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

Report Nos.: 50-259/89-11, 50-260/89-11 and 50-296/89-11

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 1, 2, and 3

Inspection Conducted: March 1 - April 14, 1989

Inspector: _____ 5/19/89
D. R. Carpenter, NRC Site Manager Date Signed

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

Approved by: _____ 5/19/89
W. S. Little, Section Chief, Date Signed
Inspection Programs
TVA Projects Division

SUMMARY

Scope

This routine resident inspection included the areas of operational safety verification, surveillance observation, maintenance observation, design deficiencies, fire prevention/protection, cable deterioration, reportable occurrences, and site management and organization.

Results

Two violations were identified:

259, 260, 296/89-11-01: Failure to Satisfy T.S. 3.2.A, paragraph 2

296/89-11-05: Failure to Satisfy T.S. 4.6.B.1.c, paragraph 2

*One unresolved item was identified:

259, 260, 296/89-11-02: Potential Failure to Satisfy Single Failure Criteria, paragraph 5

One inspector followup item was identified:

259, 260, 296/89-11-03: Deteriorated GE Cables, paragraph 7

One non-cited violation was identified:

260/89-11-04: Failure to Follow Special Operating Instruction, paragraph 2

The two violations indicated that the licensee continues to have problems in adequately controlling post maintenance and surveillance testing activities. These areas are still considered weak and need additional management attention. The problems identified in the non-cited violation regarding following special operating instructions need more attention to ensure plant work activities are properly controlled.

*Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations.

REPORT DETAILS

1. Persons Contacted

Licensee Employees:

O. Kingsley, Jr., Senior Vice President, Nuclear Power
C. Fox, Jr., Vice President and Nuclear Technical Director
*J. Bynum, Vice President, Nuclear Power Production
*O. Zeringue, Site Director
*G. Campbell, Plant Manager
H. Bounds, Project Engineer
*J. Hutton, Operations Superintendent
D. Phillips, Maintenance Superintendent
*J. Swindell, Plant Support Superintendent
*D. Mims, Technical Services Supervisor
*D. Hosmer, Restart Test Program Manager
G. Turner, Site Quality Assurance Manager
*P. Carier, Site Licensing Manager
*J. Savage, Compliance Supervisor
A. Sorrell, Site Radiological Control Superintendent
R. Tuttle, Site Security Manager
T. Bradish, Plant Reporting Section
L. Retzer, Fire Protection Supervisor

*Attended exit interview

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 Attendees

D. Carpenter, Site Manager
E. Christnot, Resident Inspector
W. Bearden, Resident Inspector
A. Johnson, Project Engineer
W. Little, Section Chief

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

2. Operational Safety Verification (71707)

The NRC inspectors were kept informed of 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; onsite and offsite emergency power sources available for automatic operation; purpose of temporary tags on equipment controls and switches; annunciator alarm status; adherence to procedures; adherence to limiting conditions for operations; 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 positions and system alignment; snubber and hanger conditions; containment isolation alignments; instrument readings; housekeeping; proper power supply and breaker alignments; radiation area controls; tag controls on equipment; work activities in progress; and radiation protection controls. Informal discussions were held with selected plant personnel in their functional areas during these tours.

a. Failure to Satisfy Technical Specification Compensatory Action Statements

1. On February 25, 1989, MR A-893734 was issued to troubleshoot and repair the Unit 1 channel "A" reactor zone exhaust radiation monitor (1-RM-90-142) due to test deficiencies encountered during the performance of 1-SI-4.2.A.10, "Reactor Building and Refuel Floor Ventilation Radiation Monitor Calibration and Functional Test." The SI had been stopped and the maintenance request (MR) was written which included the successful completion of the SI to satisfy the post-maintenance testing PMT requirements. The radiation monitor was removed, repaired, and was reinstalled at 1:00 p.m., on February 25, 1989.

   Technical Specification table 3.2.A, note G requires the Unit 1 Reactor Building to be isolated and the Standby Gas Treatment (SBGT) system to be started when the instrument channel which provides the "Reactor Building Ventilation High Radiation - Reactor Zone" function is inoperable. This radiation monitor performs that function for channel "A". During the performance of the SI, the SBGT system trains are initiated and the Unit 1 reactor zone is isolated until the completion of the test. At the time the test deficiency was identified and the radiation monitor was taken out of service, these TS requirements were satisfied as a direct result of the performance of the SI.

   Once the radiation monitor was reinstalled, the SI was continued until 6:05 p.m., on February 25, 1989, when the SI was stopped due to lack of coverage on the night shift. At that time, operators reset the SBGT system trains and the Unit 1 reactor zone isolation as well as other equipment actuated during the SI. The SI was started again on February 26, 1989, at 8:00 a.m., and the TS requirements were met at 8:17 a.m.; but the SI was stopped at 8:50 a.m. because a higher priority SI was needed for Unit 2. Once again the SBGT system was shut down and the Unit 1 Reactor Building isolation was reset when the SI was

stopped. On February 28, 1989, licensee personnel identified that the PMT (completion of the SI) had not been completed and the radiation monitor was declared inoperable. The compensatory actions required by the TS were reinitiated at 10:20 a.m., on February 28, 1989.

Containment, filtration, and controlled release of postulated radioactive releases are specific functions of secondary containment and Standby Gas Treatment (SBGT). The ventilation exhaust radiation monitors provide automatic isolation/acutation signals which are required for the secondary containment and SBGT to perform their functions.

Per the TS definition of Secondary Containment Integrity, SBGT is required to be operable and:

All the unit reactor building ventilation system penetrations required to be closed during accident conditions are either:

1. Capable of being closed by an operable reactor building ventilation system automatic isolation system or

2. Closed by a least one reactor building ventilation system automatic isolation valve deactivated in the isolated position.

Therefore, the operability of SBGT and automatic secondary containment isolation require the operability of the exhaust radiation monitors.

TS 3.2.A states that the instrumentation required for primary containment integrity is given in Table 3.2.A and states that the reactor vessel, reactor building, main steam lines, and SBGT are also included. Table 3.2.A requires 1 radiation monitor channel for each of the two train systems. If the required number of channels is not met for the reactor zone exhaust radiation monitors then the reactor building must be isolated and SBGT started.

In summary only one radiation monitor was operable on the unit 1 reactor zone ventilation exhaust for a period of several days following corrective maintenance because the post maintenance testing had not been performed. The required number of operable radiation monitor channels was not met and the compensatory actions for this condition were not maintained while the radiation monitor was inoperable.

The failure to maintain secondary containment and the SBGT system trains in operation during the time period that the Unit 1, channel "A" reactor zone exhaust radiation monitor was inoperable is considered a violation of Technical Specification 3.2.A, 3.7.B, and 3.7.C (Violation 259, 200, 296/89-11-01). The licensee identified and reported this violation to the NRC as documented in LER-89006, issued March 30, 1989. An NRC notice of violation (NOV) will be issued, rather than classifying it as "licensee identified" with no NOV since the corrective action did not identify the steps being taken to ensure that post maintenance testing will be completed promptly.

2. On March 7, 1989, the licensee identified that a reactor coolant sample was not performed as required by TS after the Unit 3 continuous conductivity monitor (3-CIT-43-11) was removed from service on March 6, 1989 at 9:15 a.m. Technical Specification 4.6.B, "Coolant Chemistry," requires that a sample of reactor coolant be analyzed every 8 hours for conductivity and chloride ion content when the continuous conductivity monitor is inoperable. On March 7, 1989, at 6:15 a.m., a sample was taken for the normal surveillance frequency and at 7:30 a.m., a chemistry lab technician reported that the monitor was out of service and initiated the 8 hour sample frequency.

   The monitor was removed from service for calibration and troubleshooting on March 6, 1989 per MR 877517. From a review of the completed MR package, the NRC inspector noted that a TS time limit was not entered on the MR and the working instructions indicated that a work impact evaluation was not required. The NRC inspector also noted that the SOS and Unit 1 operator logs did not list the monitor as being inoperable on March 6, 1989. However, the "Work Log Sheet" provided with the MR package stated that the operator was notified of the monitor's removal and return to service.

   The failure to perform a reactor coolant sample analysis within 8 hours following the removal of the Unit 3 continuous conductivity monitor from service is considered a violation of Technical Specification 4.6.B.1.c, (Violation 296/89-11-05). Although this violation was identified by the licensee, the inspector did not believe that the licensee's correction action to prevent recurrence was adequate and a NOV will be issued.

From reviews of the control room logs, completed MR packages, LREDs, and associated incident critiques, it appears that the errors were the result of problems in the planning, review, and implementation of maintenance activities and the affected operability requirements for safety-related equipment. Also, insufficient review, or lack of review, of the MR packages resulted in neither of the components being declared inoperable. by operations personnel. The NRC inspectors are concerned that these examples occurred due to similar causes and may be indicative of a generic problem.

b. Diesel Generator Walkdown

The NRC inspector walked down System 82, Units 1/2 and 3 Diesel Generators during this reporting period using the following plant drawings:

0-15E500-3	Unit 1 and 2, Key Diagram of Standby Auxiliary Power System
3-15E500-3	Unit 3, Key Diagram at Normal and Standby Auxiliary Power System
1-47E859-1	Unit 1 and 0, Flow Diagram Emergency Equipment Cooling Water
0-47E840-3	Unit 0, Flow Diagram Fuel Oil System.

The NRC inspector noted that during this reporting period, various D/Gs for all units were placed in and out of service to support the Division I, Division II and Division III outages. No deficiencies were noted as to valve lineups, control availability, and switchboard availability. The components in all eight DG rooms and the valves directly outside the rooms were adequately labeled and identified to support operation of the system.

c. Failure to Follow Special Operating Instruction

On April 5, 1989, the licensee discovered that Shutdown Board B was not lined up as required by a special operating instruction (memo B22 890404 014). Due to various plant activities, additional 480 volt loads were shifted to the shutdown board, i.e. the 2A 480V shutdown board and the A Diesel Auxiliary Board. In order to preclude the possibility of an overload condition, the special requirements in this special operating instruction stated that the 1C and 2C RHR pump breakers were to be racked out and disabled. However, it was discovered that the 2C RHR pump breaker had not been racked out. This item was evaluated and determined by the licensee as not being reportable. The inspector considers the action taken by the licensee to be appropriate. A violation for failure to follow a procedure is not being cited because the criteria specified in Section V.A. of the Enforcement Policy were satisfied.

This is identified as Non-cited Violation (NCV) 260/89-11-04 for which no response is required. The inspectors will continue to monitor licensee activities in this area.

Two violations and one non-cited violation were identified in the Operational Safety Verification area.

3. Surveillance Observation (61726)

The inspectors observed/reviewed the surveillance instructions (SI) procedures discussed below. The inspections consisted of a review of the SIs for technical adequacy and conformance to TS, verification of test instrument calibration, observation of the conduct of the test, confirmation of proper removal from service and return to service of the system, and a review of the test data. The inspectors also verified that limiting conditions for operation were met, testing was accomplished by qualified personnel, and the SIs were completed at the required frequency.

On February 28, 1989, the licensee discovered that an expired Immediate Temporary Change (ITC)-5 was still in place for 0-SI-4.7.B.3.C, "Standby Gas Treatment System Train Operability Test." The SI demonstrates the operability of the SBGT system trains by manually starting each train and verifying that the fan starts, the relative humidity heaters energize, and dampers align as required. The ITC was issued to allow the verification of the acceptance criteria with the trains already in operation. Specifically, it allowed the performer to skip the steps for starting the trains if they were already running. At the time the ITC was written, the SBGT system trains were running to satisfy other TS requirements.

The ITC was given an expiration date of February 13, 1989, and should have been removed on that date in accordance with SDSP 2.11, "Implementation and Change of Site Procedures and Instructions." The NRC inspector reviewed copies of the SI which were performed daily from February 21, 1989 through February 24, 1989, for the "B" and "C" SBGT system trains with the expired ITC still in place. In each performance, the SBGT system trains were not running and the changes allowed by the ITC were not used. Operability of the trains was verified in accordance with the approved SI steps.

SDSP 2.11 requires that ITCs be removed from the affected procedures upon expiration. If the SBGT system trains had been running during the SI performances on February 21, 1989 through February 24, 1989, the ITC steps could have been used and TS surveillance requirements could have been missed due to the performance of an unapproved procedure. Administrative controls are established to require activities to be performed in accordance with requirements and strict implementation of the controls ensure that the requirements are met. This concern was discussed with the licensee.

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

4. Maintenance Observation (62703)

Plant maintenance activities of selected safety-related systems and components were observed/reviewed to ascertain that they were conducted in accordance with requirements. The following items were considered during this review: the limiting conditions for operations were met; activities were accomplished using approved procedures; functional testing and/or

calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; proper tagout clearance procedures were adhered to; and radiological controls were implemented as required. Maintenance requests 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/reviewed the following maintenance activities during this report period:

- On March 5, 1989, while performing post maintenance testing (PMT) on the "1/2 A" diesel generator (DG) following scheduled Division I outage work, the DG automatically started. This occurred when maintenance personnel misinterpreted a step in the instruction and thought that the DG monthly operability test (0-SI-4.9.a.1.a.(A)) was to be performed as part of the PMT. Operations began an electrical lineup checklist in accordance with the SI and due to the electrical lineup already in place per the PMT, the DG received a start signal and started as designed. Operations shut down the DG and realigned the manipulated components to the positions they were in prior to beginning the SI. The PMT procedure was clarified and completed as intended. The DG was tagged out and had not been declared operable at the time of the event.

- On March 10, 1989, the inspector observed WR 911557 which was written to troubleshoot the cause of the Unit 3 RPS channel "A" trip (half-scram actuation) which occurred on March 7, 1989, while the bus was connected to its alternate power source (transformer). Following the trip, control room annunciations indicated the cause to be a loss of power to the "A" RPS bus. However, field examination found the bus to be energized and none of the circuit protectors (for under-frequency, undervoltage, and overvoltage) were tripped. The licensee considered the cause to be a fluctuation in the bus voltage which temporarily made up the circuit protector logic and then returned to normal. The circuit protectors contain two time delay relays in the circuit to trip the bus and the system engineer stated that there had been problems with the circuit protectors in the past. During the troubleshooting, the licensee tried to duplicate perturbations that may have been seen on the bus power supply by starting a control bay chiller. The results indicated that the voltage drop was observable, but it did not decrease to the circuit protector trip setpoints. The system engineer stated that the operation of the circuit protectors and future problems would continue to be reviewed until a root cause and permanent correction could be established. The NRC inspector noted significant involvement by operations, system engineering, and maintenance in planning and conducting the troubleshooting activities. No discrepancies were identified.

- The resident inspectors followed licensee maintenance activities associated with problems with the Unit 2 RHR Loop II injection isolation valve, 2-FCV-74-67. The valve which is a 24 inch motor

operated gate valve with a SMB4T Limitorque actuator had failed on March 28, 1989. During post modification testing, the valve was backseated and the thermal overload device prevented any further operation. The valve had apparently become backseated during the process of checking for proper direction of rotation after personnel had failed to place the valve position near enough to mid position prior to attempting motor operation of the valve. MR 869976 was written to disassemble, inspect and repair the valve and actuator. The valve was disassembled and no apparent damage was detected. As a precaution, an ultrasonic test of the valve stem and visual inspection of the stem threads were performed with no apparent defects found. After repairs under MR 869976 were performed, MOVATs testing on 2-FCV-74-67 was performed. During the MOVATs testing on April 5, the limitorque operator again failed when it was unable to unseat the valve disc. MR 916006 was written to again disassemble, inspect and repair the valve and actuator. The actuator was partially disassembled and cleaned, but valve disassembly was not required. The licensee determined that the failure was due to a compressed spring pack in the actuator. The NRC inspector determined from discussions with licensee personnel that evidence of spring pack degradation was indicated in the thrust signature during MOVATs testing prior to the failure. The spring pack was replaced, valve stem checked for evidence of bending and damage, valve stroked to determine any damage, actuator reassembled and applicable portions of MOVATs testing reperformed.

The licensee performed an engineering evaluation to determine if overstress or other damage occurred to the valve during the two events. During the evaluation, TVA contacted the Limitorque and Crane-Aloyce companies to obtain their recommendations and comments. According to the vendors 292,000 lbs is the maximum possible thrust that could have been applied by the actuator during a locked motor condition. The weakest member, the stem threads, are expected to begin yielding at 384,627 lbs. No actual thrust higher than 194,000 lbs was measured during MOVATs testing of the valve. Based on this, the licensee determined that no overstress occurred and the valve should be safe to operate.

- The NRC inspector reviewed the work packages associated with MR 869976 and MR 916006. The packages contained a sufficient amount of detail and guidance to allow acceptable accomplishment of the work and the documentation supported that adequate post maintenance testing was performed.

- The NRC inspectors walked down portions of Hold Order 0-89-183, and Caution Order 0-89-145 concerning RHRSW pump maintenance and reviewed the clearance logs to verify compliance with SDSP-14.9, "Equipment Clearance Procedure." The review verified that the clearances isolated the affected portions of the systems being tagged; the documented components were tagged and in the correct positions; and any applicable TS limiting conditions for operation were satisfied. No discrepancies were identified.

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

5. Design (37700)

The NRC inspectors expressed concern about the significant number of instances of failure to meet the single failure design criteria that have been recently identified:

- During a licensee restart test program review of the 250 Volt Battery Boards and the 480 Volt AC Shutdown Boards that occurred in January 1987, a system engineer determined that the loss of 250 Volt Battery Board Number 1 would cause loss of 480 Volt Shutdown Boards 1A & 1B due to load shed signals. The result of this condition was the loss of the Division II core spray logic. This concern was documented by the NRC as IFI 259, 260, 296/88-04-04.

- A design deficiency was identified during the restart test program review by the licensee when both signal trains for the standby gas treatment system logic were found wired up to the same relay which closes all four dampers located in the equipment bay. This concern was documented by the NRC as IFI 259, 260, 296/88-05-06.

- During the recent review by the NRC of concerns associated with the seismic affects of the vitrified clay piping in the RCW system, it was noted that both redundant safety related air conditioning units associated with the Unit 2 4KV Shutdown Board Rooms would be rendered inoperable due to a single failure of the common EECW discharge flow path resulting in the failure of both divisions of 480 Volt Reactor MOV Boards. This design was the result of a recent modification associated with ECN P0956. Additional detail is included in NRC Inspection Report 259, 260, 296/89-10.

- The licensee recently identified an unanalyzed condition on March 22, 1989, where the A, B, and C Diesel Generators could be overloaded during the first few minutes of an accident. This could possibly occur due to the failure of a single lockout relay which prevents the three motor driven fire pumps from starting during an accident condition including a loss of coolant accident or a loss of offsite power. The single relay is shared among the three pump starting logic circuits. The fire pumps are designed to automatically start on low fire protection water pressure with only one pump starting initially with a second pump and perhaps a third pump starting if the

first pump is unable to provide adequate system pressure. Each fire pump receives electrical power from a separate diesel/shutdown buss and a possibility exists that the three affected diesels could successionally fail on overload because the respective fire pump motors were not blocked for the first 10 minutes of diesel loading as required. The fire pump demand could be due to actuation of non-qualified fire detectors during an accident condition. This issue is documented in CAQR BFP 890219.

The NRC inspectors met with members of licensee management and requested that the licensee described the guidance relative to detecting potential single failure problems that they give their personnel that perform design and design change reviews, review of test results, and in review events. The licensee has yet to provide a satisfactory response to this concern. This potential failure to provide adequate single failure criteria during the design process will be documented as an Unresolved Item (259, 260, 296/89-11-02) pending further review of the single failure criteria used by the licensee. Resolution of IFIs 259, 260, 296/88-04-04 and 259, 260, 296/88-05-06 will be included in the resolution of this single URI which must be resolved prior to restart of Unit 2.

No violations or deviations were identified in the Design Deficiencies area.

6. Fire Prevention/Protection - (42051)

An NRC inspector toured the Units 1, 2, and 3, reactor buildings, control bay, and turbine building to observe the fire prevention and protection activities. The inspector verified the following conditions to be in effect:

- wood scaffolding was marked as being treated with flame retardant
- there was no unnecessary accumulation of combustible forms, form lumber, shoring, or scaffolding
- fire extinguishers and fire hoses were located at designated places at each elevation
- access to suppression devices was not restricted by outage materials or equipment
- suppression devices indicated current inspection.

The NRC inspector identified one concern in that there was a large amount of material contained in yellow plastic bags stored within several contamination areas located in the Unit 3 Reactor Building. Since some of the yellow plastic bags appeared to possibly contain combustible material, the NRC inspector identified this concern to licensee management. After evaluating the condition, the licensee stated that all of the material in question was stored in approved locations and that all bags contained mirror type insulations or other noncombustible material.

No violations or deviations were identified in the Fire Prevention/ Protection area.

7. Cable Deterioration (62703)

During the performance of a functional test of the Unit 2 IRM A channel on March 14, 1989, a short circuit occurred resulting in the power supply fuse blowing for that drawer. The licensee investigated the cause of the short circuit and determined that various cables in the Nuclear Instrumentation System were deteriorated in that the rubber insulation had become brittle and cracked with portions of the conductor exposed. This problem is documented on CAQRs BFP890290, BFP890291, and BFP890292.

The licensee reported this problem to the resident inspectors on March 17, 1989. Based on preliminary information, the problem was believed to be limited to General Electric supplied GENIE SJO SI - 53115 power cables with black Nitrile-PVC jacket. The conductor insulation is styrene butadiene (Buna-S) rubber insulation which was known to have been used in the source, intermediate, and average power range instrumentation systems at Browns Ferry.

The failure of the insulation material appears to be embrittlement and cracking of the individual conductor's rubber insulation after prolonged exposed to air in the area where the outer jacket was stripped away during termination of the cables. The ozone concentration in the normal atmosphere causes the material to deteriorate. Neither the cable outer jacket or conductor insulation covered by the jacket is expected to be affected.

The licensee is in the process of replacing the NI cables with properly qualified cable. The Division I NI cables have been replaced with the Division II work remaining to be completed. Licensee management has stated that although GE has notified the licensee that based on a sample review of local panels there is probably minimal use of this type of cable, TVA has requested that GE perform a complete review of local panels for application.

Since there was a possibility that the same type of cable may have been used on other Nuclear Steam Supply System (NSSS) components GE was requested to manually search their records and determine any other applications for this type cable. Based on preliminary information from General Electric, 17 other BWRs built between the late 1960s and 1971 also have this type cable and no prior problems with this type cable have been identified. GE replied via GE Electrical Design Engineering Memos dated March 24, and March 27, 1989, that their review of control room drawings for Browns Ferry Unit 2 was complete and that this material was used as power cable for other systems in addition to NIs. Process control instrumentation (GE-MAC), Area Radiation Monitors (ARMs), and various control room recorders were identified as also being affected. GE also stated that a RICSIL communication (type of immediate action SIL) was

being issued to BWR owners to provide formal notification and recommendations.

GE made a preliminary assessment of available information associated with the problem and determined that it was not an immediate threat to safety. This assessment is partially due to the fact that the associated components would fail due to loss of power if a electrical short occurred, resulting in any required RPS or ESF actuation occurring, i.e. component failure would result in failure in a nonconservative manner.

GE has obtained a sample of the cable for further analysis to identify any additional reasons for the deterioration and will be providing information to INPO on the issue.

The NRC inspectors will follow the licensee's progress in this area during future inspections. Specifically the NRC inspectors are concerned about the proper identification and replacement of defective cables in all applications of this type cable in control room and local panels throughout the plant. Additionally the NRC inspector will need to review any licensee and/or vendor generic evaluation that is performed. This item is identified as Inspector Followup Item 259, 260, 296/89-11-03; Deteriorated GE Cables. This item must be resolved prior to restart of each respective Unit.

No violations or deviations were identified in the Cable Deterioration area.

8. Reportable Occurrences (90712, 92700)

The following licensee events reports (LERs) were reviewed to determine: adequacy of event description, verification of compliance with technical specifications and regulatory requirements, corrective action taken, existence of potential generic problems, reporting requirements satisfied, and the relative safety significance of each event. Additional in-plant reviews and discussions with plant personnel, as appropriate, were conducted.

- (OPEN) LER 296/89-03: Unplanned Engineered Safety Features Actuations Caused By Voltage Transient on Electrical Distribution System.

  On March 7, 1989, Unit 3 received an unplanned ESF actuation due to voltage fluctuations in the alternate power supply to the RPS circuit protectors 3C1 and 3C2, which caused a momentary loss of power to RPS Bus 3B. The normal 3B RPS bus is supplied by the RPS motor generator set number 3B and the alternate supply is from a unit preferred

regulatory transformer. The NRC inspector reviewed the LER as it may affect Unit 2 RPS power supplies which are the same electrically as Unit 3. The following drawings were reviewed:

45W641-4, Powerhouse Unit 2, Wiring Diagrams, RPS Power System Schematic Diagram SH-4.

2-45E641-2, Powerhouse Unit 2, Wiring Diagram Instrumentation and Control Power System, Schematic Diagram.

The NRC inspector noted that the alternate power for the Unit 2 RPS A and B is a direct feed from the secondary of a step down transformer 480 to 120/240 V, Unit Preferred Regulatory Transformer TVP-2, and is consequently susceptible to voltage fluctuations induced by the 480 volt primary side shared loads and the 240/120 volt secondary side shared loads. The normal supply to the RPS Bus A and Bus B is provided by a 480 to 120 volt motor-generator set equipped with a flywheel and does not have a shared load system on the output of the generator. This system is not readily susceptible to voltage and load fluctuations on the 480 volt shared power feed to the motor due to the flywheel and the electrical isolation provided by a motor-generator system. The NRC inspector also noted that by transferring the Unit 3 RPS Bus 3A to the alternate source in order to perform a PM on March 1, 1989, and by not performing the PM in a timely manner, i.e. when the event occurred approximately seven days after the transfer, the PM still had not been performed, this left that RPS Bus much more susceptible to electrical fluctuations. The licensee stated in the Unit 3 LER that administrative steps would be taken to minimize the amount of time all three unit RPS power supplies would be on the respective alternate power feeds. Also, design assumptions for the circuit protectors would be reviewed to determine if they could be changed to make the circuit protectors less sensitive. This item will remain open pending further review and corrective action must be in place prior to Unit 2 power operation.

- (OPEN) LER 260/89-08: Electrical Fault on Transformer Causes Engineered Safety Features Actuation.

  On March 19, 1989, an ESF actuation occurred due to an electrical fault on the Unit Station Service Transformer (USST) 2B. The transformer which is located in the switchyard, failed resulting in a loss of power to the Shutdown Bus 2. This in turn resulted in a loss of power to the Shutdown Boards C and D, which sensed a low voltage condition and automatically started DGs C and D. During the restoration of the electrical system, additional ESF actuations occurred. The NRC inspector noted, during the review of the LER, that plant operations personnel initially believed that this was caused by plant electrical maintenance personnel performing maintenance on an undervoltage relay. This belief resulted in the operators taking inappropriate action while restoring the system.

The licensee determined after the event that the Shift Operations Supervisor (SOS) had information that would have helped the operators to find the problem faster but did not communicate this information to Control Room personnel until after the event. This item will remain open until all corrective actions are complete and must be closed prior to Unit 2 restart. Corrective action includes modification activities scheduled to be complete in June, 1989 and high-potential testing to prove the adequacy of insulation.

No violations or deviations were identified in the Reportable Occurrences area.

9. Site Management and Organization (36301, 36800, 40700)

The NRC inspectors attended meetings of senior managers from Operations, Maintenance, Technical Support, and onsite DNE in the "War Room." The topics of discussion involved the planning and scheduling of system outages, the day to day workings of the "War Room", and frank discussions of issues and their priority as well as scheduling impact. Free flowing exchange of ideas, information, and questions took place with each group presenting planning and scheduling issues. Various "War Room" committee meetings were held on a daily basis following the general meeting and the NRC inspectors attended them periodically.

During this reporting period, the major topic of the meetings was the status of the division outages. The NRC inspectors noted that numerous problems occurred in the procurement area during the Phase I, Division I outage. The problems associated with obtaining materials caused the postponement of several of the scheduled work activities. Licensee management showed an increased interest and involvement in this area each day and fewer materials problems were noted during the Phase I, Division II outage.

During the event associated with the failure of USST 2B, as discussed in Paragraph 8, licensee management failed to communicate with control room personnel about information related to the electrical failure. This resulted in a delay in an operational evaluation of potential hazards. The NRC inspectors are concerned that this failure might not be an isolated case and could have resulted in a more significant event.

A concern was noted by the inspector with the security force rotating shift assignments. The NRC inspector noted that the forward shift rotation in the direction from the night shift to the evening shift and then to the day shift, is contrary to human factors engineering. The recognized and preferred shift rotation is from the day shift to the evening shift and then to the night shift. It has been documented by experience that by requiring a forward rotation, unnecessary stress and fatigue is placed on shift workers. Another concern deals with middle management meetings, specifically that two types of significant daily meetings were being conducted on site. One meeting, the daily outage meeting, was being held at 6:30 a.m. and 2:30 p.m. and dealt with the

continuing outage work. The other meeting, the daily shift turnover meetings, were conducted at 7:00 a.m., 3:00 p.m. and 11:00 p.m. and were attended by the oncoming operations shift personnel, The NRC inspector noted that first line supervisors and managers who attended the earlier meeting and received the information about upcoming work activity could then attend the operators turnover meetings to ensure a good line of communication to the oncoming shift operators. However, recently the operators meeting was changed to 6:30 a.m., 2:30 p.m., and 10:30 p.m. Thus, both meetings are being conducted at the same time.

During this inspection period, the licensee has continued to replace middle and senior management. While these changes are considered by the NRC as positive efforts to address plant and programmatic weaknesses, they initially have an impact on the plants ability to maintain an arduous schedule leading to restart. All of these proven, competent individuals must have some time in order to coalesce into a team that will be able to resolve past licensee weaknesses and provide leadership into the restart and operations mode. A new position was created called Engineering and Modifications Restart Manager, reporting directly to the Site Director with both the DNE and Modifications groups reporting to him. The Project Engineer has been replaced and various middle managers have been realigned. The only key managment slot still vacant is the Maintenance Manager, whose duties are being carried out by the Plant Manager until a permanent replacement is selected.

10. Exit Interview (30703)
The inspection scope and findings were summarized on April 14, 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.

Item	Description
259, 260, 296/89-11-01:	Violation, Failure to Satisfy T.S. 3.2.A (paragraph 2)
296,89-11-05	Violation, Failure to Satisfy TS 4.6.B.1.C. (paragraph 2)
259, 260, 296/89-11-02:	Unresolved Item, Potential Failure to Satisfy Single Failure Criteria (paragraph 5)
259, 260, 296/89-11-03:	Inspector Followup Item, Deteriorated GE Cables (paragraph 7)

Item (cont'd)	Description
260/89-11-04:	Non-cited Violation, Failure to Follow Special Operating Instruction (paragraph 2)

10. Acronyms

ARM	Area Radiation Monitor
BWR	Boiling Water Reactor
CAQR	Condition Adverse to Quality Report
DG	Diesel Generator
DNE	Division of Nuclear Engineering
ECN	Engineering Change Notice
EECW	Emergency Equipment Cooling Water
ESF	Engineered Safety Feature
GE	General Electric
IFI	Inspector Followup Item
INPO	Institute of Nuclear Plant Operations
IRM	Intermediate Range Monitor
ITC	Immediate Temporary Change
LER	Licensee Event Report
LIV	Licensee Identified Violation
LRED	Licensee Reportable Event Determination
MOV	Motor Operated Valve
NI	Nucelar Instrumentation
NOV	Notice of Violation
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
PM	Preventive Maintenance
PMT	Post Maintenance/Modification Test
RCW	Raw Cooling Water
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
SDSP	Site Director Standard Practice
SBGT	Standby Gas Treatment System
SI	Surveillance Instruction
SIL	Service Information Letter
SOS	Shift Operations Supervisor
SRO	Senior Reactor Operator
TS	Technical Specifications
TVA	Tennessee Valley Authority
VIO	Violation
URI	Unresolved Item
USST	Unit Station Service Transformer