



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

Report Nos.: 50-259/89-40, 50-260/89-40, and 50-296/89-40

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 at Browns Ferry Site near Decatur, Alabama

Inspection Conducted: August 16 - September 15, 1989

Inspector: *[Signature]* 10/19/89
 D. R. Carpenter, NRC Site Manager Date Signed

[Signature] 10/19/89
 C. A. Patterson, NRC Restart Coordinator Date Signed

Accompanied by: E. Christnot, Resident Inspector
 W. Bearden, Resident Inspector
 K. Ivey, Resident Inspector
 B. Long, Project Engineer
 A. Johnson, Project Engineer

Approved by: *[Signature]* 10/19/89
 W. S. Little, Section Chief, Date Signed
 Inspection Programs,
 TVA Projects Division

SUMMARY

Scope:

This routine resident inspection included reportable occurrences, Part 21 reports, and action on previous inspection findings.

Results:

Eighteen LERs were reviewed and 17 closed. One NCV was identified during an LER review for failure to document transfer of material parts, paragraph 2.h. Nine IFIs were reviewed and eight closed. Three URIs were reviewed and two closed. An MPA was closed regarding DG fuel oil. Thirteen Part 21 Reports and three violations were closed.

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This inspection report is primarily a closeout of open items and as such an observation can be made that the licensee is repeating many of the same issues. The adequacy of the licensee's corrective actions have not been fully acceptable in all cases. The repeatability of problems that are or might be attributed to the inadequacy of station procedures was the subject of a management meeting with TVA on September 28, 1989 (NRC letter to TVA, October 19, 1989, Meeting Summary - Browns Ferry Nuclear Plant, Unit 2 Docket Number 50-260). The repeatability of problems associated with the Surveillance Program is the subject of Inspection Report 89-43.

There are no cited violations or deviations in this inspection report.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees:

- *O. Zeringue, Site Director
- G. Campbell, Plant Manager
- *R. Smith, Project Engineer
- *J. Hutton, Operations Superintendent
- *A. Sorrell, Maintenance Superintendent
- D. Mims, Technical Services Supervisor
- G. Turner, Site Quality Assurance Manager
- *P. Carrier, Site Licensing Manager
- *P. Salas, Acting Compliance Supervisor
- J. Corey, Site Radiological Control Superintendent
- 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 Employees

- *D. Carpenter, Site Manager
- *C. Patterson, Restart Coordinator
- *E. Christnot, Resident Inspector
- *W. Bearden, Resident Inspector
- *K. Ivey, Resident Inspector
- A. Johnson, Project Engineer
- B. Long, Project Engineer

*Attended exit interview

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

2. Reportable Occurrences (92700)

The LERs listed below were reviewed to determine if the information provided met NRC requirements. The determination included the verification of compliance with TS and regulatory requirements, and addressed the adequacy of the event description, the corrective action 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.

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- a. (CLOSED) LER 259/85-57, Wide Range Torus Water Level Transmitters Not Qualified.

During an engineering review of torus wide range water level monitoring system instrumentation, the licensee determined that the fill fluid utilized in the capillary tubes was not suitable for all environmental conditions since it could crystallize at temperatures below 70 degrees Fahrenheit. These instrument loops were installed to meet NUREG-0737 requirements for post accident monitoring of the water level in the torus and are for indication only. Since the level instruments were previously scheduled for replacement, the licensee noted that replacement with EQ qualified transmitters would be the corrective action taken to resolve the LER.

The licensee initiated ECN P0323 to install a new water level system including EQ qualified transmitters. New indicators and recorders were also installed in the control rooms. The ECN was completed in November, 1988. The inspector reviewed the completed ECN package, including the work packages which implemented it, and verified that the new transmitters were qualified and documented in accordance with the licensee's EQ program; that post modification testing was performed following the installation; and that SI procedures for system calibration and functional testing were updated to reflect the new system. The inspector also walked down the new system for all three units, including control room instrumentation, and verified that they were installed as designed. This LER is closed.

- b. (CLOSED) LER 259/86-23, Switchyard Problems Lead to Reactor Scram.

This LER addressed a scram signal on Units 1 and 3 reactors due to a loss of control air. The loss of control air was caused by an electrical problem in the switchyard system.

All three BFN units were shutdown and receiving electrical power from the 500KV and the 161KV grid systems. The problem in the switchyard developed when operators were instructed to place the 161KV switchyard system capacitor banks in service. The BFN plant is equipped with two capacitor banks to aid in voltage regulation of the 161KV system. This in turn helps to regulate the voltage on the plant internal 4KV and 480V common electrical switch boards through the 161KV/4.16KV common station service transformers. During this activity, severe electrical arcing occurred in the capacitor system. In order to stop the arcing, switchyard breakers were opened which resulted in a loss of power to plant internal 4KV and 480V common boards due to loss of power to the switchyard common station service transformer. The power to a control air compressor was lost and ten minutes after the incident, scram signals were received.

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The inspector reviewed the LER, dated August 15, 1986, and the LER closure package and verified that the LER met the requirements for timeliness, content and corrective action. The root cause was determined to be a failure of capacitor bank circuit interrupter contacts and operators not performing the operation in the intended manner. The licensee corrective actions are as follows:

- A training course OPL 174.702, 161KV Capacitor Banks, was developed and administered to operators in the licensed operator and requalification training.
- A tag was mounted stating: "Caution. Hand Crank Should Not Be Used To Close Switches On Energized Banks. Switches should be closed from the control cabinet with mode selector 43MA in manual after verifying no yellow target on interrupter and no red target on capacitor end of switcher".
- A walkdown of the control air system was completed and MRs were written to repair identified leaks in the system.

The inspector reviewed the above licensee actions and determined them to be appropriate. This item is closed.

c. (CLOSED) LER 259/87-10, Failure to Properly Post Fire Watch.

This item involved the failure to post a continuous fire watch at the door to the carbon dioxide storage room as required by TS 3.11.E. On April 26, 1987, the cooling unit for the Unit 1 and 2 carbon dioxide storage tank was inoperable, causing the tank pressure to reach approximately 330 psi and relieve into the room through the instrument line relief valve. The SE phoned the safety technician on the night call list, who recommended that the room be ventilated by opening the door, and, as the door is a fire door, a roving fire watch be established. Six hours later, it was determined that a continuous fire watch was required because a fire detection system was not available in the carbon dioxide storage room.

The licensee attributed the failure to post the appropriate fire watch to a lack of adequate communication between the SE and the safety technician. The SE assumed that the technician was familiar with TS fire protection requirements. The technician was in the industrial safety group, not the fire protection section, and did not possess an in-depth knowledge of TS fire protection requirements.

To prevent future occurrences of similar nature, the licensee has revised procedure SDSP 22.2, "Emergency Response Organization," to include the fire protection manager and a fire and safety engineer familiar with TS fire protection requirements in the call-out list.

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The inspector reviewed this action and determined it to be adequate to prevent similar cases of miscommunication in the future. This item is closed.

- d. (CLOSED) LER 296/88-04, Temperature Control Valves Installed Incorrectly Due to Inadequate Design Control.

This item involves the discovery in June, 1988, that on loss of control air, the air operated TCV for the Unit 3 shutdown board room AHU, would fail in a position that would cause the chilled water supply to bypass the AHUs. Such a situation could place the shutdown board room in a high temperature environment, which could adversely impact the ability of electrical and instrumentation components in the room to function as intended. Engineering review revealed that this configuration did not satisfy Sections 10.12.3 and 10.12.6 of the FSAR, and had been in existence since original plant construction. Root cause was determined to be inadequate interface between engineering disciplines.

Corrective measures taken by the licensee are as follows:

- The Unit 3 TCVs have been modified, per DCN H1654A and WP 3101-88, so that, upon loss of control air, they will fail such that chilled water will continue to flow through the AHUs.
- Engineering evaluation and field verification of the corresponding TCVs in Unit 1 and 2 determined that they fail in the desired position and required no modification.
- Nuclear Engineering Procedures 3.3, "Internal Interface Control, and 5.2, "Review," which were not in existence during original plant design and construction, contain provisions to assure that adequate interdisciplinary design reviews are performed in the future.

The inspector reviewed the licensee's corrective measures and determined them to be appropriate and acceptable. This LER is closed.

- e. (CLOSED) LER 296/88-05, Loss of Power to 4160 Volt Shutdown Board Due to Inadequate Breaker Alignment Causes ESF Actuation.

This item involved the actuation of several ESF components due to a loss of power to the "3EA" 4160 Volt shutdown board. The licensee determined that this loss of power was caused by a misaligned breaker. A rebuilt GE normal feeder breaker was installed in the "test" position and satisfactorily tested. When racked into its normal position, the breaker did not align properly, causing the contactors to bend and not make the necessary contact to close the

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circuit. Root cause was determined to be a failure to ensure breaker alignment prior to racking it into its normal position. To preclude similar failures in the future, Procedure EMI 7.9 was instituted to provide instructions for installation testing, checkout, and alignment of new or rebuilt 4KV breakers. The inspector reviewed this procedure and determined it contained adequate assurance that breakers will be properly aligned prior to being placed in service. This item is closed.

- f. (CLOSED) LER 296/88-06, Procedural Deficiency Causes Failure to Comply With TS.

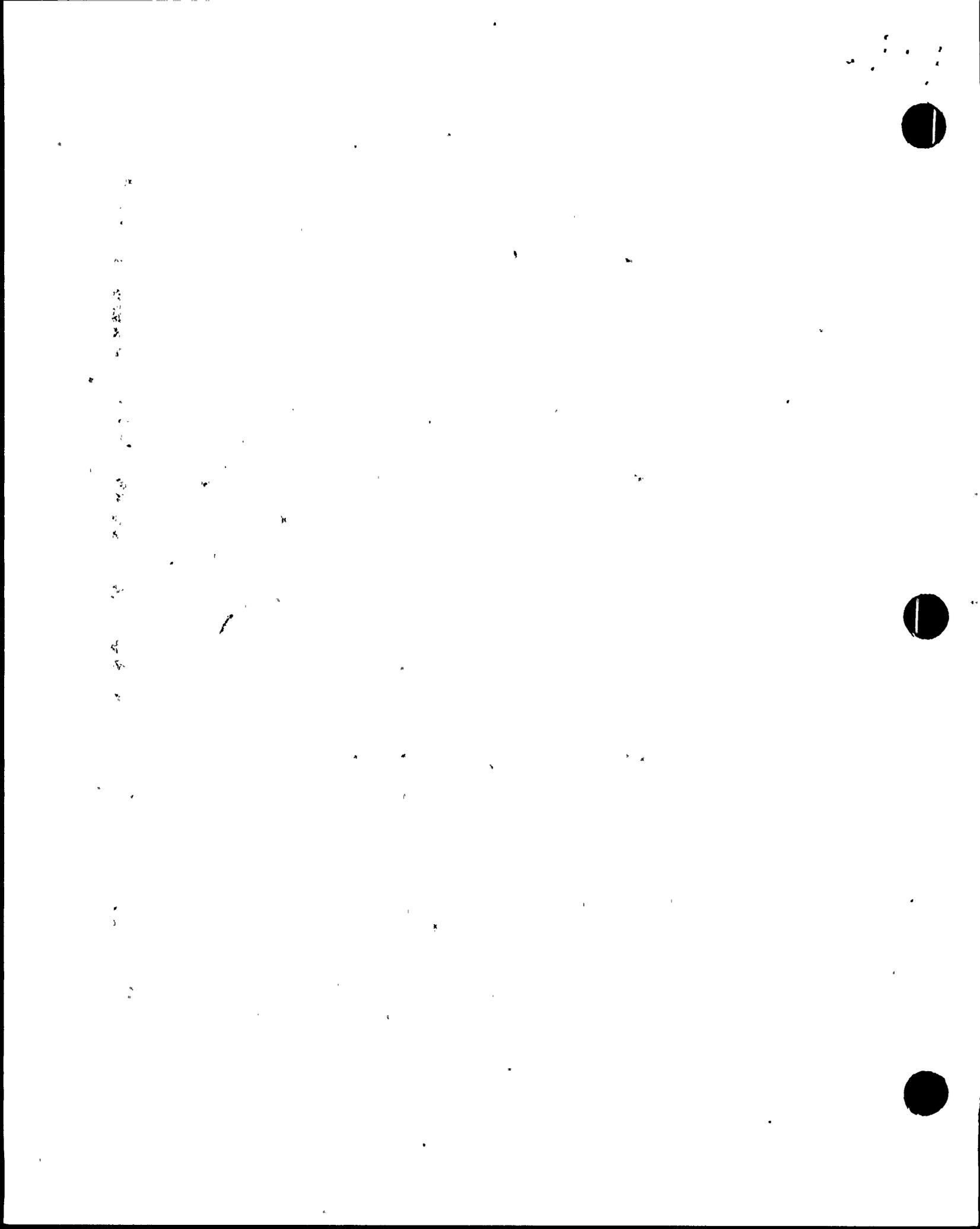
This item involves two separate instances, where compensatory sampling of RCW effluent was not performed as required in November 1988. TS Table 3.2.D; Action D requires samples to be taken at eight hour intervals when the RCW effluent radiation monitors are out of service. The licensee determined the root cause to be procedural deficiencies which led to a communications problem between operations and the chemistry section. Corrective actions were implemented as follows:

- Procedures 2-OI-24, 3-OI-24, and 1-OI-70 were revised to more clearly specify the conditions under which compensatory sampling is required.
- Procedure 0-SI-4.2.D-3B, was revised to provide additional guidance as to the preferred location from which to obtain the required sample.
- This event was included as required reading for all licensed operators.

The inspector reviewed the above corrective measures and determined them to be appropriate. This LER is closed.

- g. (OPEN) LER 260/88-06, Revision 2, 480 Volt Shutdown Board Voltage Transient Initiates Engineered Safeguard Features.

On August 24, 1988, and again on September 23, 1988, the "2C2" RPS circuit protector tripped, deenergizing the Unit 2 RPS buses and initiating ESF systems. All engineered safety features performed as designed upon loss of power to the RPS bus during both events. At the time of both events, the RPS and the Unit Preferred Distribution System were being fed from the same unit preferred transformer which is the alternate supply for the RPS. The licensee determined the root cause of the trips to be voltage transients at the input of the transformer which were beyond it's ability to regulate within the RPS circuit protector setpoints. For these specific events, the corrective action was to raise the output voltage of the transformer



to provide a greater margin to the undervoltage trip setpoint. The licensee also revised the operating instructions to minimize the time that both the RPS and unit preferred distribution are supplied from the unit preferred transformer at the same time. The inspector verified both of these actions. Revision 0 of this LER was submitted on September 23, 1988 with a supplemental report due December 1, 1988. Revision 1 was submitted to change the supplemental report date to February 2, 1989. Revision 2 was submitted on February 2, 1989, to provide the root cause of the event and corrective actions. This inspection addresses revisions 0, 1, and 2 of this LER.

This LER includes two of many RPS circuit protector trip events which have occurred for all three BFN units. There were seven such events in 1988 and, as of the date of this inspection, four events in 1989. The licensee has taken many corrective actions to preclude the recurrence of these events; however, they have not been effective considering that the most recent event occurred in Unit 1 on August 26, 1989 (see IR 89-38). The licensee considered one of the causes of the trips to be narrow tolerances in the circuit protector setpoints and were in the process of reviewing the setpoints when the latest event occurred. The licensee recently received GE SIL No. 496, Electrical Protection Assembly Performance, which included recommendations for resolving EPA spurious trips. One of the SIL recommendations was to evaluate the voltage setpoints and adjust the EPA undervoltage and overvoltage setpoints wider and/or time delay settings longer. The BFN circuit protector undervoltage and overvoltage trips do not currently have a time delay.

From discussions with licensee personnel, the inspector noted that the licensee has initiated a DCR for the review and revision of the RPS circuit protector setpoints and the addition of a time delay feature. The licensee has scheduled to have the design completed by November, 1989. The licensee is confident that these modifications will reduce spurious circuit protector trips. This LER will remain open pending completion of the modifications to the circuit protector system. Closure of this LER is a restart item.

- h. (CLOSED) LER 259/88-07, Revision 1, RHRSW Pump Flow Not Demonstrated In Accordance With TS Due To Calibration Error.

Due to errors in calibrating flow instruments, the RHRSW pumps were not providing the 4500 GPM of flow required by TS 4.5.C.1.b. The instrumentation was being calibrated for a dp of 704 inches of water at a flow of 7500 gpm instead of the correct values of 800 inches of water dp at 6000 gpm. This resulted in an indicated RHRSW flow of 4500 gpm while the actual flow was approximately 3400 gpm.

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The licensee determined that the cause of this calibration error was that the flow transmitters were being calibrated using GE instrument data sheets that had not been verified against the Daniel orifice flow calculation data sheets, resulting in the use of the above stated incorrect values. After determining the correct values, flow transmitters on FI-23-36, -42, -48, and -54 loops were recalibrated to indicate actual system flow. In order to ascertain whether this was a generic concern, the data sheets for 50 instrument loops, involving 12 additional systems were obtained from GE and reviewed. No similar calibration errors were discovered.

Following recalibration the RHRSW pumps were tested, in July 1988, per 2-SI-4.5.C.1(3). This testing revealed that five pumps (B2, C1, C2, D1, and D2) did not provide the required 4500 GPM flow. Additional evaluations resulted in the following corrective actions:

- Silt and corrosion buildup was discovered in the system piping, and the piping was flushed in accordance with ST-88-25.
- The flow transmitter associated with the C1 and C2 pumps was found to be defective and was replaced.
- Pump D2 was torn down and rebuilt, per MR-A-900705, in October 1988.

Following these corrective actions, testing was again performed in accordance with 2-SI-4.5.C.1(3), in December 1988. All of the RHRSW pumps successfully supplied the required 4500 gpm through their associated RHR heat exchangers.

The inspector reviewed the above licensee actions and determined them to be adequate in addressing the originally identified condition regarding RHRSW system flow requirements. This LER is closed. During this review the inspector identified an additional concern involving the rebuilding of the D2 pump. While reviewing a Work Log Sheet (SDSP 7.6, Attachment D) in the MR A-900705 package it was found that the bottom bowl assembly consisting of the shaft, series case, suction bell and impellers from the A3 RHRSW pump was to be used to rebuild the D2 pump, and that all the shaft column bushings were replaced. However, the appropriate material transfer documentation form SDSP 367 and material issue documentation form 575N required by procedures SDSP 16.16, step 6.5.2 and SDSP 7.6, step 6.4.8 had not been initiated. This documentation is necessary to provide material traceability to the point of installation. This discrepancy was brought to the attention of licensee mechanical maintenance personnel by the NRC inspector and , CAQR BFP890689 was then initiated. This is considered a failure to ensure that parts and components are traceable throughout installation as required by 10 CFR 50, App. B, Criterion VIII, Identification and Control of

Materials, Parts, and Components, and is identified as NCV 259, 260, 296/89-40-01, Documentation of Material Transfer. This item was discussed with the maintenance manager. The licensee initiated a CAQR to correct this problem and was conducting a complete review of the MRs involved. Cross referencing was available between the MRs to trace the material, but the forms were not complete. This NRC identified violation is not being cited because criteria specified in Section V.A of the NRC Enforcement Policy were satisfied.

- i. (CLOSED) LER 260/88-12, Violation Of TS Due To Personnel And Management Errors.

This item involved the observation of an employee in a less than fully alert state while assigned as a firewatch over welding activities in the Unit 2 drywell on October 13, 1988. A firewatch who is in a less than fully alert state or otherwise not performing his duties constitutes a violation of TS 3.11.H, which requires a continuous firewatch in the immediate vicinity of work involving welding. During the licensee's investigation of this event, it was revealed that at least three similar cases, involving different employees, had previously been observed, but had not been reported to the SOS or other appropriate levels of management. The corrective actions taken by the licensee are as follows:

- The four individuals involved were administered appropriate disciplinary action.
- The plant manager issued a formal memo to instruct supervisors in the reportability requirements of an improper firewatch.
- The incident was discussed with other firewatch personnel, emphasizing the importance of conscientiously performing firewatch duties.

The inspector reviewed the above licensee actions and determined them to be appropriate. This item is closed.

- j. (CLOSED) LER 259/88-16, Personnel Error Resulted In a Violation of TS.

This item involved two instances on March 20 and 21, 1988, where off-gas stack flow rate estimates were performed at intervals in excess of those allowed by TS Table 3.2.K. Action D of this table requires that the flow rate be estimated at least once per four hours when flow monitor O-FT/FM/FI-90-271 is inoperable. During the cognizant engineer review of completed SI-4.8.B.1.a.1 data package, it was discovered that on the above dates, flow rates were recorded at 1400 hours, 2000 hours, 0200 hours, and 0600 hours, resulting in two six-hour intervals between the required estimations.

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The licensee determined the cause of these omissions was because the responsible AUOs became involved in other duties and thus failed to perform these duties within the required four hour intervals. The individuals involved have been counseled as to the importance of performing TS required activities within required timeframes; and other operations personnel reviewed the that as part of their required reading. The inspector determined the corrective measures were appropriate. This item determined is closed.

- k. (CLOSED) LER 259/88-20, Unplanned ESF Actuation Due To Personnel Error and Procedural Inadequacy.

This LER identified an unplanned ESF actuation which occurred during restoration of the "D" DG to standby readiness following maintenance. Plant personnel were removing an equipment clearance and the DG logic breaker was closed prior to power being restored to the associated 4160 volt shutdown board. This incorrect sequence resulted in the DG logic sensing an undervoltage condition with a subsequent automatic start of the "D" DG.

The licensee's investigation into the cause of this event revealed that it occurred due to personnel error with procedural inadequacy as a contributing factor. The operators failed to perform the steps necessary to restore the "D" DG to standby readiness in the correct sequence. The existing equipment clearance procedure did not require that a sequence be specified for return to service of affected components.

The licensee has performed the following corrective actions:

- Personnel involved in the event were counseled.
- All operators received training as part of the requalification training, and the required reading program included the review of the event and the revision of plant procedures.
- SDSP 14.9, "Equipment Clearance Procedure," section 6.6 was revised to include a requirement to specify a proper restoration sequence to ensure that tags are removed and equipment positioned in an order that will prevent inadvertent reliance on interlocks. Those steps which require sequencing shall be identified by number.

The inspector reviewed the licensee's LER submittal and the above corrective actions and concluded that necessary actions have been performed and are appropriate. This item is closed.

- l. (CLOSED) LER 259/88-26, Violation of Fire Protection TS Due to Personnel Error.

This item involves a violation of TS, in that fire doors 643, 644, 659 and 660 were blocked open without proper compensatory measures.

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TS 3.11.E requires a continuous fire watch to be posted at non-functional fire barrier penetrations unless the fire detection system is operable on one side of the penetration. Although no fire detection was available, the decision was made to utilize an existing roving firewatch to monitor these areas. Factors contributing to this erroneous decision were the existence of an inadequate FHA and the fact that no well defined fire barrier compartmentation existed. Immediate corrective action was to close the doors and initiate CAQR BFQ-880533. In addition, the licensee has taken the following steps to preclude similar events.

- Fire protection technical and engineering personnel have reviewed the CAQR in order to more fully understand the required compensatory measures.
- The FPP-2 has been revised to more clearly delineate the conditions requiring a continuous watch.
- A new FHA has been completed (DWG. 47W216) which includes defined fire barrier compartmentation.

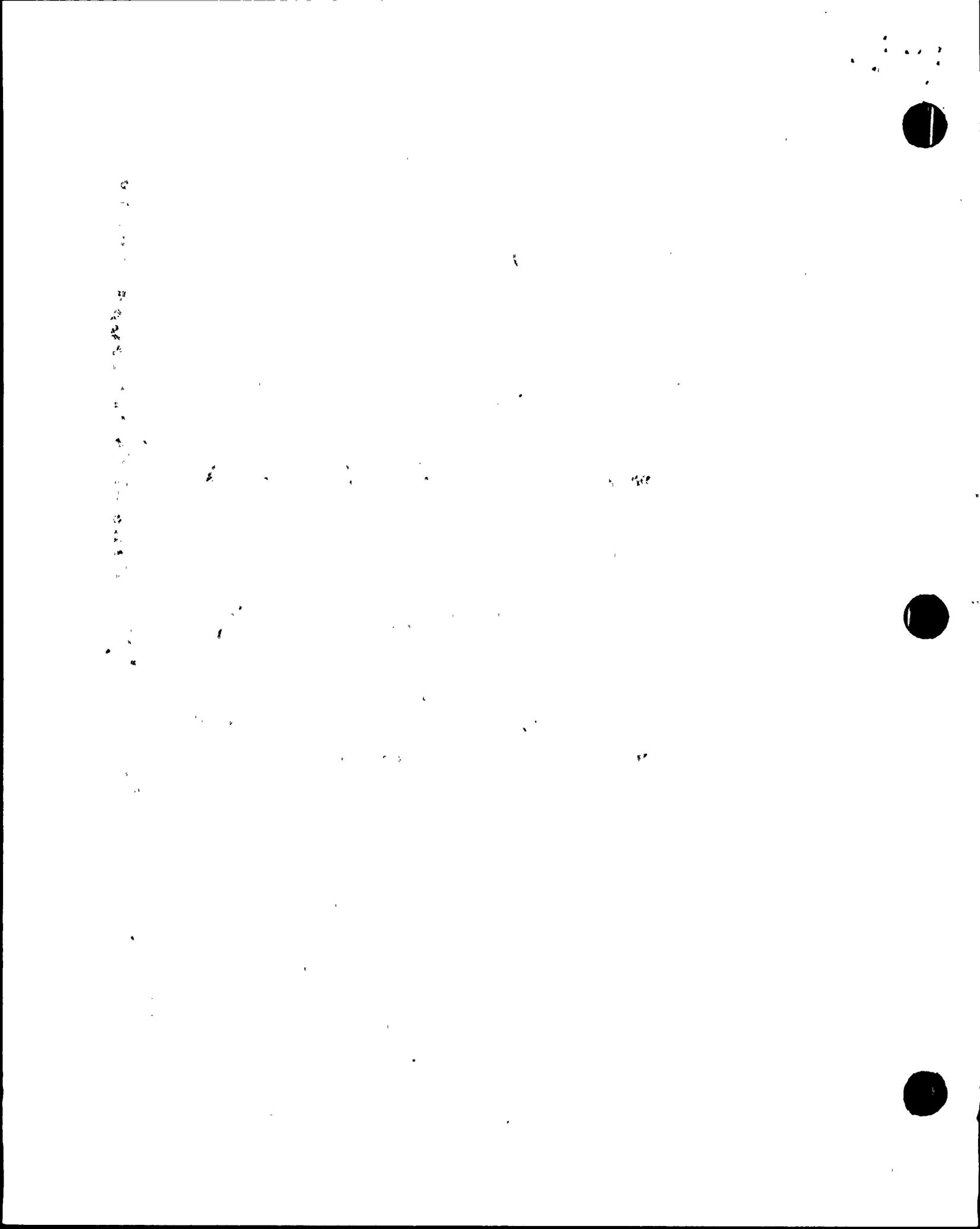
The inspector has reviewed the above corrective measures and considers them to be appropriate. This item is closed.

m. (CLOSED) LER 259/88-30, ESF Actuation Caused By Personnel Error.

During the performance of a modification to install permanent test jacks for testing the reactor and refuel zone ventilation exhaust radiation monitors, an unplanned ESF actuation occurred. This work was being performed using jumpers with the circuit energized. The ESF actuation occurred due to inadvertent bumping or grounding of associated relay contact while working in an electrical panel. Once the actuation occurred, all work in the area was halted. The cause was determined and the isolations were reset. The craft personnel involved were counseled to use extreme caution when working in sensitive panels. The modification workplan was revised to perform the work with the circuit deenergized. On a generic basis, a site procedure was revised to require that impact evaluations be performed on all activities that have potential for affecting equipment operations which may affect the safe and reliable operation of a unit. The inspector reviewed plant procedure SDSP 7.9, "Integrated Schedule and Work Control", and the associated impact evaluation sheet. The impact reviews should help prevent inadvertent ESF actuations. This item is closed.

n. (CLOSED) LER 259/88-46, Medical Emergency Causes Failure to Comply With TS.

This item involved a failure to maintain a roving firewatch, as required by TS 3.11.A.2, for a period of approximately one hour on



November 5, 1988, due to a medical emergency. Upon completing a roving firewatch round at 1023 hours, the firewatch clocked out and reported to the ERT office, complaining of chest pains and heart flutter. The firewatch was transported to an offsite hospital. ERT personnel began attempting to contact the firewatch foreman. The foreman was making his assigned rounds and could not be reached immediately. When the foreman was reached, he took immediate steps to assign a replacement firewatch, who clocked in and began the next firewatch at 1126 hours. This event was determined to be an isolated occurrence with no further action necessary. This item is closed.

- o. (CLOSED) LER 260/89-01, Fuel Load Without Adequate Neutron Monitoring Due To Inadequate Safety Review of TS Amendments.

This LER was issued as a voluntary report to document the Unit 2 unmonitored core loading event which occurred in January, 1989. This event and the determination of reportability were reviewed in detail and documented in special inspection reports 89-04 and 89-18. The licensee's corrective actions associated with this event were reviewed in those reports and the NRC findings are tracked by separate item numbers. Followup of this LER is covered by those items and this LER is closed.

- p. (CLOSED) LER 259/89-05, Plant TS Surveillance Requirement Exceeded Due to Misinterpretation of Patrolling Firewatches Responsibilities.

On March 14, 1989, BFN QA personnel discovered that firewatch patrols had exceeded the hourly intervals set by the action statement for TS section 3.11.A.1.b. This section states that "...a patrolling fire watch will be established to ensure that each protected zone or area with inoperable detectors is checked at intervals no greater than once each hour." This requirement was interpreted to mean that rounds of inspection areas were sufficient as long as the rounds were completed once per each clock hour. This interpretation was incorrect and was the cause of the late firewatch.

Immediately upon notification of this condition, actions were taken by plant management to provide roving firewatch rounds at intervals of 45 minutes. Firewatch routes were reviewed to ensure the rounds could be completed within the time allotted.

This discovery resulted in the licensee generating CAQR BFN 890247, which was initiated on March 17, 1989, and closed on May 27, 1989. The CAQR documented that patrolling fire watches were making rounds every hour. However, depending upon which route was followed and the concept that each area was to be monitored during a set hour time frame, some areas were not monitored for up to one hour and 30 minutes.

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The inspector reviewed and evaluated the licensee's corrective actions and considered the action adequate. This item is closed.

- q. (CLOSED) LER 260/89-05, Unplanned Scram During Logic Functional Testing Caused By Misplaced Jumper.

This LER identified an unplanned scram which occurred during performance of a rod block/scram functional test. The unplanned scram signal occurred due to an instrument technician momentarily contacting an adjacent terminal point during jumper installation in the RPS logic. This inadvertent action resulted in blown fuses in RPS channels A3 and B3 simulating trips of those channels thereby completing the scram logic.

The licensee investigation of the event revealed that although the scram was due to personnel error, a contributing factor was human factors inadequacies. The test procedure required the placement of jumpers on a long vertical terminal strip with screwed connections. Due to the small spacing and a relatively short insulating wall separating each terminal point, a slight misplacement of the jumper could result in contacting other connectors on the terminal strip.

The licensee has revised the design specification, section 3.4.2.6.8 of TVA's General Construction Specification G-38, for installing insulated cable rated up to 15,000 volts to allow replacement of terminal screws with permanently installed test connections such as Banana Jack type terminals where temporary configurations are needed for frequent testing and calibration of instruments and electrical equipment. The licensee now uses jumpers designed for insulated Banana Jack terminals. The inspector considers that the licensee has adequately addressed the issue. This item is closed.

3. Multi-Plant Action Items

Multi-Plant Action Item A-15, QA Request Regarding Diesel Generator Fuel Oil

10 CFR Part 50, Appendix B establishes overall quality assurance requirements for design, construction, and operation of structures, systems and components important to safety. Consumable items where quality is necessary for functional performance of safety related components shall also be classified as safety related and thus be subject to the applicable provisions of Appendix B to 10 CFR Part 50. As a result of a review performed at Arkansas Nuclear One, in 1979, it was found that diesel generator fuel oil was not on the Q-list for Units 1 and 2. In January 1980, NRR requested all licensees to check their QA programs with respect to DG fuel oil; and to include DG fuel oil in their QA programs or provide justification for not doing so. This activity was identified as MPA A-15.

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The inspector discussed this item with BFN licensing personnel and reviewed the licensee's actions to verify completion of this item. The inspector verified that DG fuel oil was covered under the licensee's QA program and was designated as QA Level III. Procedure CI-800, "Bulk Chemical Control, Sampling, and Preparation" contains receiving Specifications for DG fuel oil. This item is closed.

4. Followup of Part 21 Reports

- a. (CLOSED) 259, 260, 296/P21-84-01 Manufacturing and/or Design Defects in MG Sets.
- (CLOSED) 260, 296/P21-84-02 Cracking of LPCI MG Set Generator Clamps.
- (CLOSED) 296/P21-84-04 LPCI MG Sets Failure.

These items concerned degradation of the LPCI MG set coil clamps and rectifier rings. The licensee reported this in LER 259/85-04 and considered the item also Part 21 reportable. The LER was closed in IR 88-10. Diode failures were occurring due to vibration of the rectifier ring. All diodes were tested and rotating rectifier rings tightened. The phenolic coil clamps were cracking and pieces were found in the bottom of the generator housing. The coil clamps were replaced with aluminum coil clamps approved by vendor instructions. The MG sets have also had a history of bearing problems caused by vibration. A new type of coupling has been installed and the bearing problems have been reduced. These modification and improvements should reduce the failure rate of the LPCI sets. These Part 21 items are considered closed.

This design is unique to Browns Ferry. The LPCI MG sets are used for fault isolation to prevent transferring an electrical fault between power supplies. The licensee is considering a post restart design change to replace the MG sets with a circuit breaker.

- b. (CLOSED) 259/P21-84-02 and 260, 296/P21-84-03, Loctite-242 Causes Scram Solenoid Pilot Valves to Fail to Vent.

The inspector reviewed procedure MCI-0-85-VLV001; "Scram Pilot Valves FSV 85-39A or 85-39B Disassembly, Cleaning, Replacement, and Reassembly" which contains a caution step not to use Loctite. Mechanical Maintenance Instruction 51, "Maintenance of CSSC/Non-CSSC Valves and Flanges," contains a caution statement regarding Loctite. These items are cross-referenced to NRC Information Notice 84-53 concerning use of Loctite. This item is closed.

- c. (CLOSED) 259/P21-84-04, ITE-27N Undervoltage Relays Users Contact Brown Bovari.

This item was a design problem with a feedback resistor in the relays. Brown Bovari made a 10 CFR Part 21 Report of this condition on March 13, 1984. The licensee reported problems with the relay in LER 82-13. The LER had five revisions with the latest on June 28, 1984. The LER was closed in IR 88-10. The relays were replaced with more stable Gould-Brown Bovari relays. This was accomplished under work plans WP #1003-84R1 and WP #13183R1. This item is closed.

- d. (CLOSED) 259, 260/P21-85-01, Incorrect Bolting Material on Scram Discharge Volume Tanks.

This item concerned hardened steel cap screws that had been used with mild carbon steel nuts for seismically mounting the level switches for the scram discharge volume tanks. Over-stressing of the nuts could occur if torqued per the plant maintenance tables. The bolting material supplied by the vendor was not of the required grade specified by the licensee. This resulted in the installation of different grade bolts and nuts. The licensee issued a 10 CFR 21 report on January 18, 1985, concerning the incorrect material supplied by the vendor. The licensee's corrective action was to replace bolting material with the correct material on all three units. A 10 CFR 21 report was issued to notify other plants of this problem. This item is closed.

- e. (CLOSED) 259, 260/P21-85-02, Defective Analog Level Detector.

This item was a defect in a vendor supplied valve flow monitor. A module could fail to reset after indicating full flow. This item was reported by the licensee in LER 259/85-016 Revision I. The LER was closed in IR 87-33. Three defective cards were found on Unit 1, none on Unit 2, and one on Unit 3. The defective cards were replaced and retested. This item is closed.

- f. (CLOSED) 259, 260/P21-85-03, Faulty AK and AKR Low-Voltage Panel Circuit Breakers.

This item concerned the failure of the under voltage device of a GE Type AK-2-25 Reactor Trip Breaker. Information Notice 85-058 also discussed this issue. This condition was found not applicable to BFNP which depends on an under voltage trip by relay sensing board bus voltage instead of breaker tripping. BFNP does not use any AKR breakers. This item is closed.

- g. (CLOSED) 259/P21-86-02, Attwood and Merril MSIV Failure Due to Quench Cracks.

This item concerned breakers closing assist springs on MSIVs. All inner and outer MSIV springs for all three BFNP Units were visually

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inspected. Of the 384 springs inspected, 2 were found to be broken on Unit 1. This item was stasured in IR 87-46. The licensee is keeping information notice 86-081 open until the springs are replaced on Unit 1. Since the inspections are complete and a mechanism to track the Unit 1 spring replacement is in place, this item is closed.

- h. (CLOSED) 259/P21-86-03, Limitorque DC Motors Lead Wire Insulation Failure.

This Part 21 item is discussed in IN 87-008, "Degraded Motor Leads in Limitorque DC Motor Operators." Ten Unit 2 motors were identified to be applicable to this report. Three motors were verified acceptable and seven motors have been replaced. The valve numbers were 1-59, 69-2, 71-8, 71-34, 73-3, 73-16, and 73-35. Similar verifications are planned for Unit 1 and 3 prior to startup. The IN 87-008 remains open pending action on the other units. Based on correction of the Unit 2 problems and a mechanism to verify the other units, this item is closed.

- i. (CLOSED) 259, 260, 296/P21-88-04, Reinstalling Foxboro Controller Circuit Cards May Cause 100% Output Subsequent Transient to Occur.

This item was related to a scram that occurred at Perry while reinstalling a circuit card in the recirculation system automatic flux controller. The licensee performed a review of the instrument tabulations and did not identify any of these type cards used at Browns Ferry. This item is closed.

- j. (CLOSED) 259, 260, 296/P21-88-07, Morrison-Knudsen EMD 999 DG Systems Have Potential for Field Breaker Trip Due to Combined Air Temperature and Field Amperes; and

(CLOSED) LER 259, 260, 296/88-34, Overheating of Diesel Generator Field Breaker Could Cause Loss of Diesel Generator Placing Plant in an Unanalyzed Condition.

During a 24 hour load test, a diesel generator tripped due to the field breaker opening. The licensee reported this in LER 88-034. Morrison-Knudsen Company issued a 10 CFR 21 report on September 27, 1988. The field breaker was a General Electric type TED 136100 thermal activated, molded case breaker with a nominal setpoint of 100 amperes. The field current at the time of the trip was measured at 97 amperes. The control cabinet temperature was approximately 130 degrees Fahrenheit which was less than the 140 degrees breaker design operating temperature. The field breaker was sized to protect the field from an output fault. Only a small amount of operating margin existed between the normal operating current and the trip setpoint. In this event, the control cabinet temperature reduced the effective field breaker thermal overcurrent trip setpoint causing it to trip.

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This condition was identified by the Restart Test Program during testing. Corrective action consisted of replacing the field breakers with non-automatic switches. It was determined that automatic overcurrent protection was not required for this circuit, thus a non-automatic switch would be a more reliable component for the system. The internal wiring in the cabinet to the switches was also replaced with a larger size. Louvers were added to the cabinet to increase the ventilation in the cabinet and prevent the elevated temperatures previously involved. Both the LER and Part 21 are closed.

- k. (CLOSED) 259, 260, 296/P21-89-01 Brown Bovari Kline, K-225 Through K-2000 Circuit Breakers Delivered Prior to 1974 Need Rebound Spring Added to Slow Close Pin wereunable to close.

This item identified that K-line circuit breakers during seismic testing were found to malfunction and were unable to close. The defect was only applicable to breakers purchased prior to 1974. BFPN reviewed the item and found that K-line breakers were not purchased before 1974. Breakers were purchased after 1978 and are used in MG Sets. The vendor modified the breakers in July 1974 and thus no known defective breakers are installed in BFPN. This item is closed.

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

- a. (CLOSED) IFI 259/84-26-17, Higher Pressure Wave in the "B" Main Steam Line.

During a scram on June 2, 1984, the four safety relief valves that opened were all on the "B" main steam line. The concern was that a higher pressure wave in the "B" line would challenge these valves more often and possibly cause one to stick open. A relief valve stuck open in 1983 and was reported in LER 259/83006 and closed in IR 84-38. The cause of the relief valve sticking open was that the pilot inlet tube mounting bracket had broken permitting the inlet tube to get under the seat of the relief valve. ECN P0653 was performed to replace the inlet tube brackets. This eliminated the concern about valves sticking open. During the scram on June 2, 1984, no valves operated or failed to operate outside their setpoint range. There were four more scrams on Unit I prior to its shutdown in March 1985. None of these scrams challenged the relief valves and the pattern could not be duplicated. There has been no occurrence of this problem at other plants with similar GE designs. This item is closed.

- b. (CLOSED) IFI 259/84-53-04, Stroke Time Testing.

This item involves a question as to the definition of full stroke operating time as pertaining to stroke time testing of MOV

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FCV-3-75-50. When tested on December 16, 1984, this MOV closed in 31 seconds, as compared to the maximum allowable closure time of 30 seconds. In order to meet the required stroke time, the licensee revised procedure EMI 18 to specify that the open limit switch for this valve be set at 85-86% of valve stem travel from the closed position. At the time, the inspector questioned whether this action was an acceptable method of obtaining the required test results. Subsequent information obtained from licensee personnel and NRC staff revealed the following:

- It is desirable to set the Open Limit Switch at a value less than 100% of valve stem travel in order to avoid damage caused by backseating the valve. Typically, the limit switch setting is at approximately 90% of full travel.
- FCV-3-75-50 is a normally closed pump test bypass valve which is opened only during pump operability testing. It is operated as a throttle valve to establish the required pump discharge head. An evaluation performed by the licensee determined that, during this testing, the valve will never have to be opened farther than the 85-86% setting of the limit switch. Therefore, it will never have to close from a position further open than that in which it has been tested.

In view of the above information, the inspector determined that the licensee's above action taken to obtain the desired test results is appropriate and acceptable. This item is closed.

c. (CLOSED) IFI 259/85-06-11, Failure of 1A Recirculation Pump to Start.

Unit 1 scrambled on January 16, 1985. While recovering from the scram, the 1A recirculation pump failed to start. The cause was determined by the licensee to be due to a Bailey positioner being in an incorrect position. The positioner was reset and the pump was found to operate properly. This item is closed.

d. (CLOSED) IFI 259, 260, 296/85-07-02, Adequacy of Procedures.

This item involves concerns relating to the adequacy of procedures used in the welding and installation of piping supports. In particular, procedures MAI 23 and BF 8.3 were identified as being inadequate to assure that work was properly performed, inspected, and documented. As previously reported in IR 86-27, NRC inspectors have reviewed enhancements to these two procedures, with no adverse comments or concerns, but that additional welding-related procedures needed to be reviewed prior to closure of this item. The inspector has completed review of the following procedures:

- SDSP 13.1, Welding Control and Applications, Revision 14
- SDSP 13.2, Filler Metal Control, Revision 5

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- SDSP 13.8, Welding Surveillances, Revision 3
- SDSP 8.4, Modification Workplans, Revision 15
- MAI-4.2, Support and Installation of Piping Systems in Category I Structures, Revision 1

This review determined that appropriate and adequate controls are now in place to assure that pipe support welding and installation is properly performed, inspected, and documented. This item is closed.

- e. (CLOSED) IFI 259, 260, 296/86-36-06, Discrepancies In Evacuation Plan Sectors and Routes.

A previous NRC inspection identified a number of concerns in the Emergency Preparedness Public Information Program with the potential for hampering the evacuation of the population within the 10-mile EPZ. The specific issues included missing evacuation signs and discrepancies between the emergency evacuation sector descriptions in the TVA Emergency Information Brochure and the Alabama RERP.

The issue concerning evacuation signs was also addressed by IFI 87-31-01 which was closed out in IR 88-09. For the sector description discrepancies, the licensee had the state of Alabama revise and update the RERP to show the same evacuation sectors as the licensee's map. The inspector reviewed both sector maps and noted that both included identical emergency sectors and alphanumeric designations. This item is closed.

- f. (OPEN) IFI 260/88-10-01, Main Steam Tunnel Blowout Deficiencies.

This item involves hardware deficiencies observed pertaining to the main steam blowout panels. These deficiencies include: 1) The use of RTV silicone sealant to fill gaps between the panels and the supporting members, and 2) many of the explosive bolts had been temporarily replaced with non-explosive bolts.

As previously stated in IR 88-32, the RTV silicone sealant had been replaced with GE seal proof silicone sealant and lithographer's bond breaker tape, as specified in DCN-H1417G, by work plan 2416-88.

The originally installed explosion bolts were designed to rupture at a value of 70 pounds per bolt. However, attempts to procure similar bolts were unsuccessful, necessitating the use of replacement bolts with a rupture value of 132-150 pounds per bolt. The licensee performed safety evaluation SEBFECN890018 which revealed that the use of these stronger bolts would increase the relief pressure of the blowout panels from 36 pounds per square foot, to 90 pounds per square foot, but that this increased blowout panel relief pressure would not cause the main steam tunnel to be subjected to internal pressures in excess of the original 10 psig design basis as stated in

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FSAR, Appendix M, Section M.2. DNE calculation ND-02001-880150, Revision 2 shows that the panels will relieve when the tunnel pressure reaches 0.625 psig with the stronger bolts, as opposed to 0.250 psig with the original bolts, and that both of these blowouts would occur early in the first 1/4 of a second following a main steam line rupture in the tunnel. The analysis also shows that the calculated peak pressure of 9.98 psig will not be reached in the tunnel until approximately 2.5 seconds have elapsed. Thus the use of the stronger bolts has virtually no effect upon the original design basis. However, use of these bolts would necessitate a revision to FSAR Section 5.3.3.4 to document the increased blowout panel relief pressure.

The installation of the new stronger bolts, replacing those found missing or broken, has been completed in accordance with ECN E-2-P7197 and WP-2191-89 for the Unit 2 Main Steam Blowout Panels. Therefore, all actions required prior to Unit 2 restart are complete. However, this item will remain open pending the above referenced revision to FSAR Section 5.3.3.4.

- g. (CLOSED) IFI 260/88-16-04, Verify Process To Review ECP Investigation Reports For Reportability.

During a review by the NRC inspectors of the ECP at Browns Ferry, a concern was identified that should be addressed by a program procedure change. SDSP 15.5, "Employee Concerns Handling Procedure," did not specifically address the review process required of completed ECP investigations to evaluate the findings for reportability requirements. After discussions with members of licensee management, the licensee committed to review all issued (26) ECP investigation reports for reportability and to correct SDSP 15.5 to address this concern.

The inspector reviewed Revision 3 to SDSP 15.5 and noted that section 6.3 has been revised to include the requirement to submit all completed safety related investigations to the licensee's PRS for effects on operability and reportability. Attachment "F" is included in SDSP 15.5 to document this review. Additionally, the licensee provided copies of the 26 affected employee concern investigation reports to the NRC inspector. Each investigation report included a completed SDSP 15.5 Attachment "F" which was signed by the PRS supervisor indicating a completed review for effects on operability and reportability. The review performed on all 26 of completed reports indicated that the associated employee concerns did not affect system operability. One concern, ECP-86-BF-C67-01, associated with a potentially damaged HPCI pipe anchor support resulted in generation of LRED 85-2-239. The support was subsequently evaluated

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as acceptable and not reportable. None of the investigation reports resulted in a required report to the NRC. The licensee had adequately addressed the concern, this item is closed.

- h. (CLOSED) IFI 259, 260, 296/89-14-01, Resumption Of A Surveillance Program For The TSC Communications Systems.

A previous NRC inspection identified that the records for periodic testing of the TSC communications equipment, including the ENS link, could not be found. The inspector also noted that the procedure for performing the testing was no longer valid.

On May 15, 1989, the licensee issued SSIL RE-5, "Testing Equipment," to resolve this concern. During this inspection period, the NRC inspector reviewed the new SSIL and noted that it included monthly testing of the TSC ENS and HPN communications and quarterly testing of the TSC telephone, telecopiers, intercoms, and copier. The inspector also reviewed completed test sheets for the last three monthly tests and the last quarterly test and noted no deficiencies. This item is closed.

- i. (Closed) IFI 260/89-20-04, Review of Hardware TEs for Procedures RTP-31A, 31B, 74, and 99.

This concern was originally identified by the inspector during a review of the completed RTPs 31A, 31B, 74, and 99. These RTPs documented a total of 87 TEs. A portion of these TEs involved hardware issues such as pumps not reaching adequate flow, a modification that must be installed before testing, and flow balancing not meeting acceptance criteria. The 87 TEs were reviewed and several TEs indicated that the program for identifying and closing out of significant TEs may not have been followed. This addition review resulted in an URI being opened in Report IR 89-38. Consequently, this IFI is closed.

- j. (CLOSED) URI 259, 260, 296/87-27-03, Seismic Qualification of SBTG Train C Blower.

This item involves a question regarding the adequacy of the support configuration for the SBTG train "C" blower. The unit was originally mounted with no lateral support, bringing into question its ability to remain functional during a seismic event.

As previously reported in IR 88-16, the licensee had performed an evaluation which revealed that the original mounting configuration did not meet current seismic support criteria, and had then modified the supports per DCN B00033C and WP 3308/88. The inspector reviewed

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the DCN, work plan and associated USQD, and the supporting calculation package and had no concerns with them, but had identified an installation deficiency in that the glue attaching the neoprene pads had lost its adhesiveness on one of the support members.

When notified of this deficiency, the licensee issued CAQR BFP 880385 to provide corrective action. The identified neoprene pads have been re-glued, and procedure MMI-4 has been revised to include provisions for their periodic repair and replacement. The inspector has reviewed the licensee's actions to correct the identified deficiency, observed the completed repair, and identified no further concerns. This issue was a matter of upgrading an existing installation to meet current seismic criteria. No violation is cited. This item is closed.

- k. (CLOSED) URI 296/87-45-01, Improper Layup and Monitoring of SLC System.

This item involves observations by NRC inspectors pertaining to layup of Unit 3 SLC system. Procedures GOI-100-13.0 and -13.15 require this system to be laid up in the dry state. The observations include:

- When low point drain valves 63-505 and 63-537 were opened, small amounts of water were present,
- The SLC test tank was found to be about 1/3 full of water, Demineralized water supply to SLC Test Tank Valve 63-532 was found to be leaking water into the tank,
- Procedure GOI-100.13.15 did not require periodic monitoring to ensure system dryness, and
- Although an engineering evaluation had determined that the instrument piping root valves should be closed in order to maintain this piping in a water solid condition, the above procedure did not require such closure prior to draining the remainder of the system.

In order to address these observations, the licensee has taken the following actions:

- Procedure GOI-100.13.15 has been revised to include provisions for periodic inspections to ensure system dryness.
- Hold Order 3-87-574 was initiated to close valve 3-2-1293, thus isolating valve 63-532 and preventing further leakage into the

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test tank. MR-726548 has been issued to perform corrective maintenance on valve 63-532, but as MR's that do not affect Unit 2 restart activities have been deferred, this MR will be completed at a later date.

- Further evaluation has determined that no adverse corrosion effects will result from instrument lines being drained or partially drained, although filling and venting of the lines will be necessary during system return-to-service. This determination is documented in a memo dated August 12, 1988 (RIMS R40880812933). Instrument Maintenance has taken measures to assure these and similarly effected lines in other systems are filled and vented when required. These measures are referenced in a memo dated August 31, 1989 (RIMS R37890831865).

The inspector reviewed the above licensee actions and determined that they are adequate to resolve the identified concerns. A violation was not issued because these items have minimal safety significance and the systems will be tested prior to returning to service. This item is closed.

1. (CLOSED) URI 259, 296/87-45-03, Quality Assurance Overview of the Layup Program.

This item involves concerns pertaining to QA surveillance involvement in the layup and preservation program for Units 1 and 3. As of May 1987, only one QA surveillance had been performed in this area and the licensee could not produce a schedule for additional surveillances.

Subsequent to the identification of this concern, QA has performed six monitoring activities and a programmatic assessment (May 1989). The inspector has reviewed the results of these activities and concludes that they were effective in identifying areas of programmatic and implementation weaknesses. The Nuclear Assurance and Services organization has developed a plan to provide site management with a quarterly report addressing the layup and equipment preservation program. These quarterly assessments are to continue through January 1990. An evaluation will be made at that time as to whether to continue these quarterly assessments or whether to base future surveillance activities on observed trends and the graded approach philosophy for monitoring activities. The inspector discussed the above approach with licensee personnel and concluded that it should be sufficient to assure program implementation. No citable violation was identified.

In addition, the inspector reviewed TVA's recently completed quarterly assessment (Attachment to RIMS R22890828925) and determined

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that it is sufficiently broad in scope and contained adequate information to provide management with an accurate picture of programmatic and implementation activities. This item is closed.

- m. (Closed) URI 260/87-46-04 Adequacy of Heat Tracing for the Residual Heat Removal Service Water and Emergency Equipment Cooling Water System.

This item was originally identified by the licensee and resulted in the generation of a CAQR. A walkdown by the inspector resulted in an additional finding involving the installation of heat trace in accordance with drawing 37W205-60. A followup observation of the RHRSW/EECW system heat trace was made and was documented in IR 88-16, dated September 12, 1988. Since the original findings the licensee has upgraded the heat trace system in the intake structure and replaced the insulation on the piping including the instrument sensing small bore pipes. The inspector reviewed this installation and documented the observations in IR-89-02, paragraph 9, Cold Weather Preparations. The final closeout of this subject was dependent on four items as follows:

- (1) Procedures should be upgraded to reference operator actions required whenever the potential for freezing occurs. The inspector reviewed procedure 1-ARP-9-20, "Annunciator Response Procedure" and noted that Section 4, of the Operator Action, for O-TA-23-70, RHRSW and EECW Heat Trace Trouble, alarm window directs the operators to contact maintenance personnel to install additional space heaters and/or cover the affected room with a tarpaulin as necessary.
- (2) The system must be evaluated in light of the Q-List program for applicability to important-to-safety and/or Limited QA components. The inspector reviewed the licensee's safety analysis which indicated that the original Master Component Electrical List considered the heat tracing temperature switches as safety related. The licensee has removed these switches from the safety related category. This system is an important system and should be adequately designed, installed, and maintained. The licensee's position is that the annual maintenance and the procedural controls exercised during extremely cold weather ensure that the heat tracing system is operable and that its failure will not result in frozen lines that could affect RHRSW/EECW operability.
- (3) Calculation MEB-BWR-M2-751-1 should be reviewed for credibility. The inspector reviewed this calculations and did not have any adverse observations or comments. The NRC inspector noted that the calculations was based on the use of 2 inches of fiberglass covered by aluminum, and that this insulation had been properly installed.

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- (4) Close out of CAGR 8700.18. The inspector reviewed this CAQR, which was closed out on August 8, 1989, and noted that part of the corrective action was to down grade the system as not being safety-related. This action also called for the removal of certain equipment from the Q-List. The inspector noted that this reclassifications of the system was not agreed upon by the site QA organization.

During the review of this item the inspector noted that none of the licensee's reviews referenced Bulletin 79-24, which addresses the potential for frozen safety related lines. The licensee's approach is to use personnel action to prevent freezing prior to the ambient temperature dropping below a value where freezing could occur. The inspector will monitor the status of the freeze protection in the RHRSW/EECW intake activities during periods of low ambient temperatures.

Related to the heat tracing concern was the adequacy of the freeze protection insulation. The inspector toured the RHRSW intake structure in 1988 and observed that the insulation was in poor condition. Although licensee personnel stated that the insulation would be replaced prior to restart, they stated that there were no established specifications to control the type of insulation to be used. TVA policy was to replace insulation with "something as good or better". The system design engineer confirmed that as-installed insulation characteristics were factored into freeze protection design calculation for ensuring system operability, but no formalized mechanism was in place to ensure that it would be replaced with material which satisfied the design assumptions. Applicable system drawings stated that insulation was to be installed in accordance with specifications on drawings to be issued later which were never provided. CAQR BFP890241 had been written to address the lack of design control of insulation, but only applied to effects of insulation on seismic calculations and did not address freeze protection. CAQR BFP870018 was written to address the loss of design control for heat tracing of the RHRSW and EECW systems, but did not appear to address design control of insulation.

The inspector observed the freeze protection and insulation activities before, during and after installation and observed that the insulation is 2 inches of fiberglass covered with aluminum, in agreement with the values used in the calculations, which form the basis for the acceptability of the procedural controls. The insulation has been in place over one year with no evidence of any freezing problems. The existence of heat tracing, insulation, and procedures for operator action resolved the inspector's concerns regarding freeze protection. This item is closed.

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- n. (CLOSED) VIO 296/80-41-01, Failure to Control Access to a Locked High Radiation Area.

This violation concerned an access door to the RWCU that was open and unguarded. The licensee took corrective action to this event at the time of occurrence. A similar violation, 259, 260, 296/86-26-04 was issued in 1986 and closed in IR 87-28. The licensee's corrective action for control of locked high radiation area was reviewed at that time. No recent events have been identified. This item is closed.

- o. (CLOSED) VIO 259, 260, 296/85-36-01, CRD Hydraulic Post Maintenance Testing and HPCI Open Resistors.

This violation, consisted of four examples in which procedures were not adhered to or were inadequate. As reported in IR 88-32, three of the four examples have previously been reviewed and closed. The fourth example involved the licensee's failure to perform a documented safety evaluation to determine system operability with failed-open resistors on HPCI steam line drain isolation valves. These resistors are located within the TSN associated with solenoid valves 1-FSV-73-6A, and -6B, and PCV-73-18B. The licensee's response to this item stated that, at the time, the cognizant engineer and electrical maintenance group supervisor had performed an engineering evaluation which determined that operability was not compromised, but had not documented their evaluation.

Subsequent documented safety evaluations dated March 29, 1985 (RIMS B22850329022) and October 30, 1986 (RIMS B22861030101) have been performed and support the previous undocumented conclusion that system operability had not been compromised. Further evaluations performed by EBASCO in September 1988 and Bechtel in January 1989 revealed that, if the TSNs were removed from the solenoid valves in the HPCI and RCIC systems, there would be no adverse effect upon operability, but would result in an improvement in reliability in that diodes in the TSN represent a possible source of undetectable failures due to the diodes being shorted or open. As a result of these evaluations, TVA has removed the TSNs from the above two systems in Unit 2, in accordance with DCN H2573A. The inspector reviewed the above actions and determined them to be acceptable. This item is closed.

- p. (CLOSED) VIO 259, 260, 296/87-38-03, Corrections to Quality Assurance (QA) Records.

This violation identified that contrary to the requirements specified in NEP 1.3, Revision 0, "Records Control", corrections to QA records were not properly made by drawing one line through the incorrect information, the correct information entered and the entry initialed and dated.

The licensee indicated compliance with this violation would be achieved by July 18, 1988, by issuing a directive to Division of

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Nuclear Engineering branches and projects to emphasize the importance of procedure compliance in this area.

The NRC inspector reviewed 72 Quality Assurance records which were generated during the 1989 time frame which included documents in RIMS and hard copies from Sequoyah, Browns Ferry, Watts Bar and Knoxville engineering. The records were found to be of good quality, with minor exceptions, and in compliance with the licensee's procedure NEP 1.3. The inspector noted that corrections made to these documents were made with black ink, single lined thru the incorrect information, the correct information was entered and the entries were initialed and dated. Based on the above, the violation is closed.

6. Exit Interview (30703)

The inspection scope and findings were summarized on September 15, 1989 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. Dissenting comments were not received from the licensee.

<u>Item</u>	<u>Description</u>
259, 260, 296/89-40-01	NCV, Documentation of Material Transfer, paragraph 2.h.
259, 260, 296/89-40-02	IFI, Adequate RHRSW Freeze Protection, Paragraph 5.m.

7. Acronyms

AHU	Air Handling Unit
AUO	Auxiliary Unit Operator
BFN	Browns Ferry Nuclear
BFNP	Browns Ferry Nuclear Power Plant
CAQR	Condition Adverse to Quality Report
CFR	Code of Federal Regulations
CRD	Control Rod Drive System
CSSC	Critical Structures, Systems, and Components
DCN	Design Change Notice
DCR	Design Change Request
DG	Diesel Generator
DNE	Department of Nuclear Engineering
DP	Differential Pressure
ECN	Engineering Change Notice
ECP	Employee Concerns Program
EECW	Emergency Equipment Cooling Water

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EMI	Electrical Maintenance Instruction
ENS	Emergency Notification System
EPA	Electrical Protection Assembly
EPZ	Emergency Planning Zone
EQ	Environmental Qualification
ERT	Emergency Response Team
ESF	Engineered Safety Feature
FHA	Fire Hazard Analysis
FPP	Fire Protection Procedure
FSAR	Final Safety Analysis Report
GE	General Electric
GPM	Gallons Per Minute
GOI	General Operating Instruction
HPCI	High Pressure Coolant Inspection
HPN	Health Physics Network
IFI	Inspector Followup Item
IR	Inspection Report
KV	Kilovolt
LER	Licensee Event Report
LPCI	Low Pressure Coolant Injection
LRED	Licensee Reportable Event Determination
MAI	Modification and Addition Instruction
MPA	Multi-Plant Action Item
MG	Motor Generator
MMI	Mechanical Maintenance Instruction
MOV	Motor Operated Valve
MR	Maintenance Request
MSIV	Main Steam Isolation Valve
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
OI	Operating Instruction
PMT	Post Maintenance/Modification Test
PRS	Plant Reporting Staff
QA	Quality Assurance
QC	Quality Control
RCIC	Reactor Core Isolation Cooling
RCW	Raw Cooling Water
RERP	Radiological Emergency Response Plan
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
RTP	Restart Test Program
RWCW	Reactor Water Cleanup
SBGT	Standby Gas Treatment System
SDSP	Site Director Standard Practice
SE	Shift Engineer
SI	Surveillance Instruction

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SIL	Service Information Letter
SLC	Standby Liquid Control
SOS	Shift Operations Supervisor
SSIL	Site Support Instruction Letter
ST	Special Test
TCV	Temperature Control Valves
TE	Test Exception
TSC	Technical Support Center
TSN	Transient System Network
TS	Technical Specifications
TVA	Tennessee Valley Authority
URI	Unresolved Item
USQD	Unreviewed Safety Question Determination
V	Volt
VIO	Violation
WP	Work Plan

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