



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

Report Nos.: 50-259/90-27, 50-260/90-27, and 50-296/90-27

Licensee: Tennessee Valley Authority
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 1101 Market Street
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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 18 - September 15, 1990

Inspectors: *Ralph H Beard* 10/11/90
for C. A. Patterson, NRC Restart Coordinator Date Signed
Ralph H Beard 10/11/90
for D. R. Carpenter, Manager for Modifications Date Signed
 and Unit 3

Accompanied by: E. Christnot, Resident Inspector
 W. Bearden, Resident Inspector
 K. Ivey, Resident Inspector
 G. Humphrey, Resident Inspector
 R. Beynhard, Project Engineer

Approved by: *Paul J Kellogg* 10/12/90
 Paul J. Kellogg, Section Chief, Date Signed
 Inspection Programs,
 TVA Projects Division

SUMMARY

Scope:

This routine resident inspection included inspections of surveillances, maintenance, operational safety, the corrective action program, modifications, the restart test program, power ascension testing, system preoperability checklists, TMI Items, NRC bulletins, reportable occurrences, action on previous inspection findings, the restart review subcommittee, and Unit 3 activities.

Results:

A violation was identified for multiple examples of workers bypassing QC holdpoints, paragraph 5. Although these were identified by the licensee's Quality Control Staff, five examples occurred in August 1990. These examples



of failure to follow procedure were caused by poor communications, lack of understanding of requirements, negligence or personnel errors. This problem has predominately occurred in the modifications area.

An NCV was identified for workers failing to comply with ALARA procedures by lying in the drywell, paragraph 4. Radiological Controls and Site Management took prompt aggressive action to curb poor radiological work practices. Several adverse personnel actions were taken.

A URI was identified concerning a potential equipment clearance violation discovered during a final system walkdown, paragraph 4. A hold order was found indicating some electrical leads were lifted, but lifted leads were not found.

Several weaknesses concerning implementation of the SPOC process were identified including system ties, walkdown boundaries, and uncompleted systems at the time of final walkdown, paragraph 9. A lack of communication existed between the system engineers and licensee management, paragraph 9. The final system return to service walkdowns were in some cases being performed at times based on the recovery schedule and not based upon system work completion.

An IFI was identified concerning potential CST tank bottom degradation, paragraph 9. This was identified during a system walkdown.

An IFI was identified concerning the resolution of undocumented cable splices in safety related panels, paragraph 9. This was identified during a system walkdown.

An IFI was identified concerning resolution of secondary prints and labeling, paragraph 11. This was identified during a review of the ENS phone power supply.



REPORT DETAILS

1. Persons Contacted

Licensee Employees:

- *O. Zeringue, Site Director
- *L. Myers, Plant Manager
- *M. Herrell, Plant Operations Manager
 - J. Hutson, Project Engineer
 - R. Jones, Operations Superintendent
 - A. Sorrell, Maintenance Superintendent
 - G. Turner, Site Quality Assurance Manager
- *P. Carier, Site Licensing Manager
- *P. Salas, 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 Personnel

- *C. Patterson, Restart Coordinator
- *D. Carpenter, Manager for Modifications and Unit 3-
- *E. Christnot, Resident Inspector
- *W. Bearden, Resident Inspector
- *K. Ivey, Resident Inspector
- *G. Humphrey, Resident Inspector
 - R. Bernhard, Project Engineer

*Attended exit interview

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

2. Surveillance Observation (61726)

The inspectors observed and/or 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.

During this reporting period, the licensee implemented a new surveillance testing program as defined in PMI-17.12, Surveillance Program Implementation. This procedure was implemented on August 1, 1990, to remove the SI program from the general conduct of testing procedure and provide increased oversight of SI scheduling and performance. The requirements of the new instruction apply to all SI's performed and cover all aspects of the SI program. The new program includes the following:

- Routine status reports on SIs performed, SIs which could not be performed, and all open TDs on completed SIs.
- A Control Room Surveillance Log which tracks the starting and completion of SIs, and any stops occurring during a SI.
- Responsibility and controls for the performance of conditional SI.

The inspector attended a training session given to system engineers on the new program and reviewed the new procedure. The new program improves the tracking and performance of SIs at BFN. The new program addresses resolution of problems with meeting SI frequencies and performing TS compensatory measures. The Plant Manager indicated that the SI procedure was still being reviewed for further enhancements and that the surveillance testing program was still being improved. The implementation of this new program and SI program improvements will be reviewed during the NRC inspection to closeout the SI enforcement action (EA 89-226), which is scheduled to be conducted prior to Unit 2 restart.

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

3. Maintenance Observation (62703)

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

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



a. Diesel Generator Outages

The inspector observed and reviewed the licensee's activities during the DG outages. All eight DGs were taken out of service or were scheduled to be taken out of service for maintenance and modifications. The modifications activity observed was the replacement of the DG start circuit relays authorized by DCN W6810A and implemented by a WP for each DG. The craft personnel utilized the WP at the work activity area. A QC inspector verified the installations. The maintenance activity involved high vibration on the fuel oil transfer pumps. It was noted that maintenance activities were also performed on the associated shutdown boards. The activities involved breaker PMs.

b. Torus Snubber Repair

c. LLRT of Various Valves

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

4. Operational Safety Verification (71707)

The NRC 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. This inspection activity also included numerous informal discussions with operators and supervisors.

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, 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. Workers Lying in the Drywell

On August 31, 1990, during a walkdown of the fuel pool cooling system in the Unit 2 drywell, the inspector observed that two individuals were lying in a horizontal position in the personnel airlock. The inspector discussed this with the health physics technician in the drywell. After exiting the drywell, the inspector requested from licensee management to review the RWPs and associated work packages for the individuals involved. A health physics supervisor interviewed several people but could not positively ascertain the identity of the individuals. The inspector reviewed RWP 90-2-02414 and RWP 90-2-02395. The area the workers were lying in was a 4 mrem/hr field. Other areas in the drywell were designated 1 mrem/hr or less.

The inspector reviewed RCI-15, Maintaining Occupational Radiation Exposure As Low As Reasonably Achievable. Section 7.0, responsibilities, requires that employees required to work in Radiologically Controlled Areas to actively work to minimize personnel radiation exposure. These workers were not complying with the instruction. No job function could be tied to the individuals. This is a violation of the requirements of TS Section 6.8.1, Procedures, for failure to implement radiation protection procedures required by Regulatory Guide 1.33. Licensee management has taken strong aggressive action recently to curb poor radiological work practices, including several employee terminations. The circumstances involving the walkdown on August 31, 1990, were being carefully reviewed for personnel actions. Health physics management increased monitoring of the drywell to correct any poor work practices. The Site Director issued a notice to all plant employees on September 14, 1990, stating that any person identified in a horizontal position in a contaminated zone would be terminated. This NRC identified violation is not being cited because criteria specified in section V.A of the NRC Enforcement Policy were satisfied. This NCV is identified as NCV 260/90-27-01, Failure to comply with ALARA procedures by lying in the drywell.

b. Failure to comply with equipment clearance procedure

On August 16, 1990, during the final SPOC walkdown for System 92, the AUO and Site Quality Representative noted an apparent discrepancy while inspecting the wiring inside of local panel 2-25-14. Although the clearance tag associated with hold order 2-89-871 was present, which stated that electrical leads were lifted, the panel did not contain any lifted leads. This condition was immediately reported to the SOS and an Incident Investigation initiated.

The licensee evaluated the event and discovered that the hold order had been issued on October 20, 1989, to replace existing hold order 86-2525, which had been issued on August 26, 1986, to permit work on



a drywell penetration. There were six hold notice tags installed which specified lifted leads for cables supplying power to the detector drives for SRM A, IRM A, and IRM C. However, the licensee determined that the detector drives had been demonstrated operable on December 12, 1988, prior to the Unit 2 core reload. This meant that the relanding activities would have occurred between the date the original hold order was issued on August 26, 1986 and December 12, 1988. The licensee's review of maintenance requests, workplans, and ECNs related to System 92 did not reveal any work item that might have resulted in the retermination of these cables.

The licensee's investigation associated with this event is continuing. This event has the potential for constituting a violation of licensee clearance/hold order procedure. URI 260/90-27-02, Potential Equipment Clearance Violation, is opened pending licensee resolution of this issue and further review by the inspector.

5. Corrective Action Program

a. CAQR/PRD Review

During the period of May 1, 1990 through August 13, 1990, the licensee closed 139 CAQRs/PRDs, of which 40 were classified as requiring closure before Unit 2 restart. The age of these items varied from one to 39 months with an average age of nine months at closure.

The inspector selected eleven items from this list of closed CAQRs/PRDs for review, five of which were classified as restart items. The selected items were reviewed to determine adequacy of the licensee's program for addressing conditions adverse to quality. The inspector reviewed the following items:

<u>CAQR/PRD</u>	<u>Description</u>
BFE878722D05	Misc discrepancies identified during QA audit
BFF880057	RWCU piping not per design
BFP880559	RHRWS conduit not sealed
BFP890270	RHRWS piping not per design
BFP890336	"C" electric fire pump did not meet criteria
BFP890346	RCIC backup control panel components not on EQ list
BFP900048	Structural weld made on wrong side
BFP900159P	QC not called to witness system closure.
BFP900160P	No welding fitup inspection
BFP900198P	No welding fitup inspection
BFP900234P	No welding fitup inspection

For those items selected, the inspector determined that the restart criteria had been adequately applied, resulting in the correct restart classification. Additionally, the inspector agreed that the corrective action plans specified for each of these items supported closure of the related item. Except for the potential adverse trend associated with missed QC holdpoints discussed in this report, no adverse trends were noted which required additional management attention.

The inspector also reviewed QA Summary Report, QBF-P-90-1472, which was issued on August 16, 1990, to document the Site Quality Organization's review of a representative sample of closed CAQRs from each discipline/organization for adequacy and completion of corrective actions. This licensee review was reactive in nature. The review resulted in response to a recent NRC concern, identified in IR 90-20, that the QA overview for CAQRs/PRDs was not focused to ensure corrective actions were adequate. During this review licensee personnel identified that four of 33 selected CAQRs/PRDs failed to achieve adequate corrective actions/recurrence controls. The documents failed to fully address remedial corrective actions or closure occurred prior to completion of all corrective actions. Three of these were associated with the maintenance section and one was associated with NE.

The inspector also reviewed Quality Monitoring Report, QBF-R-90-1585, which was issued on August 28, 1990, to document the verification and closure of the issues identified in the Quality Summary Report. As corrective action, each of the CAQRs/PRDs was reopened, and additional documentation added to more clearly define the actions taken.

b. Bypassing QC Holdpoints

During the NRC review of closed CAQR/PRDs documented in this report, the inspectors noted an adverse trend in the area of bypassing of required QC holdpoints. SDSP-3.11, Quality Control Inspection Program, Section 3.1.2.e.1 requires that, during work instruction preparation, inspection planning will include holdpoints and notification points sufficient to provide opportunity for witness/inspection of specified activities. SDSP-3.11, Attachment A, which includes site specific requirements, requires that the work activity shall not progress past the QC inspection holdpoint until signed as accepted by an inspector or until the SQM or his designee's consent to continue is obtained and documented.

More than half of the examples of bypassing QC holdpoints are related to the licensee's welding program, and most of these are associated with missed fitup inspections. Examples noted by the inspector during the above review are documented by the following licensee CAQR/PRDs:



<u>CAQR/PRD</u>	<u>Date</u>	<u>Description</u>
BFP890562P	6/30/89	No welding fitup inspection
BFP890735	10/13/89	Penetration seal void refilled without QC notification
BFP890776	11/20/89	Electrical cable pulling without QC notification. This failure resulted in NCV 259, 260, 296/90-01-02.
BFP890780	11/22/89	No welding fitup inspection
BFP900001	1/03/90	No welding fitup inspection
BFP900059	3/05/90	Removal of temporary supports without QC taking initial measurements
BFP900070P	3/14/90	Electrical cable pulled from conduit without QC notification.
BFP900086	3/25/90	Cable lift without QC notification
BFP900090	3/26/90	Base metal not inspected during weld reinstallation.
BFP900159P	5/18/90	QC not called to witness system closure.
BFP900160P	5/19/90	No welding fitup inspection
BFP900198P	6/14/90	No welding fitup inspection
BFP900234P	7/12/90	No welding fitup inspection

It should be noted that the licensee changed the criteria used to classify CAQRs and PRDs during April 1990, resulting in later failures being identified as PRDs.

The inspector held discussions with members of the Site Quality Organization to determine the extent of any licensee progress in this potential problem area. During that discussion the inspector was informed that licensee management had already considered this a programmatic issue which was directly related to a management decision to stop modifications welding activities on July 27, 1990. Welding had resumed following that decision only after training was conducted and then only with full QC oversight of all welding activities until a reasonable level of confidence could be achieved. This management decision had been made due to the identification of an adverse trend which existed in the welding program as related to 31 different CAQR/PRDs related to welding activities which had been written since January 18, 1990. This program deficiency had been documented under CAQR BFP900252. The inspector reviewed this CAQR and noted that it referenced several of the above welding related CAQR/PRDs that had been the subject of the inspector's concern plus several additional examples of missed QC holdpoints along with other types of welding program deficiencies. However, CAQR BFP900252 was written to address the welding program, and not a generic problem with bypassing holdpoints on non-welding activities.



After the above discussions the inspector was informed by the licensee that five new PRDs had been issued within one week which related to this concern. The new PRDs are as follows:

BFP900285P	8/22/90	Fire seals breached and repaired without QC inspection
BFP900288P	8/25/90	Nonsafety-related cables pulled through class 1E raceway without QC inspection
BFP900290P	8/27/90	All MAI 3.3 data sheet QC holdpoints bypassed during panel wiring activities.
BFP900296P	8/22/90	Cable pulled from conduit without documentation.
BFP900299P	8/26/90	Bypassing QC holdpoint during painting activities.

The above newly identified PRDs were evaluated by the licensee and a CAQR was written identifying a generic problem with bypassing QC holdpoints. The failures in this area that have occurred within the last year appear to have been due to causes varying from poor communications and lack of understanding of requirements to negligence and personnel errors. SDSP-3.7, Corrective Action, requires that trend analysis information in CAQRs shall be reviewed on an ongoing basis by NQA. It also requires the responsible organization to investigate any apparent adverse trends to the extent necessary to confirm or deny the existence of the adverse trend. Any confirmed adverse trends are required to be documented on a CAQR by the responsible organization. TVA Standard 3.1.10, Trend Analysis, defines an adverse trend as an undesirable change in a quality indicator statistic of such magnitude as to require increased management attention. Although the failures have been identified by licensee personnel, and the issues have been identified to management for increased attention, numerous examples of missing or the bypassing of required QC holdpoints have occurred.

This failure to follow procedure could lead to a programmatic breakdown if allowed to continue. The failure is identified as VIO 259, 260, 296/90-27-03, Bypassing QC Holdpoints.

6. Modifications (37700, 37828)

The inspectors monitored modification activities supporting the restart of Unit 2, including reviews of scheduling and work control, routine meetings, and observations of field activities. Throughout the observations of field modifications, QC inspectors were observed monitoring and documenting verification of the work activities.



a. Electrical Issues, AC/DC Calculations (37701)

The inspector reviewed and observed the licensee activities involving all six I&C electrical power buses (2 per plant) authorized by ECN P7161. The major modification was being implemented by approximately twenty WPs. For major modifications, the total number of WPs vary due to reconciliation, new work identified, and work activities canceled. Several cable pulls were performed during these activities. The inspector was informed that cable damage was identified on one cable as it was being rolled off the cable reel during the cable pull. The cable was a 400 MCM, manufactured by Essex, contract dated 1979, and the manufacturer is no longer in business. The inspector inspected the damage, which the licensee cut out and packed for shipment to a lab for analysis. The damage appeared to be a small puncture, however, it could have been a manufacturer's defect.

b. Fuses and Fuse Holders

The inspector observed modifications and maintenance activities being performed on the 125V DC electrical panels for the DGs. These activities were authorized by DCN W1569 and implemented by WP 2521-90, Install Fuse Blocks/Fuses in the DG 125V Distribution Panel. Although this panel is part of system 57-1, it was tied to system 82. The craft personnel were utilizing the WP at the work activity area and the QC inspector was verifying the installations.

No violation or deviations were identified in the modifications area.

7. Restart Test Program (37701)

The inspector reviewed and observed modifications to the stack authorized by DCN W11053 and implemented by WP 0467-90. The specific activity observed involved cable pulls from a feed point at manhole D to a pull point at manhole C and from manhole D to the 600 ft. stack. The manholes are located on the electrical raceways from the plant to the stack. The inspector observed that on two occasions 1,000 lb. pull links were broken near the completion of the pull and on one occasion a small pull rope was broken. Several pulls were involved and each pull was closely supervised by a foreman and observed by QC inspectors.

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

8. Power Ascension Testing

During this reporting period, the inspectors reviewed portions of the licensee's Power Ascension Test Program for Unit 2. All the required



power ascension procedures, with the exception of the four noted with an asterisk, have been issued. A listing of these are:

<u>Procedure</u>	<u>Title</u>
MRTI	Master Refueling Test Instruction
2-TI-147A	Fuel Loading After A Complete Core Unload
2-TI-115	Full core Shutdown Margin
2-TI-132	Recirculation Flow Control
2-TI-131	Feedwater Control System
2-TI-20	Control Rod Drive
2-TI-135	Process Computer and Core Performance
2-TI-136	Average Power Range Monitor Calibration
2-TI-149	Reactor Water Level Measurements
2-TI-188	Reactor Core Isolation Cooling System
2-TI-189	High Pressure Coolant Injection system
*2-TI-190	Thermal Expansion
*2-TI-180	Cooldown Outside the Control Room
2-TI-191	Feedwater Pump Trip Testing
2-TI-193	Turbine Trip
2-TI-183	Reactor Water Cleanup System
2-TI-186	Control Rod Drive System
2-TI-137	Core Power Distribution
*2-TI-130	Pressure Regulator
2-TI-82	Drywell Atmosphere Cooling System
2-TI-174	Recirculation System Flow Calibration
*2-TI-201	Drywell Piping Vibration
RTP/PA TSD	Power Ascension Scoping Document
STD	Startup Test Descriptions
PMI 26.1	Refueling Test Program

The key milestones and scheduled dates issued in the licensee's Weekly Status Report for the Power Ascension portion of the Refueling Test Program for the BFN unit 2 were reviewed.

The inspectors will continue to monitor the Power Ascension Test Program efforts on a routine basis.

No violations or deviations were identified in this area.

9. System Preoperability Checklist (71707)

The inspectors continued to monitor the licensee's programs to evaluate systems, make modifications, changes, and repairs, and to make the documentation corrections necessary to insure that plant systems will support plant operation in accordance with TS requirements. Of the 81 systems determined to be affected by this program, 19 have been completed.



There are 81 systems of which 55 will undergo a full SPOC review and 26 will undergo a lesser SPOC or Checklist review. The status as of September 1, 1990 is as follows:

- June; seven systems (All Checklist) turned over to operations.
- July; five systems (All Checklist) turned over to operations.
- August; seven systems (five SPOC and two Checklist) turned over to operations.

A total of 21 deferrals and five exceptions were taken against the SPOC process. This leaves a total of 50 systems for a SPOC review and 12 systems for a checklist review to be completed. This rate of system recovery does not support a fuel load date in October. Also, once the systems are returned to service, another list of deferrals and exceptions will have to be worked before all items are really completed.

For those system reviewed the results of these inspections of activities are as follows:

a. Condensate, Makeup, and Demineralized Water Transfer (System 2)

The System Checklist was completed on August 18, 1990. The inspector reviewed the completed checklist with the system engineer on August 20, 1990. The checklist was an update of the one performed during 1989. The scope of the system included portions of System 28, Water Treatment. The list of deficiencies identified during the final system walkdown was relatively large and included many housekeeping and minor repair type items. The SPOC package included six deferrals and three exceptions which related to this system. Two noteworthy items were:

ECN P0238, which installed CST #4 and CST #5, remains open almost ten years after the tanks were installed. SPOC deferral 02-10 (coded restart) was opened to track electrical PM test instructions, that have not been written, preventing closure of this ECN.

Exception 02-02 documented a FDCN, issued on August 16, 1990, to correct a design problem with Hanger #24 installed by DCN W4738. The inspector was informed that NE had evaluated the condition, and had determined that the condensate pump was safe to operate with the system in short cycle cleanup.

The inspector met with members of licensee management to discuss the concern identified in IR 90-25 associated with the potential degradation of all five CST tank bottoms. The licensee stated their position that at the present there is no indication of leakage from



the bottom of the tanks, and that initial indications of degraded conditions, should they develop, would show up as small leaks. At that time repairs could be initiated. According to the licensee there exists no concern for safety or operability. The inspector was further informed that maintenance work requests (C032979, C032980, C032981, C032982, and C032983) were written to clean and inspect the gap that exists between each tank and the concrete tank support. The inspector agrees with the licensee's evaluation that no immediate concern for safety appears to exist. However, the licensee has not adequately addressed the long term serviceability of these tanks, which are important to safety. This issue will be covered under IFI 259, 260, 296/90-27-04, CST Tank Bottom Degradation. The inspector will review the results of the licensee's inspections of the gaps and any other licensee actions in this area.

b. Fuel Oil (System 18)

The inspector observed the licensee's representative conduct a walkdown of the system. This system includes the fuel oil systems for the four Unit 1/2 DGs, the four Unit 3 DGs, the diesel driven fire pump for the fire protection inner loop, the security diesel and the diesel driven fire pump for the outer loop, located near the low level radwaste structure. The inspector asked if the other diesel driven fire pump for the outer loop, located north of the switchyard, was also within the walkdown boundary. The inspector was informed that it was not. This diesel driven pump's fuel oil system was tied to System 26, High Pressure Fire Protection.

No significant deficiencies were observed. The outstanding work item was DCN 9097, which required the removal of the check valves from the discharge of the eight Unit 1/2 transfer pumps.

c. Raw Cooling Water (System 24)

The inspector observed the licensee's walkdown of the system, which consisted of seven raw cooling water pumps, five pump suction filters and numerous valves and equipment. This equipment included the EH coolers, lube oil coolers for the main turbine and the main feed pumps, numerous heat exchangers, and the control and station service air compressors. The following observations were made:

- The system interfaces with the EECW, a safety related water cooling system, and requires several seismic pipe hangers at the interface. The licensee's representatives did not indicate if these hangers were to be tracked as part of the RCW or the EECW.
- Drawing 1-47E844-1, Units 1 and 0, Flow Diagram, Raw Cooling Water, indicated the existence of two Auxiliary RCW pumps, each with a capacity of 20,000 GPM. The licensee's representatives informed the inspector that this portion of the system would not be walked down because these pumps were not used.



- After completion of the walkdown the inspector was informed that not only were seismic hangers outstanding work items, but that 500 feet of piping in the system was scheduled for replacement. The licensee's representatives were not certain that, with these outstanding work items, the system's final walkdown or SPOC would be considered as completed.

The inspector discussed these items with plant management and indicated that the scope of a system walkdown should be clearly defined.

d. Control Air System (System 32)

The inspector accompanied the licensee during portions of a preliminary walkdown of this system. Several equipment deficiencies remain to be corrected and engineering modifications need to be implemented prior to performing a final system walkdown or SPOC evaluation. The present schedule for SPOC completion is for October 9, 1990.

e. Seismic Monitoring (System 52)

The inspector accompanied licensee personnel during the entire system walkdown associated with System 52. During the walkdown, no significant material deficiencies were noted. However, housekeeping in the general area around the nine instruments that comprise this system was poor.

This system was accepted August 30, 1990. The inspector reviewed the completed checklist with the system engineer on August 31, 1990. The SPOC package was an update of the SPOC performed in 1988. There were no deferrals, exceptions, or significant deficiencies noted during that review.

f. 120 V DC/Battery Distribution (System 57-1)

The inspector accompanied licensee representatives on a preliminary walkdown of system 57-1. This system is considered a safety related system and provides DC power with battery backup to the eight BFN diesel generators. The inspector noted electrical splices in two of the 16 battery chargers. The licensee stated that these internal electrical splices may have been made by the vendor as no documentation existed as to when and how these splices were installed. The splices were relatively large and wrapped with excessive amounts of electrical tape. The type of splice or the condition of the splice could not be determined by visual inspection. From external examination they did not appear to be butt splices. As of the end of this reporting period, the licensee had no plans of unwrapping the splices to determine their condition or to replace the splices with documented butt splices. This item is identified as IFI 259, 260, 296/90-27-05, Resolution of undocumented and uninspectable splices in safety related electrical panels identified during SPOC.



During a walkdown of the fuel oil system the inspector noted a modification being installed in a DC panel which had previously been identified as part of system 57-1. This modification involved the installation of fuses and fuse holders. The inspector discussed this item with the licensee and was informed that this modification, although a system 57-1 modification, was tied to system 82, Diesel Generators. Therefore, it was not initially identified as an outstanding work item on system 57-1 to the NRC inspector. This is example of a weakness of the SPOC process.

g. Switchyard and 24V/48V DC Distributions (System 57-6)

The System Checklist was completed on September 10, 1990. The inspector reviewed the checklist with the cognizant system engineers on September 11, 1990, and no deficiencies were identified. The inspector noted there were two deferrals for this system. Deferral 262-01 was taken because the main generator neutral grounding disconnect is removed for generator layup. This will be reinstalled prior to startup when the generator is placed in service. Deferral 262-02 was taken because the generator main bus disconnect links are removed to isolate the main generator and turbine from the electrical distributions. This is a standard procedure for refueling outages and the links will be reinstalled prior to startup. The inspector and the cognizant system engineers performed a walkdown of this system on September 14, 1990. No deficiencies were identified.

h. Standby Liquid Control (System 63)

The SPOC for this system was completed on August 11, 1990. The inspector completed the review of the SPOC package on September 10, 1990. No deficiencies were identified. The inspector noted that no SPOC exceptions or deferrals were taken against this system.

i. Reactor Water Cleanup (System 69)

During a review of the licensees activities in the electrical issues area, the inspector noted that design change activities associated with system 74, RHR, also impacted system 69. The specific activities involved DCN H2242. The design change is a significant change and requires double electrical isolation for non-divisional cables located throughout the plant.

The system 69 equipment affected by this modification was the 2A holdup pump. The double isolation is accomplished by the installation of fuses in series with the power supply breaker to the affected equipment. Previous reviews and observation by the inspector indicated that the installation of these fuses require extensive electrical outages in that an entire electrical panel was deenergized to facilitate an installation. The inspector was informed by the

licensee that no SPOC deferral was written to document this significant outstanding hardware related item. Instead, this item was tied to a totally unrelated system, RHR.

The inspector questioned the advisability of handling this item in this manner and was informed that this modification did not affect the operability of the Reactor Water Cleanup system. The inspector also noted that, when an extensive electrical outage is required to install the various double electrical isolation fuse, numerous systems are made inoperable during these outages. This item is another example of a weakness of the SPOC process.

The inspector accompanied the system engineer on a portion of the scheduled final walkdown on August 31, 1990. The engineer felt the system was not ready for a final walkdown but was told to perform the walkdown because it was scheduled. The system engineer and operations representative stopped the walkdown because of scaffolding still in place and work in progress. The inspector discussed this issue with licensee management with emphasis on the lack of communication between the system engineers and management. The inspector noted that operations personnel were conducting the first party check for the system valve lineup. This was discussed with operations, and they stated that the walkdown and valve lineup were stopped.

j. Core Spray System (System 75)

The inspector accompanied the licensee during a major portion of the final walkdown of this system as required by the SPOC. Although several outstanding items remain open against the system, most were associated with electrical cable and fuse replacements, post modification testing, instrument calibrations, and documentation closures. Final system completion and SPOC closure is scheduled for October 6, 1990.

k. Fuel Pool Cooling (System 78)

On August 31, 1990, the inspector accompanied the system engineer on selected portions of the system final walkdown. The walkdown was accomplished in accordance with OSIL Number 64, System Pre-Operability Checklist Walkdowns. Only minor deficiencies were noted which did not affect system operation.

l. Fuel Handling and Storage (System 79)

The inspector participated in a preliminary walkdown on this system conducted on September 11, 1990. The walkdown group included the cognizant system engineer, the Reactor Engineering Supervisor, and



representatives from operations and maintenance. No major concerns were identified. Some minor work items were noted for resolution prior to SPOC completion. The SPOC for this system is scheduled to be completed by October 5, 1990.

m. Primary Containment Cooling System (System 80)

The inspector accompanied plant personnel on the final scheduled SPOC walkdown of the system's temperature indicators in the drywell on August 28, 1990. Many items identified in the initial walkdown were still not resolved. There were still deficiencies that had the potential to affect operability of the temperature sensors in a post accident condition. Preliminary indications are that an additional walkdown may be required.

The inspector noted much debris, many loose tools, misplaced grating, and unused structural material in the drywell. The heavier loose material at the upper elevations could have the potential to damage equipment if it fell.

n. Diesel Air Start System (System 86)

The inspector accompanied licensee personnel during selected portions of the system walkdown associated with System 86. During the walkdown various material deficiencies were noted as follows:

The left bank AC/DC powered air start compressors for each of the Unit 1/2 DG were not equipped with protective covers for the drive belts. The inspector was informed that the omission of the covers had been approved by TVA management and that although there was a chance of personnel injury, that chance was very remote due to the location and orientation of the drive belts. Additionally, the inspector learned that it had been considered desirable to leave the covers off in order to facilitate performance of the monthly test of the DC drive motor, which required the drive belts to be exchanged between pulleys. The inspector notified licensee management that this did not appear to comply with the requirements of 29 CFR 1910 for guards for power transmission equipment.

The "C" DG air start dryer had a possible crimped instrument tube.

Various valves located on all eight air dryers were equipped with locking devices that were ineffective because they did not prevent valve operation or would actually fall off the valve. The inspector noted that similar valves on one train would be equipped with locks while another train would not.

Loose or damaged flexible electrical conduit connections were noted.



The System Checklist was completed on September 4, 1990. The system was placed in status and configuration control but not declared operable. The inspector reviewed the completed checklist with the system engineer on September 5, 1990. One SPOC exception was documented which must be resolved prior to declaring the system operable. Exception 86-01 documented that the starting air valves for DG B, 3A, 3B, 3C, and 3D were tagged for outstanding work on those DGs. The inspector did not identify other material deficiencies that affected operability of the system.

o. Neutron Monitoring (System 92)

The System Checklist was completed on August 23, 1990. The system was placed in status and configuration control, but not declared operable. The inspector reviewed the completed checklist with the system engineer on August 27, 1990. The inspector noted that the checklist included various identified deficiencies that affected system operability. Of particular interest are the following:

One extension cable is still needed to complete the undervessel work. The cable is still on order with a long lead time.

Eleven LPRM strings are defective and must be replaced prior to restart. This core alteration is constrained because secondary containment is not operable.

ECN H6272, which replaces the present "Hold-In" control room detector drive switches with momentary "Drive-In" switches, is still open. Delivery date for parts is after fuel load, and the item is coded for prior to restart. The inspector noted that although this is not an operability issue, the simulator has already been modified to reflect this ECN; and the actual configuration of the panel will differ from that used for operator training.

No actual calculation can be located for scaling and setpoint of the 120% HI HI APRM trip/106% Rod Block. This calculation must be regenerated. Although this item was not present on the SMPL, the system engineer was fully aware of the condition. The inspector was informed that the item is present on the DBVP punchlist maintained by NE.

The licensee system engineer was well prepared and the final walkdown was thorough. This resulted in a high level of confidence that the remaining work that must be accomplished prior to the system being ready to support fuel load was identified.

No violations or deviations were identified in the System Operability Checklist System.



10. TMI Action Items

- a. (CLOSED) TMI I.C.1.2.B, Short Term Accident and Procedure Revision - Inadequate Core Cooling - Revise Procedure.

(CLOSED) TMI I.C.1.3.B, Short Term Accident and Procedure Revision - Transients and Accidents - Revise Procedure.

These TMI Action Items required the revision of Browns Ferry EOIs to assure conformance with NRC Generic Letter 82-33. Short term revisions have been incorporated in the EOIs at Browns Ferry. NRC IR 260/88-200 documents that certain elements of Revision 3 to the EOIs were not fully acceptable in the long term. Follow up visits by HQ staff, Region II Operator Licensing Examinations, and a full participation EP drill have demonstrated that the operators can use the Revision 3 of the EOIs, and that they are acceptable for Unit 2 restart. TVA has committed, by letter dated October 10, 1989, to fully implement the BWR Owner Group Emergency Procedure Guidelines, Revision 4 by the next outage for Unit 2 and prior to restart for Units 1 and 3.

By letter dated January 18, 1990, the NRC reviewed this issue and agreed that Unit 2 could be restarted and safely operated using the Revision 3 based procedures. TVA will revise the current Writer's Guide to incorporate the staff's comments identified in IR 88-200 and amplified in Enclosure 2 to the letter.

Since the two TMI Action Items concerned short term revisions to support operations, these two items are closed for all three units. The additional long term commitments will be addressed by the staff as each unit prepares for restart.

- b. (CLOSED) TMI II.K.3.19, B and O Task Force - Interlock Recirculation Pump Modification.

This item applies to BWRs without jet pumps and is closed for all three Browns Ferry Units as it is not applicable.

No violations or deviations were identified in the TMI Action Items.

11. NRC Bulletins (25599)

- a. 259, 260, 296/BU-80-15, Possible Loss of Emergency Notification System with Loss of Offsite Power.

The inspector reviewed the status of this bulletin. This bulletin was closed in IR 259, 260, 296/81-18.



During the review of the ENS phone power supply, the inspector identified that the current as-built drawing for this power supply drawing is 55N2788-2 R-B, Communications 48V DC and 120V AC Power Distribution Application Schematic, dated November 25, 1985. An ECN, P0742, DCR 2967 generated BF-FCR 84-396, changed the power supply to a different source, Bay 46, breaker 19. There was an as-designed print, which would not be used for plant activities, that showed Bay 46, breaker 19 as the ENS and the Health Physics Network phone power, but the as-built print showed that breaker as a spare. Since this is classified as a secondary drawing, it would not be required for update before Unit 2 restart. This print and other electrical distribution prints are important to operation, fire fighting, and event mitigation, and should be updated to support reactor operation. The panel on Bay 46 in the communications room is not permanently labeled with its feeder power supply identified, nor are the individual breakers labeled as to what they feed. There is a paper label taped next to the panel but it was found initially to be unreadable. Resolution of the secondary prints required to support Unit 2 restart, distribution panel labeling, and breaker labeling is identified as IFI 259, 260, 296/90-27-06.

b. (CLOSED) 260/BU-88-04, Potential Safety-Related Pump Loss.

The NRC Inspection Manual TI 2515/105 listed those plants that required field completion inspections for the requirements of NRC Bulletin 88-04. The Browns Ferry plants did not require inspection. TVA's letter of August 2, 1989 described the completion of the long-term actions fulfilling the reporting requirements of the bulletin for Browns Ferry Unit 2. On January 10, 1990, the NRR HQ staff closed this item for Unit 2. This item is closed for Browns Ferry Unit 2.

c. (CLOSED) 260/BU 88-07, Power Oscillations in Boiling Water Reactors.

The inspectors have verified that the licensee has implemented the requirements as specified in the bulletin to ensure that all licensed operators and Shift Technical Advisors receive training to be cognizant of the plant conditions which may result in the initiation of uncontrolled power oscillations, actions to be taken to avoid plant conditions which may result in an uncontrolled power oscillation, how to recognize an uncontrolled power oscillation, and actions to be taken in response to an uncontrolled power oscillation. In further actions to meet the requirements of the bulletin, the licensee has reviewed and determined the APRM fixed high neutron flux signal does not incorporate a time constant. The instrumentation responds directly to instantaneous neutron flux and is not subject to any other time delays or filters, except the time delay in the electrical circuit, which is approximately 60 milliseconds, and which is comparable to other BWRs.



TS changes which involve thermal-hydraulic stability, Section 3.5/4.5-M, Amendment no. 174 has been submitted by the licensee and approved by the Commission to address the issues identified in NRC Bulletin 88-07, Supplement 1. These carefully define the operating ranges permitted to prevent uncontrolled power oscillations as defined in the subject bulletin. In addition, an accompanying Safety Evaluation by the Office Nuclear Reactor Regulation supporting Amendment no. 174 to the Browns Ferry Nuclear Plant, Unit 2 was issued to support the recommendations for BWR thermal hydraulic stability related operations.

The licensee has revised the applicable unit 2 operating procedures to include the requirements as specified in the bulletin and to insure TS compliance.

Based on the inspector's review of the licensee's actions, the requirements of the bulletin have been satisfied.

- d. (OPEN) 259, 260, 296/BU-88-10, Nonconforming Molded-Case Circuit Breakers.

NRC Bulletin No. 88-10 was issued in November 1988, to request that addressees act to provide reasonable assurance that molded-case circuit breakers purchased for use in safety-related applications perform their safety functions.

The inspector reviewed the licensee's response dated April 11, 1989, which stated that TVA had identified more than 1,200 molded-case circuit breakers in warehouse stock that were being maintained as stored spares for future safety-related applications.

The majority of these circuit breakers were not traceable to the CB manufacturer. Many of these items were purchased commercial-grade, TVA QA Level II, which could later be dedicated for safety-related use. Since TVA identified less than 80 percent of the in-stock breakers as being traceable to the CB manufacturer, TVA committed to determining the location of the installed breakers and to verify their traceability per action item 4 of Bulletin 88-10.

During this reporting period additional review by the inspector and discussions with the licensee indicated that another submittal was being prepared to update the status of the CBs, due to additional information uncovered by the licensee's reviewers. This additional information included such items as the status of the CB installed in the 480V SBT Board, compartment 2A, which supplies electrical power to the SBT Filter, Train C, Humidity Control Heater.

The inspector was informed by the licensee that due to additional information obtained by further reviews, another submittal will be forwarded to the NRC by October 1990. This item remains open pending final review.



No violations or deviations were identified in the NRC Bulletins.

12. 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 259/86-14, Inadvertent ESF Actuation Leads to Water Spillage, Unit 2 Only.

This item was originally identified when in May 1986, an inadvertent actuation of ESF occurred in Unit 1 and was twice repeated. The actuation was caused by a false high drywell signal due to an electrical short. All eight DGs and two EECW pumps started automatically. Since CS and RHR pump motor breakers were tagged, no ECCS pumps started. However, the CS injection valves opened, which allowed charging water from the condensate storage system to flood the reactor cavity. Water overflowed into the vents on the periphery of the refueling well and some spillage occurred from the ventilation ductwork on the lower elevations of Unit 1 reactor building before the valves were discovered open. The electrical short, caused by moisture in two high drywell pressure switches, was believed due to a spurious actuation of fire spray valves in the area of these switches earlier in the week of the event.

The inspector reviewed the licensee's submittal and noted that fire spray valve actuations had also occurred in Unit 3 as well as Unit 1. The Unit 2 reactor building fire spray system has been modified to a preaction type system. This system operates on the fused head spray valve design. When an actuation occurs, the system floods with water, and only those spray valves where the fused head has disengaged will actually spray water. Spurious actuations will only cause the system to flood with water, and no actual spraying will occur. Although the systems for Units 1 and 3 have not been modified, this item does not apply to Unit 2 because of the plant modification.

- b. (CLOSED) LER 259/88-39, Control Room Operator Dose After a Design Bases Event May exceed 10 CFR Limits Because of a Design Error.

This item was originally identified when, in October 1988, a review of all open conditions adverse to quality reports was performed using a conservative reporting philosophy. This review discovered a condition that affected all three units. A test was performed which



determined that a convective draft did not exist in the plant stack with the standby gas treatment system running and the offgas dilution fans, steam packing exhausters, and offgas filter cubicle fans not running. Some standby gas treatment exhaust was detected coming out of the offgas dilution fans inlets. A calculation was performed that showed the control room operator 30 day thyroid dose would exceed the 10 CFR Appendix A General Design Criteria 19 limit of 30 rem, with a ground level release of 900 cubic feet per minute from the standby gas treatment exhaust. The licensee indicated that the cause of this condition was a design error made in the original plant design.

The inspector reviewed the licensee's corrective action, which stated that a modification to the stack would be performed prior to restart. Throughout this reporting period the licensee was implementing this modification.

- c. (CLOSED) LER 259/89-10, Failure to Perform Preventive Maintenance on a RPS Motor Generator Set Causes ESF Actuations.

(CLOSED) LER 296/88-08, Unplanned ESF Actuations Caused by Erratic Voltage Regulation Due to Lack of Preventive Maintenance.

These LERs involved two events on December 21, 1988 (Unit 3), and March 23, 1989 (Unit 1), where RPS circuit protectors tripped deenergizing the RPS power busses. Each event resulted in ESF actuations which occurred as designed. The root cause in both events was determined to be a lack of preventive maintenance on voltage adjust potentiometers. In each case, dust accumulation on the potentiometers resulted in voltage fluctuations causing the circuit protector trips. As corrective action for the first event, the PM program was enhanced to include cleaning of the potentiometers; however, the procedure had not been performed in Unit 1 prior to the second event.

The inspector reviewed both LERs and determined that they met the reporting requirements of 10 CFR 50.73. The inspector noted that at least two later LERs (259/89-24 and 259/89-27) were issued for similar events occurring in Unit 1. Both of these LERs were closed in IR 90-14. Since the first event occurred in Unit 3, the licensee conducted extensive investigation and evaluation of RPS power supply and circuit protector problems. As noted in IR 90-14, all of the open design RPS voltage potentiometers were replaced with an enclosed design potentiometer to reduce the susceptibility to dust accumulation. In addition, the RPS circuit protector setpoints were found to be deficient and design modifications have been initiated. The circuit protector modifications will be closed by the followup of LER 296/90-01.

The inspector concluded that the concerns identified by these LERs had been resolved or were being tracked by separate NRC items.

d. (CLOSED) LER 260/90-03, Unplanned ESF Actuation Caused by Personnel Error.

(CLOSED) LER 259/90-10, Unplanned ESF Actuation Caused by Personnel Error.

LER 260/90-03 reported that on May 2, 1990, an unplanned ESF actuation was initiated when a power supply fuse was pulled to support a modification. Personnel error was identified as the root cause, because of an inadequate review prior to performance of the clearance. Corrective action included a review of the event by operations personnel, a written reprimand, and termination of an operations staff employee.

LER 259/90-10 reported that on June 27, 1990, a power supply fuse was removed to support modifications, resulting in an unexpected ESF actuation. Personnel performing inadequate review of the clearance was identified as the root cause. Corrective actions included: operations personnel performed a review of the event; operations personnel performing clearances have been relocated to a separate office; a list of fuses with the potential to cause an ESF actuation will be developed. The list will be developed prior to each Unit's startup.

Previous events and their corrective actions are:

- * LER 296/85-21, July 30, 1985, a fuse was pulled to perform a modification and an inadvertent containment isolation occurred. The tagout procedure was modified to add evaluations of effects of tagouts on the plant.
- * LER 259/86-11, March 25, 1986, normal cooling water flow to the control air compressors was isolated to support a modification. Low cooling water pressure switches picked up when the isolation was made, causing the EECW pumps to auto start. Poor quality drawings and oversight in the clearance review were identified as the root cause. An event critique was distributed to operations personnel.
- * LER 259/87-29, November 5, 1987, a fuse removed to support modifications activities resulted in an unanticipated ESF actuation. Inadequate clearance preparation was identified as the root cause. An event critique was prepared for operations review during retraining.
- * LER 260/88-04, July 1, 1988, during a modification, instrument lines were drained resulting in a RPS actuation and a second actuation an hour later during event investigation. Incorrect clearance boundaries and poor evaluation of the effect of the clearance by the modifications engineer and ASOS was identified



as the root cause. A critique of the event was sent to all operations personnel and modifications engineers.

- * LER 260/88-14, November 3, 1988, a tagout performed to allow maintenance resulted in an inadvertent RPS actuation and scram. An inadequate review of the clearance was identified as the root cause. The individuals involved were counseled. SDSP 7.9, Inadequate Schedule and Work Control, was written. The SDSP is currently in Revision 3 and places emphasis on an evaluation of the work's effect on plant systems, not the effect of proposed tagout. Significant system response evaluation is located on the Plant Operations Impact Evaluation Sheet prior to the Hold Order boundary evaluation. The Work Control System Evaluator responsibilities section does not address the response of other plant equipment to the hold order. The Tagging and Support Coordinator (operations) responsibilities section does not include a hold order evaluation for impact on other systems.

Based upon discussions with operations personnel, about 30 tagouts per day are processed. The inspector reviewed 13 packages delivered to the operations tagging group requesting clearances. The degree of completeness varied greatly in the packages reviewed. Operations sends back packages with inadequate information on scope of work, but makes all tagging impact evaluations themselves. Although SDSP 14.9 requires the group requesting the tagout to list potential adverse effects, this evaluation does not seem to be consistently performed. One evaluation performed currently that is not listed in the procedure is a review performed by the work control group. The reviewer initials the Clearance Request above the Operations Review signoff prior to operations review. Operations indicated that the more difficult hold order evaluations are performed on dayshift, including those involving fuse removal.

Interviews with the Work Control group indicate Work Impact Evaluation Forms and the Clearance Requests are usually filled out and reviewed at separate times. The emphasis of the work impact evaluation is to evaluate the impact of the work, and the impact of the hold order is not always addressed on the impact evaluation form. The evaluation form and the clearance request arrive in operations at different times, so the clearance evaluation may not be influenced by the work impact evaluation.

Interviews with operations management showed they were aware of current tagout practices. They indicated the relocation of the tagout crews to a quieter work area and increased attention on the part of the tagging crews will prevent recurrence of the problems.



- e. (CLOSED) LER 259/90-06, Unplanned ESF Actuation-Automatic DG Start Caused by Personnel Error.

This item was originally identified when in April 1990, DG C, automatically started and tied to 4160V Shutdown Board C, when its logic breaker was closed during performance of the functional test on 4160V Shutdown Board C following wet high voltage potential cable tests. The start of the diesel generator resulted in an ESF actuation. The breaker for the normal feed to 4160 volt shutdown board C tripped. A degraded voltage alarm on 4160 volt Shutdown Board C was received in the main control room.

The root cause for the diesel start was personnel error. A PDD, a document used to evaluate and disposition differences between the plant and the as-constructed drawings, disposition resulted in the rolling of two conductors of a field cable, creating a false board degraded voltage signal. The engineering evaluation utilized to disposition the PDD failed to address the effect of the rolled cables on the control logic circuitry internal to the shutdown boards.

The licensee's immediate corrective action was to restore the shutdown board back to its normal power source and to secure the DG. The degraded voltage alarm on 4160V Shutdown Board C was reset, and the shutdown board was returned to its normal feed. The internal wiring discrepancies were corrected to agree with the plant drawing. System engineering personnel involved were counseled and instructed in the importance of performing a complete and thorough technical-evaluation of future PDD's.

Violation 259, 260, 296/90-14-04, Failure to Implement Drawings and Procedures, was initiated and documents these activities as an enforcement item.

- f. (Closed) LER 259/90-08, Unplanned ESF Actuation Due to a Blown Fuse Caused By Personnel Error.

This item is the same issue as example 1 of URI 90-14-01, which is closed in this report. The inspector reviewed the LER, dated June 11, 1990, and concluded that it met the reporting requirements of 10 CFR 50.73. No additional issues were identified during this review.

- g. (CLOSED) Part 21 296/P21 85-01, Defective Analog Level Detectors.

(CLOSED) Part 21 296/P21 85-02, Faulty AK and AKR Low Voltage Power Circuit Breakers, GE.

The above two 10 CFR Part 21 items were addressed and closed in IR 259, 260, 296/88-40, Sections 4.e and f respectively. These items were given different numbers for Unit 3 than for Units 1 and 2. The inspector verified that the items were addressed for all three units.



- h. (CLOSED) Part 21 259, 260, 296/P21 89-12, Cam-type Torque Switches for Limatorque.

This 10 CFR Part 21 came from Limatorque Corporation on September 29, 1989 and concerned the failure of type SMB-000 operators manufactured before 1980 and type SMB-00 operators manufactured before 1976. The failures of these units were caused from the fiber spacers under the contact bridge of cam-type torque switches. Browns Ferry does have these type units. Browns Ferry revised Electrical Preventive Instruction EPI-0-000-MOV001, Preventive Maintenance for Limatorque Motor Operated Valves, Step 7.2.3.3 to verify that torque switches do not have the fiber spaces under the contact bridge for type SMB-000 and SMB-00 operators. Electrical Corrective Maintenance Procedure ECI-0-000-MOV001, Maintenance for Limatorque, Step 7.3.4, has the same statement. These actions will insure that the inspections and removals will occur the next time any of the affected type operators are worked on. This meets the action requirement of the Limatorque notification. The inspector reviewed the Limatorque letter, the site Nuclear Experience Review groups correspondence, and the above referenced procedures. These reviews were fully acceptable to resolve this issue.

No violations or deviations were identified in Reportable Occurrences.

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

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

This item was reviewed in IR 89-40 and found acceptable for Unit 2 restart. All hardware issues were completed and only the FSAR update remained. FSAR Amendment 7 was submitted on July 23, 1990, and incorporated the changes. The inspector reviewed FSAR Section 5.3.3.4 and the blowout relief pressure was increased from 36 to 90 pounds per square inch as required by the plant ECN.

- b. (CLOSED) URI 259, 260, 296/89-38-05, Corrective Action on Composite Crews.

As a result of violation 327, 328/87-78-02, at SQN regarding the training and qualification of composite maintenance crews, TVA committed to address the generic implications at all TVA sites. The specific issues were training and qualification for foreman and general foreman supervising personnel in other crafts, craftsmen performing work outside their craft, and craftsmen performing independent verification outside of their crafts. This URI concerned whether the review and implementation of corrective actions at BFN had been completed.

The concerns identified by the URI in IR 89-38 have been reviewed and clarified by the licensee. PMI 6.2, Rev. 9, Conduct of Maintenance, was issued June 8, 1989, to include those clarifications and ensures that all the generic implications of the SQN violation were adequately addressed. Section 4.2.3 of PMI 6.2 discusses the qualification of foremen and implements NQAM 6.1 (which has subsequently be replaced with STD-2.1.900, Selection and Training of Personnel for Nuclear Power Plants, Part III, Section 6.1). It also addresses ANSI N18.1-1971, Paragraph 4.3.2 which deals with qualifications. Section 4.4 of PMI 6.2 addresses training of maintenance personnel.

The inspector talked with the Maintenance Manager and various foremen and determined that the procedures were understood and had been implemented. The inspector also reviewed PMI 6.2, NAQM Standards STD-2.1.900, ANSI/ANS-3.1-1987, and SDSP-3.15, and found them consistent and acceptable. The licensee has adequately addressed the generic implications of SQN violation 87-78-02 at Browns Ferry prior to restart of Unit 2 and no violation has been identified.

- c. (CLOSED) URI 259, 260, 296/90-14-01, Problems With Wire Lifting and Jumpering.

This item was left open during a previous inspection pending further review of two examples of problems which occurred during the jumpering of relay contacts. Example 1 involved jumpering the wrong contacts during the performance of a SI which resulted in an unplanned ESF actuation. This example was caused by personnel error and an inadequate SI. Example 2 involved jumpers placed between relay contacts which were not landed on the correct contacts as required by procedure. Both examples involved relays which do not follow normal contact configurations. The configuration abnormalities were not identified in the procedures used and drawings of the relays were not attached.

The inspector reviewed the licensee's incident investigation reports for both of these examples and held discussions with licensee personnel on the specifics of each event. From this additional information the inspector determined that example 1 was caused by personnel error for failure to question incomplete instructions. Contributing to the error was that information on the abnormal relay configuration was not included in the procedure. Additionally, the problem with identification of the contact sequence was identified during the SI upgrade validation process but was never incorporated into the SI. The failure to incorporate validation comments into a SI is in violation of the SI upgrade procedures. However, since the SI was walked down and validated during May - September, 1989, this violation is considered another example of the escalated enforcement



action (EA 89-226) issued on March 2, 1990, on the surveillance testing program. As part of the incident investigation process the licensee reviewed all SIs which involve relays with abnormal contact configurations and added cautionary notes and a relay contact drawing to each procedure. The inspector reviewed the specific SI involved in this event (O-SI-4.2.G-2) and verified that it had been revised and a relay drawing was included. The adequacy of SIs and resolution of SI concerns at BFN will be addressed during the followup of EA 89-226.

The inspector determined that example 2 was caused by personnel errors and a lack of information on the contact configuration in the procedure (1-POI-200.4). However, the jumpering of the incorrect contacts was identified by the technicians during the performance of the work and corrected at that time. Since the job was not complete or turned over for completion, the inspector determined that a violation of NRC requirements had not occurred. As part of the incident investigation, the licensee added a copy of the relay contact configuration and a caution statement to the procedure. The inspector verified that this corrective action was performed. In addition, the licensee performed a review of maintenance instructions performed on relays with abnormal relay contact configurations and has included drawings of the relays in appropriate procedures.

- d. (CLOSED) DEV 260/89-20-05, Failure to Conduct Volume III Training for Modifications Engineers.

During a NRC review of the licensee's training program inspectors identified the failure to provide modifications engineers with orientation phase training within established time limits and a failure to ensure that modifications personnel not receiving training did not have independent unreviewed work responsibility.

The inspector reviewed the licensee's response to the deviation dated August 4, 1989. In that response the licensee stated the reason for the failure was the addition of a relative large number of people who were not originally part of the incumbent population to the list of personnel requiring training. Due to demands resulting from supporting the work schedule, insufficient progress was made in completing the training requirements. A specific corrective action plan was detailed to address the problem with full compliance to be achieved by March 9, 1990.

The inspector reviewed documentation provided by the licensee to verify completion of the required training. The modification section training matrix and classroom attendance records were examined to determine the licensee's progress in this area. The inspector noted that the documentation supported closure of this item.



Additionally, the inspector reviewed Monitoring Report, QBF-M-90-1496, which documented the review by the site quality organization personnel of the technical staff and manager orientation phase training for site construction and modifications personnel as required by SDSP-4.9. The inspector noted that during the licensee review, the QM did identify one modifications section employee that was due one required course. However, the report further stated that the course was scheduled for August 1990, and the QM was informed that the individual did not have unreviewed work responsibility. The inspector further noted that the report documented the review by the QM of 18 workplans which the modifications individual could have had unreviewed responsibility in areas concerned with the training topic. No examples of unreviewed responsibility were identified during that review.

The inspector reviewed Revision 1 to SDSP 4.9, Training Program for Technical Staff and Managers and determined that the procedure established adequate controls for training of professional/technical personnel, managers and supervisors. The inspector determined that the licensee has adequately addressed the problem and corrective action should be adequate to prevent recurrence.

- e. (CLOSED) VIO 259, 260, 296/89-18-01, Failure to Meet the Requirements of 10 CFR 50.59.

(CLOSED) VIO 259, 260, 296/89-18-02, Inadequate Refueling Procedures.

(CLOSED) IFI 259, 260, 296/89-18-06, Core Alteration Technical Specification Changes.

The core reload of January 3, 1989, was started with procedures and technical specifications that allowed loading the core without incore instrumentation that actively monitored the subcritical assembly's neutron count rate. Inspection Reports 89-04 and 89-18 investigated the event.

TS Amendment 50-259, Amendment 143, issued by the NRC in a letter dated November 3, 1989, included changes that require active monitoring of neutron flux during core reload. These changes adequately address the concerns of IFI 89-18-06.

The inspector reviewed changes to ONP standard STD-10.1.54, Revision 0-Interim, SCN number 1, dated April 30, 1990, Plant Operating Instructions, and Plant Procedure 2-TI-147A, Revision 0, dated July 13, 1990, Fuel Loading After a Complete Core Unload. The changes included steps to ensure active monitoring of neutron flux during reload consistent with the new TS requirements. Tracking number 24, processing a revision to 2-GOI-100-3, contained changes that delete direct references to 2-TI-147. The existing GOI Revision



was found to reference the changed TS. The inspector discussed the procedure changes with Reactor Engineering and considers the concerns of Violation 89-18-02 to be adequately addressed.

The reviews of the event performed by the inspector to close out the above items indicate the actions performed by the licensee ensure adequate procedure control of the refueling process.

No violations or deviations were identified during the Followup of Open Inspection Items.

14. Restart Review Subcommittee

On September 13, 1990, the inspector attended a meeting of the restart review subcommittee. The purpose of the meeting was to classify several CAQRs as restart or not. The subcommittee used the restart checklist/recommendation form to classify the CAQRs. Use of the restart criteria was a commitment made by the licensee in the NPP. Each discipline presented their respective CAQR with a restart recommendation. The inspector concluded that conservative recommendations were made during the meeting.

15. Unit 3 Activities

The TVA Unit 3 Restart Advisory Committee met at BFN on September 5, 1990. Although the Scope Development Phase has slipped 90 days due to delays in Unit 2 restart, several elements of the Unit 3 work are going forward. The critical path for completing the Scope Development Phase the Restart Equipment List. The projects currently underway for Unit 3 are:

- Restart Support Building - This is a 120,000 square foot building to support all of the Unit 3 recovery effort. The contract has been awarded to a joint venture of Goodrum Knowles and Stone & Webster.
- Unit 3 Condenser Retubing - This activity is similar to the retubing of the Unit 2 condenser. Bechtel North American is preparing the procurement package. The retubing effort can proceed independent of the Unit 3 schedule slip.
- Unit 3 Safe End Replacement - This activity involves the replacement of ten Unit 3 recirculation inlet safe ends and their associated riser piping. General Electric has been awarded the procurement package preparation contract. This work can also proceed independent of the Unit 3 schedule delays.
- Unit 3 Process Computer - This project replaces the current G. E. PAC 4020 computer with an integrated process computer system with SPDS, rod worth minimizer, nuclear fuels advanced monitoring capability, and transient analysis capability. The Unit 3 input/output list is

scheduled to be completed by the end of September 1990. The contractor for both Unit 2 and 3 is Science Applications International Corporation. The Unit 2 upgrade is scheduled for the next refueling outage. These upgrades will complete the work required for closure of TMI Action I.D.2.2 and I.D.2.3.

Other Unit 3 items that require early attention are the Dose Reduction Program, licensing and relief issues, and the detailed evaluation of the Unit 2 inspections and its cycle 6 outage. The licensee is also reviewing the merits of going to the new Revised Standard Technical Specifications for the restart of Unit 3.

16. Exit Interview (30703)

The inspection scope and findings were summarized on September 18, 1990 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.

The Site Director stated that strong management action to correct bypassing of QC holdpoints had occurred and the error rate was small compared to the volume of work activities. The inspector stated that the basis of the violation was for failure to follow procedure with multiple examples and an increasing trend with five examples occurring in August 1990.

<u>Item Number</u>	<u>Description and Reference</u>
259, 260, 296/90-27-01	NCV, Failure to Comply With ALARA Procedure By Lying in the Drywell, paragraph 4.
259, 260, 296/90-27-02	URI, Potential Equipment Clearance Violation, paragraph 4.
259, 260, 296/90-27-03	VIO, Bypassing QC Holdpoints, paragraph 5.
259, 260, 296/90-27-04	IFI, CST Tank Bottom Degradation, paragraph 9.
259, 260, 296/90-27-05	IFI, Resolution of Undocumented and Uninspectable Splices in Safety Related Equipment, paragraph 9.
259, 260, 296/90-27-06	IFI, Resolution of Secondary Prints and Labeling, paragraph 11.

Licensee management was informed that eight LERs, two IFIs, two URIs, two violations, one deviation, three Part 21s, three TMI Items and two Bulletins were closed.



16. Acronyms

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
AOI	Abnormal Operating Instruction
APRM	Average Power Range Monitor
ASOS	Assistant Shift Operations Supervisor
AUO	Auxiliary Unit Operator
BFN	Browns Ferry Nuclear Plant
BU	Bulletin
BWR	Boiling Water Reactor
CAQR	Condition Adverse to Quality Report
CB	Circuit Breaker
CFR	Code of Federal Regulations
CS	Core Spray
CST	Condensate Storage Tank
DBVP	Design Baseline and Verification Program
DCN	Design Change Notice
DEV	Deviation
DG	Diesel Generator
EA	Enforcement Action
ECCS	Emergency Core Cooling System
ECN	Engineering Change Notice
EECW	Emergency Equipment Cooling Water
ENS	Emergency Notification System
EOI	Emergency Operating Instruction
EP	Emergency Preparedness
EQ	Environmental Qualification
ESF	Engineered Safety Feature
FCV	Flow Control Valve
FDCN	Field Design Change Notice
FSAR	Final Safety Analysis Report
GE	General Electric
GOI	General Operating Instructions
GPM	Gallons Per Minute
HQ	Headquarters
IEB	Inspection and Enforcement Bulletin
IFI	Inspector Followup Item
IRM	Intermediate Range Monitor
IR	Inspection Report
JCO	Justification for Continued Operation
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LPRM	Local Power Range Monitor
MAI	Modification Alteration Instruction
MCPR	Minimum Critical Power Ratio
MR	Maintenance Request
MRTI	Master Refueling Test Instruction

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NCV	Non Cited Violation
NE	Nuclear Engineering
NPP	Nuclear Performance Plan
NQA	Nuclear Quality Assurance
NQAM	Nuclear Quality Assurance Manual
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
OI	Operating Instruction
ONP	Office of Nuclear Power
OSIL	Operations Section Instruction Letter
PDD	Potential Drawing Discrepancy
PMI	Plant Managers Instructions
PM	Preventative Maintenance
POI	Plant Operating Instructions
PRD	Problem Reporting Document
QA	Quality Assurance
QC	Quality Control
QM	Quality Monitoring
RCIC	Reactor Core Isolation Cooling
RCI	Radiological Control Instruction
RCW	Raw Cooling Water
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RMOV	Reactor Motor Operated Valve
RPS	Reactor Protection System
RTP	Restart Test Program
RWCU	Reactor Water Cleanup
RWP	Radiological Work Permit
SBGT	Standby Gas Treatment System
SCL	System Checklist
SDSP	Site Directors Standard Practice
SI	Surveillance Instruction
SMPL	Site Master Punchlist
SOS	Shift Operations Supervisor
SPDS	Safety Parameter Display System
SPOC	System Pre-Operability Checklist
SQM	Site Quality Monitoring
SQN	Sequoyah Nuclear Plant
SRM	Source Range Monitor
STD	Standard
TD	Test Deficiency
TI	Technical Instruction
TMI	Three Mile Island
TS	Technical Specification
TVA	Tennessee Valley Authority
URI	Unresolved Item
VIO	Violation

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Work Plan
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