

UNITED STATES NUCLEAR REGULATORY COMMISSION REGION II 101 MARIETTA STREET, N.W. ATLANTA, GEORGIA 30323

Report Nos.: 50-259/91-16, 50-260/91-16, and 50-296/91-16

Licensee: Tennessee Valley Authority 6N 38A Lookout Place 1101 Market Street Chattanooga, TN 37402-2801

Docket Nos.: 50-259, 50-260, and 50-296

License Nos.: DPR-33, DPR-52, and DPR-68

Facility Name: Browns Ferry Units 1, 2, and 3

Inspection Conducted: April 20 - May 17, 1991

Inspector A. Patterson, Senior Resident Inspector Sianed Accompanied by: E. Christnot, Resident Inspector W. Bearden, Resident Inspector K. Ivey, Resident Inspector G. Hymphrey, Resident Inspector Approved by: いい

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Paul Kellogg, Section Chief, Inspection Programs, TVA Projects Division

SUMMARY

Scope:

This routine resident inspection included surveillance observation, maintenance observation, operational safety verification, environmental equipment qualification, modifications, restart test program, switchyard activities, system pre-operability checklist, operational readiness review, nuclear instrumentation reliability, Three Mile Island Action Items, reportable occurrences, Part 21 reports, action on previous inspection findings, and Systemmatic Assessment of Licensee Performance commitments.

Results:

A cross section of activities were reviewed in preparation for Unit 2 restart. Hold orders, test deficiencies temporary alterations, restart procedures, restart operational readiness review items, and Systemmatic Assessment of Licensee Performance commitments were reviewed. Minor administrative items were identified and promptly corrected. These activities support Unit 2 restart.

9107080141 910605 PDR ADOCK 05000259 Q PDR A non-cited violation was identified for failure to correctly document environmental equipment qualification maintenance record, paragraph 5. The licensee identified the problem and corrected it.

The licensee continued the nonconservative practice of deliberately entering action statements while the plant is in cold shutdown contrary to the technical specification requirements, paragraph 4. This was done to allow backfilling of water level instruments lines while making inoperable several emergency core cooling systems. No effort was made to clarify the technical specification requirements before performing the maintenance. This is another example of unresolved item 91-10-01.

The inspector identified a possible safety hazard where vehicle access was not being restricted in the transformer and switchyard area, paragraph 8. Vehicles were observed backing and maneuvering inside the transformer area and gates to the transformer area were open and unlocked. The licensee initiated steps to restrict vehicle areas and control entry into these areas.

The licensee with vendor assistance took steps to correct problems with the nuclear instrumentation, paragraph 4. This included actions for the source range monitors, intermediate range monitors, and local power range monitors. These steps should help correct the numerous system problems that occurred after the system was prematurely returned to service.

Two licensee event reports, one Three Mile Island Action Item, one Part 21 report, one inspector followup item, four unresolved items, and four violations were closed.

REPORT DETAILS

1. Persons Contacted

Licensee Employees:

- *0. Zeringue, Vice President, Browns Ferry Operations
- L. Myers, Plant Manager
- *M. Herrell, Operations Manager *J. Rupert, Project Engineer
- *M. Bajestani, Technical Support Manager
- R. Jones, Operations Superintendent
- A. Sorrell, Maintenance Manager
- G. Turner, Site Quality Assurance Manager
- P. Carier, Site Licensing Manager
- *P. Salas, Compliance Supervisor
- *J. Corey, Site Radiological Control Manager
- R. Tuttle, Site Security Manager

Other licensee employees or contractors contacted included licensed reactor operators, auxiliary operators, craftsmen, technicians, and public safety officers; and quality assurance, design, and engineering personnel.

NRC Personnel:

- *C. Patterson, Senior Resident Inspector
- *E. Christnot, Resident Inspector
- *W. Bearden, Resident Inspector
- K. Ivey, Resident Inspector
- *G. Humphrey, Resident Inspector

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Surveillance Observation (61726)

> The inspectors observed and reviewed the performance of required SIs. The inspections included reviews of the SIs for technical adequacy and conformance to TS, verification of test instrument calibration, observations of the conduct of testing, confirmation of proper removal from service and return to service of systems, and reviews of test data. The inspectors also verified that LCOs were met, testing was accomplished by qualified personnel, and the SIs were completed within the required frequency.

a. Test Deficiencies

The inspector continued to monitor the licensee's activities involved in the disposition of TDs generated as a result of the performance of SIs. The process is controlled by PMI 17.1, Conduct of Testing, and PMI 17.12, Surveillance Program Implementation. The inspector reviewed several outstanding TDs and previously closed TDs. The inspector also observed SIs being performed in the field which generated TDs. Based on these reviews and field observations, the inspector concluded that the SI generated TDs were being adequately dispositioned.

b. Work activities in progress were reviewed during the performance of 2-SI-4.7.h.1A, Rev. 4, Drywell/Suppression Chamber Hydrogen Analyzer, Channel A Calibration. The SI was being validated during the process and documented on Validation Form, SSP-4. No discrepancies were noted during the review.

No violations or deviations were identified in the Surveillance Observation area.

3. Maintenance Observation (62703)

Plant maintenance activities were observed and reviewed for selected safety-related systems and components to ascertain that they were conducted in accordance with requirements. The following items were considered during these reviews: LCOs maintained, use of approved procedures, functional testing and/or calibrations were performed prior to returning components or systems to service, QC records maintained, activities accomplished by qualified personnel, use of properly certified parts and materials, proper use of clearance procedures, and implementation of radiological controls as required.

Work documentation (MR, WR, and WO) was reviewed to determine the status of outstanding jobs and to assure that priority was assigned to safetyrelated equipment maintenance which might affect plant safety. The inspectors observed the following maintenance activities during this reporting period:

a. Issuance of Material

An inspector reviewed the process for issuing materials to be used for maintenance and modifications at BFN. The inspector discussed this process with cognizant licensee personnel and reviewed the governing procedure. The requirements for this process are included in SDSP 16.16, Material Issuance and Return. The procedure requires that a request be submitted to M&P by authorized personnel to withdraw material from Nuclear Stores. A request is made by the use of Form TVA-575N, Material Issue Request. Nuclear Stores personnel review the requests to ensure that the material issued for work

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activities is the equipment designated on the form. The responsibility for correct material specifications lies with the requestor and the responsible supervisor in the requesting organization. No concerns were identified. The inspector concluded that the procedural controls were adequate to provide correct material for use in the plant.

- b. Main Turbine Oil Flush and Restoration
- c. Nuclear Instrumentation Troubleshooting.
- d. Replacement of CRD O Rings in Leaking Flanges

No violations or deviations were identified in the Maintenance Observation area.

4. Operational Safety Verification (71707)

The inspectors followed the overall plant status and any significant safety matters related to plant operations. Daily discussions were held with plant management and various members of the plant operating staff. The inspectors made routine visits to the control rooms. Inspection observations included instrument readings, setpoints and recordings, status of operating systems, status and alignments of emergency standby systems, verification of onsite and offsite power supplies, emergency power sources available for automatic operation, the purpose of temporary tags on equipment controls and switches, annunciator alarm status, adherence to procedures, adherence to LCOs, nuclear instruments operability, temporary alterations in effect, daily journals and logs, stack monitor recorder traces, and control room manning.

General plant tours were conducted. Portions of the turbine buildings, each reactor building, and general plant areas were visited. Observations included valve position and system alignment, snubber and hanger conditions, containment isolation alignments, instrument readings, housekeeping, power supply and breaker alignments, radiation and contaminated area controls, tag controls on equipment, work activities in progress, and radiological protection controls. Informal discussions were held with selected plant personnel in their functional areas during these tours.

a. Control of Tagging Programs

The inspectors reviewed Hold Orders, Temporary Alterations, Cautions, and Deficiency tagging of plant equipment. The results of this review is documented as follows:

(1) Seventeen Hold Orders were reviewed and the affected equipment was properly configured and tagging documentation was correct.

- (2) Two Caution Orders, 2-90-930-1 and 2-90-930-2, were reviewed which were attached to electrical breakers labeled as "Spare" and "Future." Further review revealed that the breakers had been removed from service under ECN P7221, which was closed on March 26, 1991. As of May 7, 1991, the tags had not been removed from the breakers as required by SDSP 14.9, which states that tagging should be removed as soon as practical once the tag is no longer required.
- (3) Four Temporary Alteration Control Forms, TACF 2-85-46-32, 0-85-34-32, 1-85-26-32, and 2-88-09-68, were reviewed and equipment was found to be properly aligned as documented on the control form. One of the TACFs, 2-88-04-68, was on the instrument line to the #11 Jet Pump and was applied as a result of a plug in the tubing. Associated documentation indicated that this plug may be opened by pressure from the hydrostatic testing of the reactor vessel and the tag would be removed. However, the hydrostatic testing was completed which resulted in the tubing being unplugged, but the tag had not been removed when reviewed on May 7, 1991.
- (4) One Deficiency Tag was observed on 250V Reactor Motor Operator Valve Board 2C, Compartment 2A. Maintenance Request, MR886758, was generated in the year 1988 to correct the deficiency which involved a wire that was hanging loose in the panel. However, since that time, the subject wire has been abandoned due to a change made to the system.
- b. Reactor Water Level Instrument Line Backfilling

On May 5, 1991, the licensee initiated LRED 91-2-044 to review a planned situation where the minimum number of operable reactor water level instrument channels required by TS were not available. This situation occurred during the performance of SII-0-XX-130, Backfilling of Instrument Sense Lines. This procedure made the reactor water level instruments inoperable in that they could not perform their safety functions. TS Table 3.2.B, Instrumentation That Initiates or Controls The Core and Containment Cooling Water, requires a minimum of two operable instrument per trip system. In addition, TS also requires CS (3.5.A) and RHR (3.5.B) systems to be operable with fuel in the vessel at greater than atmospheric pressure. Reactor water level instruments supply safety initiation signals to the logics for the RHR and CS systems. The licensee initiated LCO 2-91-51-3.2.B for the duration of the procedure which required that the reactor remain in the Cold Shutdown condition.

The NRC resident inspectors documented a condition identical to this in IR 91-10. In that report, the inspectors stated that it was inappropriate to make TS required components or systems inoperable for the performance of work or testing. URI 91-10-01 was initiated

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to follow up on that condition. The situation identified in LRED 91-2-044 will be reviewed during the followup of the URI.

c. SBGT System Line Leak

On May 14, 1991, during the performance of 2-SI-4.2.A-24(B), "Groups 2, 3, and 8 PCIS Logic," the SBGT system was started, as designed. While the system was operating, the unit operator noted that the system flow and differential pressure were oscillating. Investigation did not reveal the cause of the oscillations and the SBGT system was declared inoperable. Further investigation identified approximately 6000 gallons of water in the SBGT system discharge piping. The cause of the water intrusion was a leaking Dresser coupling in the discharge piping.

The licensee initiated LRED 91-0-047 to review this event and determined that the SBGT system would have been unable to perform its intended function. The licensee made a 4 hour ENS notification to the NRC Duty Officer at 9:40 p.m. (CT), on May 15, 1991. Repairs to the line were being performed at the end of this report period.

No violations or deviations were identified in the Operational Safety Verification area.

5. Environmental Equipment Qualification

The inspector continued to monitor the licensee activities in the area of EQ. During a review of 2-SI-4.5.A.1.d (I), the TVA EQ maintenance group determined that junction box 8793 had been opened without a QMDS work record being filled out. The NSSS system engineering supervisor determined that three similar SIs were involved: 2-SI-4.5.A.1.d (II), 2-SI-4.5.B.1.d (I), and 2-SI-4.5.B.1.d (II). The junction boxes entered without QMDS work records, and the associated EQ cables were as follows:

<u>SI</u>	<u>JB</u>	<u>Cable</u>
2-SI-4.5.A.1.d (I)	8793	2ES807-I
2-SI-4.5.A.1.d (II)	8790	2ES3308-II
2-SI-4.5.B.1.d (I)	8794	2ES1191-I
	8792	2ES1198-I
2-SI-4.5.B.1.d (II)	8791	2ES3653-II
	2296	2ES3674-II

The above SI's were immediately revised to include a prerequisite that QMDS work records be attached to the work package. A survey of all other SI's was initiated to determine if there were any other cases of omitting



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the required prerequisite. The results of the survey indicated that an additional three SIs were required to be revised. All seven SIs were immediately revised. This failure to document EQ maintenance activities is designated as NCV 260/91-16-01, Documentation of EQ Maintenance. This licensee identified violation is not being cited because the criteria specified in Section V.G.1 of the NRC Enforcement Policy were satisfied.

6. Modifications (37700, 37828)

The inspectors maintained cognizance of modification activities to support the restart of Unit 2. This included reviews of scheduling and work control, routine meetings, and observations of field activities. Throughout the observation of modifications being performed in the field QC inspectors were observed monitoring and documented verification at work activities.

The inspector reviewed and observed activities associated with DCN W16734A, Disconnect/Remove the Alarm Auto-Acknowledge Feature from the Units 1/2 and 3 DG Control Room Panels. This DCN was installed to require the operator to manually reset the alarm. Prior to this modification, the alarm would auto-acknowledge after several seconds. The inspector reviewed the DCAs and WP associated with this DCN. The inspector observed the PMT and verified that the alarm would annunciate continuously and required the operator to manually reset the alarm.

7. Restart Test Program (99030B)

The inspectors reviewed 2-TI-189, General Revision, High Pressure Coolant Injection System, and performed a walkdown of the applicable equipment. In addition, the integration of the procedure into the Master Startup Operations/Testing Instruction, 2-SOI-100-1, Rev. 2, was reviewed. Some areas of concern identified during the review were that 2 areas of the SOI referenced 2 sections of the TI that were incorrect and 1 step of the SOI did not identify the particular section of the TI required.

The concerns were discussed with the system engineer and efforts to correct the procedure were initiated.

The inspectors reviewed 2-SOI-100-1, Revision 2, dated February 26, 1991. Problems with incorrect procedure and step references were noted.

Sections 5.2 and 5.3 cover the initial criticality, the startup for the shutdown margin check using a modified 'B' rod sequence, the shutdown after the check, the restart on a normal 'A' rod sequence, and the training criticals. Problems with incorrect SI referencing for the proper rod pull order existed in this section. This was complicated by the lack of an overview in these sections explaining the order of events and the rod sequence change. The inspector noted that GOI-100-1B, used by the SOI for the actual performance of the rod pulls, did not have the proper SI listed either. The steps that deal with the RWM have the same problem.

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These comments were provided to reactor engineering for resolution. The discrepancies identified indicate the SOI has not been thoroughly reviewed for proper procedure and section number references.

The inspector discussed these concerns with operations on May 10, 1991. Operations said an additional review of the SOI would be performed.

No violations or deviations were identified in the Restart Test Program area.

8. Switchyard Activities

The inspector reviewed and observed the licensee's activities involved with the switchyard. The BFN Switchyard is divided into two sections a transformer area and an OCB/disconnect area. Access to either area is not controlled by the plant operations group. The inspector noted that a locked gate into the transformer area was maintained in a locked status with a sign indicating access permission was required. The inspector also noted that at both ends of the transformer area access was easily accomplished in that on the west end a portion of fence had been removed and on the east end an equipment access gate was kept open. The inspector observed vehicles backing and maneuvering inside the transformer area. These vehicles are used by personnel to inspect the transformer area on a recurring basis. The inspector also observed that when the vehicles were backing and maneuvering in the transformer area only the driver was present in the vehicle.

The inspector also observed activities in the OCB/disconnect area of the switchyard. The inspector noted several large truck cranes and a self propelled bucket hoist. Several of these vehicles were backing and maneuvering with only the driver present. The inspector discussed these observations with the licensee. The concerns involved large truck cranes, bucket lifts, and other vehicles maneuvering in the switchyard with just the driver checking for clearance, unrestricted access to the transformer area, and this area is a Unit 2 operating area. The licensee initiated steps to restrict vehicles and personnel access to these areas.

9. System Pre-Operability Checklist (71707)

During the reporting period, the inspectors continued to monitor the licensee's activities to repair and modify plant equipment and systems to acceptable standards and to update the essential documentation.

a. High Pressure Fire Protection (System 26)

The SPOC for this system was completed on February 3, 1991. The inspector accompanied licensee personnel on the preliminary walkdown for this system on January 16, 1991, and the final walkdown on January 29, 1991. No major items of concern were identified during either walkdown. The inspector reviewed the SPOC package with the cognizant system engineer and noted that one exception and two



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deferrals were issued. The inspector also noted that the exception and deferrals had been closed. No deficiencies were identified during the review of the SPOC package.

b. Sampling and Water Quality (System 43)

This system provides a means for obtaining liquid and/or gaseous samples from various systems. Sample points are located at a variety of locations within several different buildings. The system design is intended to provide monitoring process fluid chemistry and activity during normal operations. The PASS is a subsystem of System 43 and would be used to monitor fluid activity and chemistry after an accident. The PASS installation is complete with testing required to demonstrate operability of this portion of System 43 scheduled to occur after Unit 2 restart. Further status of the completion of PASS activities is included in paragraph 12.

The system checklist was completed on April 18, 1991. The inspector reviewed the SPOC package with the system engineer on May 9, 1991. During the review the inspector determined that plant staff had accepted the system for status and configuration control but not for operability due to work remaining. The SPOC package included five deferrals and two exceptions. The two exceptions were associated with completion of outstanding design changes and approval of TS Amendments 251 and 284. Resolution of the two issues will be required prior to declaring the system operable. The deferrals were associated with uncompleted testing which do not affect system operability.

Based on the above review the inspector determined that the licensee has adequately identified the remaining work associated with System 43 necessary to support sampling requirements during normal operations.

c. High Pressure Coolant Injection (System 73)

The inspector had accompanied licensee personnel on a system walkdown during a previous reporting period. Additionally the inspectors had monitored portions of the licensee's testing of the HPCI turbine while uncoupled from the pump and supplied from the auxiliary steam system via a temporary spoolpeice.

The system checklist was completed on May 11, 1991. The inspector reviewed the SPOC package with the system engineer on May 14, 1991. During the review the inspector determined that plant staff had accepted the system for status and configuration control and for operability (the system was not declared operable and is not required to be operable until after criticality) The SPOC package included no deferrals and exceptions.





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Additionally the inspector determined that the licensee had implemented necessary design changes on the HPCI to address GE SIL #480. Recent experience at other BWRs has shown that this simple modification will eliminate the initial speed peak and can significantly reduce the severity of a startup transient on the system.

d. Containment Inerting, System 76

The inspector performed a walkdown of the system to evaluate the equipment and reviewed the completed SPOC package. One exception and one deferral remained open awaiting issuance of a TS change. Other open items were reviewed by the licensee and evaluated to have no impact on system operability.

Based on the inspectors review of the completed system, no deficiencies were noted that would impact system operation.

e. Main Steam, System 1

The inspector continued to review, observe and followup on the licensee's SPOC activities involving System 1, Main Steam. The reviews, observations and followup involved system walkdowns, review of the PM status, modification status, and performance of SIs. During these reviews and observations, the inspector noted that for this system, the licensee followed the SPOC process. Design changes and equipment replacements were performed in a controlled manner. The inspector concluded that the system was ready for operation.

f. Primary Containment Isolation, System 64A

The inspector continued to review, observe and followup on the licensee's SPOC activities involving System 64A, Primary Containment Isolation. The reviews, observations and followup involved system walkdowns, review of the PM status, modification status, and performance of SIs. During these reviews and observations, the inspector noted that for this system, the licensee followed the SPOC process. Design changes and equipment replacements were performed in a controlled manner. Two PMs were scheduled for completion. The PMs involved the hand rotating of an air compressor and lubricating a MOV. The inspector concluded that the system was ready for operation.

10. Operational Readiness Review (40500)

The inspector reviewed the status of the licensee's program for implementation of corrective actions associated with concerns identified as part of the licensee's ongoing ORR program. TVA's ORR program was designed to be a comprehensive effort to assess the material and personnel readiness at Browns Ferry necessary to support safe plant operation. The licensee has conducted three phases of their review of Browns Ferry's operational readiness. The first phase ORR was performed in May 1989, the second phase ORR was performed in February 1990, and the final phase was performed during January 1991. A total of 62 general concerns with 534 associated action items were identified by the licensee during these three phases of review. These items are tracked on the licensee's TROI system along with other corrective and administrative control programs. The inspector determined that as of May 24, 1991, the corrective actions have been completed for 81% of the concerns and 95% of the individual related action items.

During reviews documented in previous inspection reports the inspector selected several individual action items from the TROI that the licensee had listed as having corrective action complete. These items were reviewed to determine the adequacy and extent of licensee corrective actions in each area. Additionally the inspector reviewed the listing of open concerns to determine the adequacy of the licensee's restart determination for these items. Based on those reviews the inspector determined that the licensee had in place an adequate program for the tracking and disposition of ORR concerns.

During the most recent review in this area the inspector determined that although a large number of action items were not yet closed only two action items classified as required for restart had not been closed. These items were as follows:

ORR Concern VI-D Action Item #3, Test the excess flow check valves on the RPV water level sensing lines.

ORR Concern VI-D Action Item #10, Thermal expansion inspections to be performed on RPV water level sensing lines.

After the above inspection the licensee performed the required testing associated with the excess flow check valves. This was accomplished under 2-SI-4.7.D.1.D.1, 2-SI-4.7.D.1.D.2, and 2-SI-4.7.D.1.D.3 which were completed on April 15, 1991. Additionally the licensee determined that the required thermal expansion inspections could not be performed until the RPV was at normal operating temperature and pressure. Licensee management approved this item to be reclassified as non-restart. The inspection is currently scheduled to be performed as part of the power ascension testing by 2-TI-190 and is shown on the licensee's integrated schedule as action 11022 to be performed on or by June 1, 1991. The inspector determined that the licensee had adequately addressed the remaining ORR restart action items.

11. Nuclear Instrumentation Reliability

Browns Ferry has had a history of poor reliability associated with System 92, Nuclear Instrumentation. The inspectors followed the licensee's recent corrective actions in this area. During this reporting period this system received a large amount of attention. In particular licensee personnel performed a series of troubleshooting activities by a GE vendor representative.

All 172 LPRM channels were tested for amplifier, cable and connector problems. Of these, 28 were identified as requiring maintenance. Actions in this area are continuing.

All SRM/IRM channels were tested for drawer response, cable leakage currents, signal loss, EMI susceptibility, preamplifier gain and proper detector response. Various problems were identified during these activities with corrective actions including:

Replacement and/or cleaning all connectors identified to have high leakage.

Replacement of IRM channel D and F preamplifiers to eliminate intermittent noise and oscillations.

Placement of ferrite beads on detector cables on channels routed through preamplifier cabinet 2-25-61 to reduce EMI problems.

Replacement of capacitors in IRM high voltage power supplies to reduce noise.

Readjustment of IRM drawer and preamplifier gains using GE recommended criteria.

Replacement of zener diodes in IRM drawers to alleviate temperature related voltage drift.

Although all of the above actions were completed, the C SRM pulse height discriminator module was identified as needing replacement to eliminate parasitic oscillations. That action is still pending.

Assistance from the GE representative was received in setup and checkout of the TIP System. This effort is still ongoing.

Additionally the GE representative assisted the licensee by reviewing all licensee System 92 maintenance procedures and SIs. Although no deficiencies were identified during that review improvements were recommended for the SRM pulse height discriminator setup and other maintenance procedures. Assistance was received in developing a TI for preoperational testing the Rod Block Monitor functions before running the applicable SIs. Action is pending in both of these areas.

Since the above troubleshooting was performed the licensee has experienced a smaller number of nuclear instrumentation spikes and spurious RPS trips. However they are still occurring. The inspectors will follow the licensee's actions in this area.

Additionally, the inspectors reviewed information concerning potential problems with achieving acceptable overlap of indication between the IRMs and power range. All eight IRM channels are presently reading off zero (approximately 25-40% of scale) on range 1 while all SRMs are indicating

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relatively low (less than 50 CPS). Since there are only 5 decades of IRM indication a concern exists with the ability to demonstrate overlap with power range indication during reactor startup.

The inspector met with licensee technical support and management personnel to discuss this issue. Based on this interview, the inspector determined that the licensee had considered this issue and although the licensee did not consider it a probable event a contingency plan existed. Based on a request from the inspector, the licensee technical staff nuclear engineering supervisor committed to contact other BWRs concerning this issue. As of the close of this reporting period, one other site had responded. According to the licensee, that site which was currently shutdown had IRM readings consistent with those at Browns Ferry.

If the off zero IRM readings are due to noise, it is possible there will not be a problem with obtaining acceptable overlap. According to the licensee, GE is aware of the issue and does not believe there is a problem. However, if overlap can not be demonstrated, the licensee will have to abort the startup and possibly readjust the IRM gains.

- 12. TMI Action Items
 - a. (Resolved for Restart) 260/TMI Item II-B-3-4, Post Accident Sampling System (PASS); Preoperational Testing, Calibration, and Proposed Training Program

The inspectors reviewed the materials related to the PASS installation. The installation was completed and preoperational testing complete. All types of samples available on the system have been successfully collected. The system was leak tested at pressures more than 1700 pounds per square inch and system technicians had participated in sample collection per the system training schedule.

The inspectors reviewed the progress the licensee had achieved in resolving IFI 90-02-01, (NUREG-0737, Item II-B-3-4, Power Ascension Testing). Power ascension testing cannot be completed prior to restart. This testing is scheduled for 55 percent power testing after startup. This item cannot be closed until this testing can be observed and completed after startup. This IFI remains open.

In conclusion, TMI Item II-B-3-4 is resolved for Unit 2 restart only. When IFI 90-02-01 has been satisfactorily resolved this TMI Item will be closed for Unit 2.

b. (CLOSED) 260/TMI Item II-F-12 A, Noble Gas Effluent Monitor (Wide Range Gaseous Effluent Radioactivity Monitor (WRGERM); Surveillance Testing

The inspectors reviewed the history of the problems encountered in the installation of the WRGERM and the vendor changes which were encountered in the process. Post-modification procedures were

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completed prior to the inspection of January 14-18, 1991 (IR 91-01). Surveillance and operability testing and radioactivity testing procedures were scheduled for April 30, 1991 at the time of the inspection. These procedures included SI-4.2.F-25(A), WRGERMS Normal Range Noble Gas Calibration, and SI-4.2.F-25(B), WRGERMS Mid and High Range Noble Gas Calibration, which were supplied to the inspectors for review. These SI's were completed satisfactorily on May 17, 1991.

In conclusion, TMI Item II-F-12 A is closed for Unit 2.

c.

(Resolved for Restart) 260/TMI II-F-12 B, Iodine and Particulate Effluent Monitors

The inspectors reviewed the status of URI 91-01-01 (adequacy of the calculations for sampling line cases).

This URI remains open. There had been no substantial changes on the system since the previous inspection performed on January 14-19, 1991. The computer program submitted by Browns Ferry to quantify sample line losses due to right angle sample line bends and the lack of electrical heating tracing has been sent to NRR for review. Adequacy of the computer sampling model had not been completed at the time of the inspection. The licensee was informed that a decision by NRR on the sampling would be forthcoming.

There were not any surveillance or operability procedures associated with this system. This TMI Item is considered resolved for Unit 2 restart. This assessment was concurred with by the NRR technical reviewer. When the URI has been satisfactorily resolved this TMI item will be closed for Unit 2.

13. Reportable Occurrences (92700)

The LERs listed below were reviewed to determine if the information provided met NRC requirements. The determinations included the verification of compliance with TS and regulatory requirements, and addressed the adequacy of the event description, the corrective actions taken, the existence of potential generic problems, compliance with reporting requirements, and the relative safety significance of each event. Additional in-plant reviews and discussions with plant personnel, as appropriate, were conducted.

a. (CLOSED) LER 259/88-40, Inadequate Design Controls Result In The Backup Control System Not Meeting Design Requirements.

The design of the Backup Control System to be utilized if the main control room became inhabitable was determined not adequate to meet the requirements specified in Section 7.18 of the FSAR. Five areas were documented on CAQR BFN870614002. The areas applicable to Unit 2 are identified as follows:

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(1) Concern: Power and control cables for unit 2 are routed through the cable spreading room for the normal power feeder to the Backup Control Panel and the RHR Mini-Flow Control Valves. An accident in the spreading room could result in the loss of numerous systems required to shut the plant down safely from the Backup Control Panel.

Action: The corrective action was to reroute cable for equipment other than the RHR cable for control of the RHR Mini-Flow Control Valves from the Backúp Control Panel. The licensee evaluated the necessity for the mini-flow valves during an accident and determined that these valves were not needed for safe shutdown of the plant. The justification was based on calculation NEB830811219 and further evaluated in the Appendix R analysis.

(2) Concern: Control of all the MSIVs and SRVs from a common location, Backup Control Panel, panel 25-32, creates a common point of vulnerability.

Action: Controls for 3 SRVs were eliminated from this panel per ECN P0889. Calculations NEB830811219 and WEDC 31119 were performed to evaluate the MSIV issue and the conclusion was that the likelihood of disabling all MSIV controls from the panel was not credible.

(3) Concern: The ability to transfer the circuitry for 3 HPCI valves to isolate from the Control Building does not exist. Should these valves spuriously open, reactor coolant could be lost.

Action: No corrective actions were required based on the licensee's evaluation and determination that the valves in question are not required essential services, such as main steam, RBCCW, and etc.. The general function of the containment isolation valves is not required to be operable. Therefore, this is not a credible scenario.

(4) Concern: The backup control panel may not be available due to loss of its preferred supply power cables which are routed through a common area, the cable spreading room. These cables supply power to various safety-related components and could prevent a safe shutdown if lost due to a common accident in the spreading room.

Action: The licensee determined that cable reroutes were necessary and the work was performed under ECNs P0807 and P0889.

(5) Concern: Five power cables for backup control are routed through a common area, cable spreading room, and all may be lost in an accident involving this area.

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Action: The licensee performed and an evaluation which resulted in the rerouting of various cables or the cables were evaluated to be acceptable.

The licensee has performed an extensive program in the areas of EQ and Appendix R as required by 10 CFR 50.48, Fire Protection. Emergency and Shutdown Systems have been evaluated and corrective actions have been implemented where necessary. These programs have been evaluated by the NRC and determined to be acceptable.

Based on a review of the licensee's documented corrective actions and evaluations, this item is closed.

b. (CLOSED) LER 260/89-11, Failure to Meet Technical Specifications Because of Loss of RHRSW Pumps.

On April 4, 1989, TS 3.5.A.5, 3.5.C.7, and 3.5.B.9 associated with standby coolant supply, containment cooling, and the RHRSW System were not met while Unit 2 had fuel in the reactor vessel. The failure occurred when the A1 RHRSW Pump Room Sump Pump was declared inoperable due to a problem with the level switch that controlled the pump operation. The A2 sump pump had already been made inoperable due to ongoing maintenance. Since at least one sump pump is required to support the RHRSW pumps, the A1, A2, and A3 RHRSW pumps were declared inoperable. Loop II of RHR was also inoperable for ongoing maintenance. Because of this the B1 and B2 RHRSW pumps did not have an operable injection path to support the standby coolant supply function. Additionally the requirement for containment cooling was not satisfied with an available RHR loop.

The standby coolant supply was again made operable and TS 3.5.A.5, 3.5.B.9, and 3.5.C.7 requirements satisfied when RHR Loop II was declared operable on April 8, 1989. Necessary repairs were made and the A1 RHRSW Sump Pump was declared operable on April 14, 1989.

The inspector reviewed the LER and supporting documentation provided by the licensee. The inspector determined that the event was an isolated case related to many system outages ongoing at the same time. The licensee has restored all of the affected components to operable status. Additionally, current procedures controlling work on systems required by TS should preclude recurrence of a similar event.

14. Part 21 Reports

(CLOSED) 259, 260, 296/P21-91-05, Limitorque Torque Switches SMB-00 Roll Pins.

The licensee was notified by Limitorque Corporation on December 11, 1990, of a potential for failure of SMB-00 Torque Switch Roll Pins. The defective component was the pins used in SMB, SB, and SBD-00 actuators

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(serial numbers 232, 218, and greater) with heavy spring packs. The licensee reviewed this P21 and determined on March 11, 1991 there were none stocked or installed at the site. On April 4, 1991, the licensee received notification by Limitorque Corporation of additional serial numbers to be checked. The licensee found 10 items and accounted for all of them in power stores. This was completed May 8, 1991. The licensee plans to return all items to Limitorque. The inspector reviewed the applicable documentation and considered these actions adequate to resolve the issue.

15. Action on Previous Inspection Findings (92701, 92702)

a. (CLOSED) IFI 260/90-33-05, QA Control Process Related To Calculations.

During the subject inspection, two different versions of a QA record for the same calculation were provided to the NRC inspector. One was provided directly to the inspector and the other was part of an open item closure package. At that time, the inspector determined that the official record was the calculation provided to the inspector. This IFI was issued to follow-up on the licensee's review of the cause of this discrepancy.

During this reporting period, an inspector reviewed the licensee's closure package for this item and concluded that the discrepancy was the result of a personnel error. The engineer who provided the information for the closure package had made a copy of the calculation prior to its final approval. During the review process, an error in the calculation was noted and corrected. When asked for a copy of the calculation by Compliance Licensing, the engineer attached an official "RIMS" calculation cover sheet to his preliminary copy of the calculation and provided that as an official record. This practice is not in accordance with existing BFN policies for the control of calculations contained in NEP-1.3, Records Control, and NEP-3.1, Calculations. Final issued documents are to be used for all design outputs. Original calculations are retained in the NE Master File and are always available to be signed out for use. The copy of the calculation provided directly to the inspector during the initial inspection was taken from the original RIMS copy. No additional concerns were identified during the review of this item.

b. (CLOSED) URI 260/89-10-03, Potential Failure to Assure Proper Design Control.

This item was identified during a special reactive inspection performed on February 20 - March 22, 1989. Contrary to the requirements of the TS the licensee had proceeded with the Unit 2 core reload with the CS system and the motor operated valves in the Unit 2 standby coolant supply flowpath inoperable due to the presence of nonseismically qualified vitrified clay piping in the EECW

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discharge flowpath. This event had resulted in issuance of Violation 260/89-10-01. During this inspection the inspector identified a concern about the adequacy of the licensee's design change process about an EECW modification which had been recently completed. This item had been left open pending additional review of the design controls that were in place at the time. Later, the licensee rerouted the EECW flow paths into seismically qualified discharge

TVA submitted a letter dated February 14, 1990, to the NRC which provided their analysis supporting the licensee's position that adequate flow through the affected discharge path would have been maintained to affected safety-related equipment in the event of an earthquake. This analysis was reviewed by the NRC staff at NRR with the results of that review documented in an internal NRC memo (TAC 76752) dated April 19, 1991. The staff concluded that TVA presented an acceptable analysis to support that design flow would have been maintained. Based on the results of this review and the resulting determination by the staff concerning the previous design the inspector determined that a violation did not exist.

c. (CLOSED) URI 259, 260, 296/89-17-06, Followup of Licensee's Corrective Action for EA Audit BFT89901.

During a NRC review of the licensee's transitional design control process at Browns Ferry the inspector noted that the licensee had identified various weaknesses during a prior TVA QA audit in this area. The audit had identified implementation weaknesses as well as ECN/DCN closure problems. This item was left open pending review of the licensee's review results and later corrective actions.

EA Audit BFT89901 was conducted by the licensee during March, 1989, to evaluate the adequacy and effectiveness of the design change process at Browns Ferry. Various deficiencies were identified during that audit and are described in CAQRs BFT890394901, BFT890395901, BFT890396901, and BFT890397901. Specifically based on the ECNs/DCNs selected for review, EA personnel determined that several failures had occurred in the area of control of ECN closures and essential calculations, drawing updates, and changes to design basis documents. Additional deficiencies in this area were identified during QA Surveillance Report QBF-S-89-0959 which was conducted concurrently with this audit. These findings were documented in CAQRs/PRDs BFQ890380P, BFQ890381P, BFQ890405. The apparent cause of these failures was inattention to detail and insufficient technical review. These audit findings were similar to those findings identified during a separate licensee review of the essential calculations program as documented in a previous CAQR BFE880646 and those identified during the NRC SSQE inspection as documented in IR 89-16.

piping which corrected the problem.

The inspector reviewed various documents provided by the licensee to determine the status of corrective actions in this area. Additionally the inspector met with members of the licensee QA organization that had originally identified the discrepancies to determine their involvement in the corrective actions. The inspector determined that the Site Director had immediately suspended DNE modification package output until temporary corrective actions and a temporary review plan could be put in place. After this inspection the licensee carried out a series of corrective actions which improved the overall implementation of the design change process. Oversight of the calculation generation and review effort has improved. The licensee decided to upgrade the existing SPAE process to include additional attributes including review of status of essential calculations and an enhanced review (scrub process) of drawings, i.e. prior to the completion of the SPAE process for each system, all outstanding issues concerning design and essential calculations must be reviewed.

To verify the completion of corrective actions the licensee performed an additional QA audit and various QA monitoring activities in this area. The subsequent licensee QA audit was much more intensive in scope with the team reviewing a larger sample of ECNs/DCNs and finding fewer deficiencies. Although some deficiencies were found the licensee determined that those were limited and not generic to the program implementation. None were of such magnitude to affect operability of any equipment that has been accepted by the plant staff as the result of the upgraded SPOC and SPAE processes.

Based on the above reviews and discussions the inspector determined that a generic problem with the current existing Browns Ferry design change process does not exist. Any discrepancies that have been identified during past audits have been corrected or are tracked and will be dispositioned as part of the existing SPAE and SPOC processes. The corrective actions taken by the licensee in this area have resulted in an overall improvement in the design change process since the original inspection. Problems with essential calculations have been corrected as evident by staff review performed to followup various other open items.

d. (CLOSED) URI 259, 260, 296/91-03-01, SBGT Test Deficiencies.

This item was identified during the performance of SI-4.7.B.3. The acceptance criteria could not be met and test deficiencies were written to resolve the problem. The SI was revised to delete the portion of the test that failed. The inspector questioned this practice since the test had been successfully performed in the past. The test in the past measured air flow across the upstream and downstream HEPA filters. The downstream HEPA filter test was deleted from the SI. The licensee reviewed this issue and concluded the upstream test was sufficient. The licensee reviewed ANSI-N510-1979, FSAR, Standard TS and INPO nuclear network. NE reviewed the

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licensing basis and concluded that upstream HEPA filter has a 99.97 percent particulate removal rate and no credit was taken for the downstream HEPA. The downstream filter functioned as a screen in case of any charcoal filter breakup. A safety evaluation was performed and a FSAR revision was planned to clarify the function of the downstream HEPA filter on each SBGT train.

Additionally, the inspector questioned the effect of plant modifications on the flow distribution. A valve in the decay heat flow line which was previously a normally closed valve was being left open because of the difficulty of certifying the operator as EQ. The licensee conducted a flow test with the valve closed and the air flow data did not change. This resolved the concern that the modification did not adversely change the system air flow.

The inspector reviewed the licensee's closure package for this item. Discussions were held with the licensee concerning the plural wording of HEPA filter in TS. The licensee stated that due to the construction of the HEPA filters and charcoal banks, the rows of filtering although a single HEPA filter group are often referred to as filters or banks. Based on these discussions, the safety evaluations, and review of the closure package, the inspector concluded that the testing performed demonstrated satisfactorily performance of the SBGT filters.

e. (CLOSED) URI 260/91-06-01, RPS MG Set Room Temperature Control.

This item concerned the doors to the RPS MG set room being periodically left open to increase the cooling to the MG sets. The licensee reviewed this issue and performed air flow tests for the rooms. One room airflow was found to be low and the ventilation damper was adjusted to bring the air to 500 cfm. The inspector reviewed the room temperature recorded for the past several weeks and the temperatures had stabilized at 90 degrees or less. The room doors had been maintained closed during this time. Compensatory room temperature monitoring is initiated at 95 degrees to prevent exceeding the design limit of 104 degrees. No further problems are expected except on extremely hot days in the summer. Since the room doors have remained closed with acceptable room temperatures, this problem is resolved.

f. (CLOSED) VIO 259,260,296/87-33-01, Failure to Seal Conduit.

This item concerned failure to seal electrical conduit and junction boxes as required by drawings. Problems were encountered when a spurious actuation of the open head deluge fire protection system occurred. The inspector reviewed the closure package for this item. Several actions have been taken to alleviate this problem. CAQR BFN 870913 was issued to correct the drawings. As part of the Appendix R modifications the open head nozzles were removed from most areas of the plant. DCN H0397 was issued to seal all required conduits and к .



drill weep holes in junction boxes. The only remaining areas with open head fixed water spray systems are the HPCI room and south wall of the turbine building. The inspector questioned if any equipment needed for Unit 2 operation in Unit 1 and Unit 3 was sealed. The licensee issued a FDCN to DCN H0397 on May 10, 1991, to seal an additional 216 items to address the concern. Since this problem was identified, the licensee certified that the EQ program was implemented. The EQ program sealed all components necessary for harsh environment. The licensee plans to revise the response to this violation to more accurately describe the corrective actions taken. These actions resolve the issue.

g. (CLOSED FOR UNIT 2 ONLY) VIO 259, 260, 296/88-04-03, Failure to Correctly Translate Design Requirements into Drawings.

This item was previously reviewed in IR 91-02. In that report, the inspector concluded that all activities required for Unit 2 fuel load had been completed. However, this item remained open pending further review and resolution of the following deficiencies:

- In the response to the violation, the licensee committed to update the FSAR to include coupling modifications by July 22, 1989. However, the FSAR had not been updated.
- (2) Reviews conducted for CAQR BFP871126, which also addressed the coupling problems, concluded that the issue constituted an unanalyzed condition which was reportable to the NRC in accordance with 10 CFR 50.73. However, no LER had been submitted.

During this reporting period, an inspector walked down portions of the completed modifications with the cognizant system engineer and identified no discrepancies. From discussions with licensee personnel and a review of associated records, the inspector determined the following concerning the deficiencies identified in IR 91-02:

- (1) The modifications were completed after issuance of the 1990 FSAR update and the licensee intends to include the modifications in the 1991 FSAR update. This will result in the FSAR being updated by the first revision issued following completion of the modifications.
- (2) Upon further review of the details of this issue, the licensee concluded that it constituted an unanalyzed condition which is reportable to the NRC in accordance with 10 CFR 50.73. The licensee submitted LER 259/91-05 on May 11, 1991, to report this issue.

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From the reviews conducted, the inspector concluded that the licensee had completed modifications required for the restart of Unit 2 and resolved the previously identified deficiencies. The modifications for Units 1 and 3 will be completed prior to the restart of the respective units. This item is closed for Unit 2 only. This item will remain open for Units 1 and 3 until the completion of required modifications.

h. (CLOSED) VIO 259, 260, 296/90-40-04, Failure to Implement Design Control Measures.

This violation was issued for two examples of a failure to implement design control measures. Example one involved the installation of electrical cable which did not meet design criteria. Example two involved the issuance of out of date incorrect electrical drawings as part of design changes.

The inspector reviewed the licensee's response to the violation dated March 22, 1991. As part of the corrective action, the licensee stated that all design and warehouse personnel were counseled that each was responsible for ensuring accuracy and quality in the work they performed. SDSP-16.16, Material Issuance and Return, was revised to address concerns described in the violation. A complete walkdown of electrical cables stored on the site was performed and cables not in compliance with design requirements were segregated and/or removed from the site. All cable issued for installation from August 1, 1987, was reviewed. The response also indicated that specific actions were taken to address each item in example two.

The inspector observed and reviewed the activities performed by the licensee for both examples. This included a review of the results of the warehouse activities, and review and observation of activities in the field to correct the modifications. The inspector also observed and reviewed the results of PMT. The inspector concluded that this violation was adequately addressed.

i. (OPEN) VIO 260/91-06-02, Failure to Maintain System Drawing.

This item concerned four fire dampers which were not indicated on a ventilation flow drawing although the system SPAE and SPOC was complete with all drawings updated. The inspector discussed this item with the licensee. The problem was determined to be a drawing deficiency that was not correctly processed by contractor personnel. The deficiency was identified in 1988 and involved updating of two drawings and 65 dampers. The rest of the 65 dampers were found to be correctly indicated and a sampling of other work by the contractor found no other errors. The licensee response to this violation was not yet due. However, this review indicated this was an isolated personnel error and not a programmatic problem with updating the drawings. This issue is resolved for restart. , ,

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16. SALP Commitments (40500)

The licensee's most recent SALP is documented in NRC inspection report 90-07. Enclosure 2 to the licensee's response to that report contains a list of 31 commitments generated to address planned corrective actions associated with identified weaknesses. An inspector met with licensee management personnel to determine the status of completion of corrective actions in this area. Of the 31 commitments eight are classified as long term with completion dates scheduled after restart. The remaining 23 commitments were classified as being required for restart. Many of these were actually redundant items which had also existed as previously open items on other tracking programs. During that meeting and subsequent discussions with licensee personnel the inspector determined that all licensee commitments in this area that are necessary to support Unit 2 restart have been closed.

18. Exit Interview (30703)

The inspection scope and findings were summarized on May 17, 1991, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection.

Item Number

Description and Reference

259, 260, 296/91-16-01

NCV, Documentation of EQ Maintenance, paragraph 6.

Licensee management was informed that 2 LERs, 1 TMI Action Item, 1 Part 21 Report, 1 IFI, 4 URIs, and 4 VIOs were closed.

19. Acronyms and Initialisms

ANSI	American National Standards Institute
BFN	Browns Ferry Nuclear Plant
BWR	Boiling Water Reactor
CAQR	Condition Adverse to Quality Report
CFM	Cubic Feet Per Minute
CFR	Code of Federal Regulations
CPS	Counts Per Second
CRD	Control Rod Drive System
CS	Core Spray
СТ	Control Time
DCA	Design Change Authorization
DCN	Design Change Notice
DG	Diesel Generator
DNE	Division of Nuclear Engineering
EA	Engineering Assurance
ECN	Engineering Change Notice
EECW	Emergency Equipment Cooling Water

EMI Electromagnetic Interference ENS Emergency Notification System EO Environmental Qualification Field Design Change Notice FDCN **FSAR** Final Safety Analysis Report GE **General Electric** GOI General Operating Instruction **HEPA** High Efficiency Particulate Activity HPCI High Pressure Coolant Injection IFI Inspector Followup Item INPO Institute of Nuclear Power Operations IRM Intermediate Range Monitor LCO Limiting Condition for Operation LER Licensee Event Report LPRM Local Power Range Monitor LRED Licensee Reportable Event Determination MOV Motor Operated Valve M&P Materials and Procurement MR Maintenance Request Main Steam Isolation Valve MSIV NCV Non-Cited Violation NE Nuclear Engineering NEP Nuclear Engineering Procedure NRC Nuclear Regulatory Commission NRR Nuclear Reactor Regulation NSSS Nuclear Steam Supply System OCB **Oil Circuit Breaker** ORR **Operational Readiness Review** PASS Post Accident Sampling System PCIS Primary Containment Isolation System PMI **Plant Managers Instruction** PM **Preventive Maintenance** PMT Post Modification Test PRD Problem Reporting Document QA Quality Assurance **0C** Quality Control **QMDS** Qualification Maintenance Data Sheets Reactor Building Closed Cooling Water RBCCW Residual Heat Removal RHR RHRSW Residual Heat Removal Service Water Records and Information Management System RIMS RPS **Reactor Protection System** RPV **Reactor Pressure Vessel** Rod Worth Minimizer RWM Systematic Assessment of Licensee Performance SALP Standby Gas Treatment System SBGT SDSP Site Directors Standard Practice SI Surveillance Instruction SII Special Instrument Instruction SIL Service Information Letter SOI Startup Operations Instruction

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SPAE SPOC SRM SRV SSP TACF TD	System Plant Acceptance Evaluation System Pre-Operability Checklist Source Range Monitor Safety Relief Valves Site Standard Practice Temporary Alteration Change Form Test Deficiency
	Technical Instruction
TMI TROI	Three Mile Island Tracking and Reporting of Open Items
TS	Technical Specification
URI VIO	lennessee Valley Authority Unresolved Item Violation
WO WRGERMS WR	Work Order Wide Range Gaseous Effluent Radiation Monitoring System Work Request

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