Radiation Areas, Rev. 45
SPP-5.1, Radiological Controls, Rev. 5
SPP-3.1, Corrective Action Program, Rev. 5

Records and Data

LHRA key control logs, 1/29/04 - 02/05/04
Radioactive material intake logs, calendar year 2003
Internal dose assessment calculations for PER 03-015587-000 and PER 03-018546-000

Corrective Action Program (CAP) Documents

PER 03-015587-000, A worker received facial contamination while removing the debris dam from the N2C nozzle in the U1 drywell, 08/15/03
PER 03-018546-000, A worker removed a Radcon seal from a nozzle in the U1 drywell and became contaminated, 09/25/03

Section R1.2 Radiation Monitoring Instrumentation and Protective Equipment

Procedures, Guidance Documents, and Manuals

Browns Ferry Nuclear Plant FSAR Section 7 (Plant Area Monitors)
Browns Ferry Nuclear Plant Operations Weekly Schedule, Week of February 2, 2004
Component Calibration Instruction (CCI)-0-RE-00-117, Eberline Rm-14 Portable Radiation Ratemeters, Rev. 3A
CCI-0-RE-00-238: Eberline Instrument Corporation PCM-2 Personnel Contamination Monitor, Rev. 2
CCI-0-RM-90-150, Eberline Air Particulate Cam Source Calibration with Control Room Communications Interface, Rev. 15
CCI-0-RE-00-237, Eberline Instrument Corporation PCM-1B Personnel Contamination Monitor, Rev. 16
Bicron-NE -Small Article Monitor (SAM-11) Calibration, Response Check and Operating Procedure, Rev. 51
Special Instrument Instruction (SII)-0-XX-00-271, AMS-3 Beta Air Monitor Calibration, Rev. 3
SII-0-XX-00-300, PM-7 Portal Monitor, Rev. 2

Calibration Procedure for the MG DMC-90, 100 and 2000, LSCP-0078, Rev. R11
RCI-1.1, Determination of Respiratory Protection Requirements, Rev. 0109
RCI-3.1, Respiratory Protection Program Implementation, Rev. 27
Lesson Plan: HPT063.002, Self Contained Breathing Apparatus (SCBA) Training

CAP Documents

Self Assessment Report: BFN-RP-02-003, To evaluate the Effectiveness of the RADCON Instrumentation Program at BFN, 9/9-27, 2002
PER 03-005622 Electronic Dosimeter malfunction, 3/27/03
PER 03-003951 Electronic Dosimeter alarm investigation, 3/5/03
PER 03-014406 Increased rate of alarms occurrences for electronic dosimeter associated with workers signing in on wrong RWPs, 8/1/03

Section R1.3 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

Procedures, Guidance Documents, and Manuals

Offsite Dose Calculation Manual, Rev. 15
0-SI-4.2.D.1, Liquid Radwaste Monitor Calibration/Functional Test, Rev. 27
0-SI-4.2.K.1, Airborne Effluents - Main Stack Monitoring System Calibration, Rev. 27
1-SI-4.2.K.2.a, Reactor Building Vent Exhaust Radiation Monitor Source Calibration and Functional Test 1-RM-90-250
CI-303.15, Efficiency Calibration (Gamma-Ray Spectrometry System), Rev. 11
SPP-3.1, Corrective Action Program, Rev. 5

Records and Data

0-RM-90-130 Liquid Radwaste Monitor, Calibration records dated 8/27/03
1-RM-90-250 Reactor Building Vent Exhaust Monitor, Calibration records dated 6/16/03
0-RM-90-147&148 Main Stack Monitors, Calibration records dated 11/15/03
Gamma Spectroscopic Efficiency Calibration records for Detector No. 1 dated 2/5/03
Compensatory sampling records of monitors 0-RM-90-147 on 9/12 - 15/03, and 1-RM-90-250 on 1/19 - 21/03
Interlaboratory comparison analytical results for first three quarters of 2003
Monthly liquid effluent dose calculations for June and July 2003
Monthly gaseous effluent dose calculations for January through December 2003

Annual Reports

Browns Ferry Nuclear Plant - Units 1, 2, and 3 - Annual Radioactive Effluent Release Report - January through December 2002, dated April 30, 2003

CAP Documents

Nuclear Assurance - TVAN-Wide - Audit Report No. SSA0302, Radiological Protection and Control Audit, 12/31/03
PER 03-002938, Abnormal organ dose calculated for 4th Quarter of 2002, 2/20/03
PER 03-013732, 1-RM-90-251 failed source check, 7/23/03

PER 03-015331, Evaluate replacing Liquid Radwaste Effluent flow rate instrument, 8/13/03
PER 03-018049, Revise alarm response procedure for 1-RM-90-132 to rectify low flow trip conditions, 9/18/03

Section R1.4 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program

Procedures, Guidance Documents, and Manuals

Browns Ferry Nuclear Plant Final Safety Analysis Report, Section 2 (Environmental/ Meteorological)
Browns Ferry Nuclear Plant Offsite Dose Calculation Manual, Rev. 15
Browns Ferry Nuclear Plant Annual Radiological Environmental Operating Report-2001
Browns Ferry Nuclear Plant Annual Radiological Environmental Operating Report-2002
EMSTD-01, Environmental Radiological Monitoring Program, Rev. R21
G-01, Gross Alpha and gross Beta Activity Determination, Rev. R9
G-03, Gamma Analysis By Germanium Spectroscopy, Rev. R6
QC-10, Alpha and Beta Background and Count Reproducibility Checks, Rev. R6
QC-04, Gamma Efficiency Calibration of Germanium Detectors, Rev. R8
QC-104, Sample Receiving and Log-In, Rev. R10
QC-18, Liquid Scintillation Background and Count Reproducibility Check, Rev. R5
SC-01, Collection of Environmental Monitoring Samples, Rev. R18
SC-02, Preventive Maintenance for Radiological Environmental Monitoring Air Sampling System, Rev. R3
SC-03, Calibration Procedure for Radiological Environmental Monitoring Air Sampler System Gas Meter, Rev. 4
T-01, Beta Activity Determination by Liquid Scintillation, Rev. R13
TLD-0018, Environmental Dosimetry Procedure, Rev. R9
Emergency Preparedness Field Support (EPFS-6), Calibration of Environmental Data Station Data Logger and Sonic Channels, Rev. 10

Records and Data

0-RM-90-130 Liquid Radwaste Monitor, Calibration records dated 8/27/03
EPRFS-6 Sonic Wind Direction Calibration Sheet dated 10/21/03
EPRFS-6 Sonic Wind Direction Calibration Sheet dated 4/21/03
EPRFS-6 Air Temperature System Calibration Sheet dated 10/21/03
EPRFS-6 Solar Radiation Data Logger Calibration Sheet dated 10/21/03
EPRFS-6 Rain Gage and Data Collection Calibration Sheet dated 10/21/03
EPRFS-6 Rain Gage and Data Collection Calibration Sheet dated 4/21/03
EPRFS-6 Dew Point System Calibration Sheet dated 5/7/03
EPRFS-6 Dew Point System Calibration Sheet dated 10/21/03

CAP Documents

Nuclear Assurance (NA)-TVAN-Wide Audit Report No. SSA0302 - Radiological Protection and Control Audit, December 31, 2003
PER 03-000068, The Radiological Environmental Monitoring Program air filter and charcoal samples could not be collected as scheduled on February 18, 2003 from BFN location LM-7 due to problems with the sampling pump, 2/19/03

PER 03-000177, During performance of Self-Assessment CRP-ERMI-03-002, documentation could not be found for the training provided to the ERM&I sample personnel, 5/6/03
PER 03-000178 During the preparation of The Annual Radiological Environmental Operating Report for BFN, it was noted that 75% of the environmental TLD readings from Station N-2 were unavailable due to damaged or lost TLDs, 5/6/03
PER 03-000186, Total air volume sampled did not meet the minimum required value for the air filter and charcoal cartridge samples scheduled for collection on May 12, 2003 from BFN REMP monitoring location LM-3, 5/13/03
PER 03-000483, The BFN REMP air filter and charcoal samples scheduled for collection on October 20, 2003 from location PM-3 did not have an adequate total volume, 10/21/03