APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-458/91-10 Operating License: NPF-47

Docket: 50-458

Licensee: Gulf States Utilities Company (GSU)
P.O. Box 220
St. Francisville, Louisiana 70775

Facility Name: River Bend Station (RBS)

Inspection At: RBS, St. Francisville, Louisiana

Inspection Conducted: February 13 through March 28, 1991

Inspectors: E. J. Ford, Senior Resident Inspector
D. P. Loveless, Resident Inspector

Approved: P. H. Harrell, Chief, Project Section C Date 4-5-91

Inspection Summary

Inspection Conducted February 13 through March 28, 1991 (Report 50-458/91-10)

Areas Inspected: Routine, unannounced inspection of onsite followup of events, operational safety verification, maintenance and surveillance observations, followup of a previously identified item, licensee event report (LER) followup, and Three Mile Island (TMI) action plan requirement followup.

Results:

- An accident was caused when a full, pressurized Halon bottle was inadvertently actuated during weighing activities. This event indicated poor performance and complacency by personnel involved, as well as nonprescriptive procedures and poor training. However, the licensee's response and corrective actions to the event were appropriate and timely (paragraph 3.a).

- The licensee was proactive in finding a small weld crack in a control rod drive hydraulic control unit (HCU) spool piece. The operator finding the problem displayed good attention to detail. Additionally, the licensee inspected all other HCUs and replaced or corrected 16 additional weld indications.

In response to this issue, Mr. P. D. Graham, Plant Manager, committed to perform a metallurgical analysis to determine the cause of the weld cracking and to issue a voluntary 30-day report to provide the results of the analysis to the NRC (paragraph 3.b).

- It appeared that operations personnel performed their duties and operated the plant in a good manner (paragraph 4.a).

- No problems were noted during walk down of selected plant systems (paragraphs 4.b and 4.c).

- Maintenance and surveillance observations indicated good performance and understanding of these activities by plant personnel (paragraphs 5 and 6).

Note: Acronyms and initialisms used in this report are identified in an alphabetical listing in the attachment at the end of this inspection report.

DETAILS

1. Persons Contacted

   G. A. Bysfield, Assistant Plant Manager - System Engineering
   E. M. Cargill, Director, Radiation Programs
   J. W. Cook, Technical Assistant
   T. C. Crouse, Manager, Administration
   W. L. Curren, Cajun Site Representative
   J. C. Deddens, Senior Vice President
   P. D. Graham, Plant Manager
   G. K. Henry, Director, Quality Assurance Operations
   J. C. Maher, Engineer, Nuclear Licensing
   W. H. Odell, Manager, Oversight
   J. P. Schippert, Assistant Plant Manager - Operations, Radwaste and Chemistry

   The above personnel attended the exit interview conducted on March 28, 1991. In addition to the above personnel, the inspectors contacted other personnel during this inspection period.

2. Plant Status

   At the beginning of this inspection period, the reactor was operating at 100 percent power.

   On February 26, 1991, instrumentation for the B reactor recirculation pump motor became inoperable for unknown reasons. The licensee received the following alarms: winding cooler leakage, various ground faults, oil high level, and oil low level. As reported in NRC Inspection Report 50-458/91-07, the pump's No. 1 seal had been degrading for approximately 2 months. The interstage seal pressure had slowly increased from its normal 540 psid to approximately 800 psid. In response to the seal problems, the licensee was considering a shutdown in mid-March to replace the seal.

   Licensee management determined that the outage should begin immediately because the loss of instrumentation would prohibit the full evaluation of continued seal degradation. As a result, on February 27, the licensee began reducing power toward cold shutdown to repair the instrumentation problems and to replace the seal package in the B reactor recirculation pump. The required maintenance actions took approximately 5 days. The licensee successfully replaced the seal in the pump. After plant startup, the seal functioned normally.

   On March 6, the unit was taken critical. The generator was synchronized and tied to the grid at 12 midnight the following night. The unit achieved 100 percent power on March 10.

At the end on this inspection period, the plant was at 100 percent power, steady-state operations.

3. Onsite Followup of Events (93702)

a. Inadvertent Actuation of a Halon Cylinder

On February 26, 1991, workmen were weighing a large Halon cylinder as part of a routinely scheduled surveillance test. During the testing, the craftsmen removed a pipe fitting from the cylinder in preparation for weighing the bottle. When the fitting was removed, it caused the 2-inch valve assembly to open and allowed the 200 pounds of liquid Halon to escape, causing the cylinder to become a missile. The event occurred in the service building restroom/shower area and did not effect safety-related equipment or structures.

One individual was injured and an ambulance and doctor were sent from a local hospital to the site. The injured individual was held overnight for observation. The individual developed blood pressure problems and tests were continued to determine the reason. The individual was subsequently admitted to a hospital in Baton Rouge, Louisiana, on February 28.

Another individual was also taken to the hospital with minor injuries. Four additional people went to the hospital for examination for possible Halon ingestion. All five individuals were treated and released.

The licensee determined that two errors appeared to have been made during the removal of the cylinder and its fittings. First, when the Halon cylinder was disconnected from the fire suppression system, the technicians failed to remove a short pipe fitting from the discharge outlet of the valve located atop the Halon cylinder. As a result, the technicians were unable to install an anti-recoil plug on the valve discharge outlet, which would have reduced the release rate of the cylinder contents. Secondly, it appeared that a fitting was inappropriately removed as a result of inadequate instructions in the test procedure. This resulted in the valve opening and the subsequent discharge of the cylinder contents.

When the contents discharged, the 450-pound (fully-charged weight) cylinder became a missile, causing extensive damage to the area where the individuals were working. Gouges were made in the tile of the shower wall, ceramic tile was knocked off a concrete floor leaving a 2-inch deep gouge in the reinforced concrete, tiles from a suspended ceiling were knocked off, and a hole (approximately 1-foot square) was made in a 6-inch cinder block wall.

In response to this incident, the licensee suspended the weighing of this type of Halon bottle until all the root causes could be identified and appropriate corrective actions taken.

The inspector reviewed the uses of other pressurized Halon containers with licensee personnel, including a different type of pressurized bottle in use for fire suppression in the control room instrument racks. It was noted that the control room bottles were of a spherical design and weighed approximately 50 pounds total when charged to approximately 350 psig with about 25 pounds of Halon. Additionally, the bottles require the presence of a firing voltage for the internal squib valve whose contacts are separated by an inserted cap upon removal of the basketball-sized bottle from the fire protection rack. The inspector concluded that while these bottles also represent a potential missile hazard, they are more difficult to inadvertently actuate and the testing instructions are more detailed and stringent in their requirements.

b. A Weld Crack in an HCU Spool Piece

While the plant was shut down for replacement of the seal in the recirculation pump, the licensee, on March 3, 1991, identified a small leak in a spool piece attached to a control rod drive HCU. The spool piece is installed in the line that provides charging water from the HCU to the control rod drive mechanism. The licensee performed dye penetrant testing and identified a crack in the weld that connects the spool piece flange to the piping.

To address the generic aspects of the weld problem, the licensee performed dye penetrant testing on all 145 spool pieces (one per HCU) and identified 16 additional spool pieces that had weld indications in the same location that the crack was initially found. The licensee stated that the problem appeared to be fatigue cracking. The licensee replaced or repaired the 17 spool pieces. Ten spool pieces were replaced with spares and the weld was repaired in the other seven spool pieces. Presently, all spool piece welds meet the original design criteria. The onsite review committee reviewed the issue and approved plant startup.

Following a preliminary investigation, the licensee determined that the probable cause of the weld cracks was flow-induced vibration (fatigue cracking) and that the cracks initiated on the external surface of the welds.

The plant manager committed to having General Electric (GE) perform a metallurgical analysis and an engineering evaluation to determine the failure mechanism. In the interim, the licensee will monitor the spool pieces each shift for leakage while an evaluation of the possible long-term corrective actions is being completed. Also, the plant manager committed to submit a voluntary report within 30 days from the date of the event.

Conclusions

The event related to the Halon bottle indicated poor performance and complacency by personnel involved, as well as nonprescriptive procedures and poor training. However, the licensee's response and corrective actions to the event were appropriate and timely.

The licensee displayed a proactive attitude in finding a small weld crack in a control rod drive HCU spool piece. The operator finding the problem displayed good attention to detail.

4. Operational Safety Verification (71707)

a. Control Room Observations

The inspectors routinely verified that proper control room staffing was maintained, access to the control room was properly controlled, and operator attentiveness was commensurate with the plant configuration and activities in progress. The operators were observed adhering to approved procedures for the ongoing activities. Additionally, the inspectors routinely observed upper management in the control room.

The inspectors also verified that the licensee was operating the plant in a normal plant configuration as required by the Technical Specifcation (TS) and, when abnormal conditions existed, that the operators were complying with the appropriate limiting condition for operation action statements. The inspectors verified that reactor coolant system leak rates were within the TS limits.

The inspectors observed instrumentation and recorder traces for abnormalities and verified the status of selected control room annunciators to ensure that control room operators understood the status of the plant. Panel indications were reviewed for the nuclear instruments, emergency power sources, and radiation monitors to ensure operability and operation within TS limits.

b. Tour of Vital Electrical Equipment

On February 24 and March 13 and 20, 1991, the inspector toured the Division I, II, and III diesel generator (DG) rooms and their associated control rooms. No problems were noted with regard to general conditions in the rooms, air start or cooling water system lineups, day tank minimum required levels, or DG control board lineup

The inspector also toured the Division I, II, and III standby switchgear rooms and noted correct indications and breaker positions for the 4160- and 480-Vac electrical boards. The condition of the Class 1E battery rooms and the dc equipment rooms was also reviewed and found acceptable. The inspector noted that the battery electrolyte levels were within allowable limits and that the switches for the inverters and chargers were correctly positioned.

The inspector toured the nonvital, normal switchgear building on March 11 and determined that the 13.8-kV Switchgears 1NPS-SWG1A and 1NPS-SWG1B, and the 4.16-kV Switchgear 1NNS-SWG1A, -1B, and -1C were energized and providing power to the nonvital loads. The inspector noted what appeared to be burned out indicating lights on Breaker 1NPS-SWG1A ACB-30. The shift supervisor (SS) was notified and an operator was dispatched to investigate. No other problems were noted.

c. Tour of Standby Service Water (SSW) Cooling Tower

On March 7, 1991, the inspector toured the SSW cooling tower to verify that the tower was ready for operation as required by TS 3.7.1.1. It was noted that vital-power Motor Control Centers 1EHS*MCC-16A and -16B were properly aligned to supply power to the appropriate equipment. These centers contain breakers for the cooling tower fans, SSW pump discharge valves, and pump room vent and supply fans, in addition to other loads. The inspector noted that the pumps, their associated motors, and the discharge valves appeared to be in good physical condition. The inspector also noted that the oil indication for the D SSW pump motor was very close to an adjacent wall and difficult to read. This was discussed with licensee management. It was acknowledged that the problem existed and that the oil level indication was read by the use of an inspection mirror.

The inspector noted that Fire Doors SS118-01 and -02 were blocked open. The inspector contacted the SS who stated that the doors were authorized to be open and were logged in a tracking document, as well as being on the roving firewatch tour route. The inspector noted that a firewatch was touring the cooling tower at the time of the inspector's tour.

d. RBS Emergency Exercise

GSU conducted an emergency exercise on February 27, 1991, with participation by NRC personnel. The exercise was observed by an NRC evaluation team. For further details, refer to NRC Inspection Report 50-458/91-08.

e. Service Water Piping (SWP) Chemical Cleaning Demonstration

In March 1991, GSU initiated a demonstration test of a qualified chemical cleaning process on the radwaste SWP prior to the system-wide cleaning of the safety-related SWP. The system-wide cleaning is scheduled for the upcoming refueling outage. The chemical cleaning of the radwaste SWP provided the licensee with experience on a large-scale chemical cleaning job and tested the overall logistics for the system-wide SWP cleaning. It also gave additional information for waste characterization to further define the waste management plan. Temporary Modification PMR-90-0033 made the necessary changes to this portion of the service water system to create a loop to circulate chemicals for the cleaning of the radwaste/fuel building ventilation chilled water chiller condensers.

The cleaning is a multistep process. The first phase is the iron removal process that utilizes a chelate with an inhibitor and reducing agent for the removal of the bulk of the iron oxide-rich deposits. This process leaves a slick film with iron and copper compounds entrapped on the surface. The second phase is the alkaline process that is designed to remove the remaining film. The third phase is the copper removal process. During the copper removal process, the copper compounds are removed and the steel surfaces are passivated. To ensure a good passivation of the steel surfaces, the fourth process is a steel passivation stage.

f. Radwaste Building Tour

On March 14, 1991, the inspector toured all elevations of the radwaste building and verified that general housekeeping and radiological controls were acceptable. The inspector also verified by physical manipulation that all doors bearing the appropriate radiological signs were locked. The inspector discussed the progress of the chemical cleaning demonstration with personnel attending the equipment and with members of plant management. No problems were noted.

g. Region IV Shift Technical Advisor (STA) Survey

As requested by Region IV, the inspector conducted a survey regarding the status of the STA program at the RBS. This was accomplished by interview of an on-duty STA and review of the TS and licensee documentation. The TS-required STA is taken from a pool of individuals with technical degrees who are free to perform normal duties when not needed in the control room.

During their 24-hour duty tour, they perform independent control board walkdowns and are present for operations shift turnovers (operators are on a 12-hour shift), major evolutions, plant transients, and when called on by the SS of the control operating foreman (COF). The 15 STAs are on an approximately 2-week rotation schedule and provide coverage as required by TS Section 6.2.2.

h. Unescorted Visitor in the Protected Area

On February 26, 1991, the inspector observed an unescorted visitor within the protected area. The visitor stated that his escort was in the restroom and would be out momentarily. The inspector stayed with the individual until the escort returned, then called the central alarm station and requested an officer be dispatched.

The inspector discussed the event, documented by the licensee in Security Incident Report 91-0206, with a visiting Region IV security specialist. This event is further discussed in NRC Inspection Report 50-458/91-09.

Conclusions

It appeared that the operations staff operated the plant in accordance with the TS. No problems were noted during walkdowns of selected systems. The overall performance in this area of the inspection was good.

5. Maintenance Observations (62703)

a. Control Building Chiller 1D

On March 15, 1991, the inspector observed portions of work being performed under Maintenance Work Order (MWO) R147065. This MWO was written to rebuild the 1HVK*CHL1D chiller. The portion observed was the fabrication and installation of temporary rigging, as identified in the attachments section of the MWO. The fitter and welder working on this project appeared to be knowledgeable of the procedure and were following the steps.

The inspector reviewed Weld Material Requisitions 15032 and 24779 and determined that the correct material was being utilized and the weld material was being appropriately handled.

b. Weld Cracking in HCU Spool Pieces

On March 2, 1991, the licensee discovered a cracked pipe weld below the inlet scram valve on one of the HCUs, as discussed in paragraph 3.b. This was documented on MWO R167651.

The inspector observed dye penetrant testing of the spool pieces, as well as cross-sectioning for metallurgic inspection. The licensee's evaluation was reviewed and determined to be satisfactory. Additionally, the inspector walked down other HCUs to look for any additional problems.

Conclusions

These observations indicated adequate performance and a good working knowledge of the procedures by the craftsmen involved.

6. Surveillance Observations (61726)

a. Jet Pump Operability Test Observation

On March 15, 1991, the inspector observed portions of the conduct of STP-053-3001, "Jet Pump Operability Test," Revision 3A. The purpose of this procedure was to determine jet pump operability as required by TS 4.4.1.2. The jet pumps are verified to be operable by using data obtained from recirculation loop flow, total core flow, and diffuser-to-lower plenum differential pressure of each jet pump and comparing it to established norms. When questioned, the operator satisfactorily explained his method of reading the fluctuating indicators and displayed a good knowledge of the contents and intent of the procedure. The inspector subsequently verified, during a data review, that all the test results were acceptable and were reviewed by the COF shortly after the completion of the procedure.

b. DG Run Observation

On February 21, 1991, the inspector observed portions of the performance of PEP-0026, "Diesel Generator Trending and Failure Reporting." The purpose of this procedure was to provide a recording and reporting mechanism, in accordance with Regulatory Guide 1.108 and TS 4.8.1.1.3, for DG operating data and failures.

The diesel was operated in accordance with the requirements of SOP-0053, "Standby Diesel Generator and Auxiliaries," to collect the necessary post-troubleshooting data after repairs had been made to Temperature Control Valve EGT*TCV20A. This valve was documented by the licensee on Condition Report (CR) 91-0063 as being suspected of sticking during a previous operability test when lubricating oil and jacket water temperatures started increasing. The inspector noted that the operators and engineers involved were utilizing the required procedures and were properly attentive to the performance of the diesel.

The inspector reviewed the data package following the test and verified that the acceptance criteria had been met and that the completed documents had received appropriate review and approval.

Conclusions

The above surveillance observations indicated adequate performance and understanding of the activities by plant personnel.

7. Followup of a Previously Identified Item (92701)

(Closed) Unresolved Item 458/8808-02: Panel Wiring Discrepancies

The specific issue addressed by this item was the apparent discrepancy between the grounding arrangement of Panel H13-P629. The panel grounding arrangement resulted in spurious trips of Rosemount trip units. This panel has three isolation signal busses that act as instrument power returns within the panel. The original wiring of the panel tied all three busses individually to the floor grounding bus. This bus is the safety ground and is considered electrically "dirty." However, one of the panel power supplies had its return running through the floor grounding system because the isolation busses were electrically separate.

Section 4.12.2.8 of GE Specification 22A2736 requires, in part, that an instrument power return shall not depend on a power generation power complex (main control room) cabinet or an interconnecting panel ground bus. Modification Request (MR) 88-0118 corrected this discrepancy by connecting the three isolation signal busses, removing the individual grounding straps, and adding a single, No. 10 AWG wire to ground the isolation bus network to the floor ground. This work was completed in April 1989.

The inspector determined that the licensee does not have a regulatory requirement to meet GE Specification 22A2736. GE stated, in a June 6, 1986, memorandum to GSU, that the discrepancies represented "less than ideal" grounding arrangements and were a result of differing philosophies between GE and Stone and Webster. The memorandum went on to state that the as-built arrangements "do not present a safety concern." Additionally, the licensee did correct the discrepancy when identified.

Based on the discussion above, this unresolved item is considered closed as no violations of regulatory requirements have been identified.

Following implementation of the MR, the licensee continued to monitor spurious trips of the Rosemount trip units as documented in the Transient Trips Log. On June 31, 1990, the licensee issued CR 90-0597 that documented the failure of MR 88-0118 to correct the problems with the spurious trips.

In a September 15, 1983, letter from Rosemount to the Tennessee Valley Authority, Rosemount documented that the power supply on-off cycles will cause these transients, and that "In all cases, there is no way to eliminate the transients from within the trip unit without changing its design. The only reasonable solution is to disable whatever the trip output is driving during switching conditions."

The licensee is still in the process of identifying the corrective actions needed to resolve this issue. Although the unit is in a conservative state when tripped, tripping of the units could potentially cause reactor protective system and/or engineered safeguard feature (ESF) actuations; thus challenging safety systems when not needed.

For this reason, the inspector will continue to track the licensee's corrective action as Inspector Followup Item 458/9110-01.

8. LER Followup (92700)

The following LERs were reviewed to verify that reportability requirements were fulfilled, corrective actions were accomplished, and actions were taken to prevent recurrence.

a. (Closed) LER 88-011: Failure to recognize the as-found condition of a containment isolation valve as inoperable.

On May 3, 1988, containment isolation Valve 1E51*MOV-F078 was discovered to be inoperable because the torque arm key had fallen out of its keyway. The personnel that initially discovered this condition were performing a valve lineup and did not recognize this condition as affecting valve operability.

The licensee inspected the 41 accessible valves, out of the 49 safety-related valves which were similar in design. The valves were inspected for missing torque arm keys and for the tightness of the capscrews that lock the torque arm to the valve stem. Valve SWP*MOV-502A was found to be missing the torque arm key. This valve was stroked in the as-found condition and was verified to operate properly. The key was then replaced. Additionally, the licensee determined that Valve 1E51*MOV-F078 had passed a stroke test during its quarterly operability test. The remaining eight valves were subsequently inspected and no problems were noted.

The inspector reviewed MWO R112336 associated with this event, and verified that the licensee had documented closure of the corrective actions.

To address this issue, the licensee notified all operations personnel, via memorandum dated June 17, 1988, on the importance of consulting with subject matter experts concerning the impact on operability of plant equipment where detailed design information is required. In addition, information was provided during discussion of operator requalification Training Module REQ-431-1, "Related Industry Events/Experience."

It appeared that the licensee had taken appropriate actions to prevent recurrence of this event.

b. (Closed) LER 89-001, Revision 1: Reactor water sample valve isolation due to a blown fuse.

An ESF actuation occurred causing reactor water cleanup (RWCU) sample isolation Valve 1B33*AOV-F019 to automatically isolate. This was apparently caused by instrumentation and control (I&C) technicians working in tight quarters and causing a fuse to blow which deenergized the isolation logic of seven valves. Six of the valves are normally closed; therefore, only one valve actuated.

The licensee reported that the isolation was not recognized as an ESF actuation and, as a result, was overlooked. The initial LER reported that a modification would provide an alarm and annunciation when an isolation occurred. Revision 1 of the LER subsequently reported that a change had been made to OSP-0012, "Daily Log Report," to include verification of the logic every 12 hours.

The inspector reviewed OSP-0012 and verified that Step 61 of Data Sheet 8 required a check of the isolation status lights on Panel 1H13-P622 every 12 hours.

c. (Closed) LER 89-032: Reactor core isolation cooling (RCIC) isolation during performance of an surveillance test procedure (STP) due to personnel error.

An unplanned ESF actuation occurred during the performance of STP-207-4536, "RCIC Isolation - RCIC Steam Line, Flow - High Monthly Channel Functional (E31-N083B, E31-N683A, E31-N690B)," when an I&C technician failed to properly lift a lead. The STP required the lead to be lifted to prevent an isolation from occurring during the test. However, the wrong lead was lifted and the RCIC outboard containment isolation valve closed when the trip signal was initiated.

Upon discovery of the error, operators reset the trip signal, restored the system, and the STP was successfully completed.

The licensee briefed personnel in the I&C department on the event and cautioned them that the utmost attention to detail was required while performing STPs. Technicians involved were counseled on their error. In addition, ADM-0015, "Station Surveillance Test Program," was revised to require that the reader verify that an action is completed prior to signing off a step.

The inspector reviewed Required Reading APM-M-89-468, "RCIC Isolation During Performance of a STP Due to Personnel Error," which briefed the I&C personnel. Additionally, the ADM-0015 revision was reviewed and found to be acceptable.

d. (Closed) LER 89-042, Revision 3: Reactor scram due to a fault on an offsite transmission line.

The main generator tripped, causing a reactor scram, as a result of a fault in the offsite 230-kV line. The fault did not clear because of a faulty relay in the 230-kV switchyard and slow backup relay response. Additionally, during the event, the nonsafety-related 4.16-kV normal switchgear failed to transfer to offsite power, causing the Division III emergency DG to start and restore power to the bus.

This event was reviewed and documented in NRC Inspection Report 50-458/89-47. The report noted that the licensee had taken actions to address this event. In addition, GSU has initiated MR 89-241 to replace the Westinghouse Kv-1 relay with an ITE relay.

e. (Closed) LER 89-044: Unplanned isolation of the RCIC system.

An unplanned ESF actuation occurred as a result of an I&C technician failing to perform the steps of an STP in sequence. STP-207-4539, "RCIC Isolation - RCIC Steam Supply Pressure Low Monthly Channel Functional," required the technician to request an operator reset the isolation signal prior to restoring the removed fuses and lifted leads. The restoration was begun prior to the isolation signal being reset.

This event occurred prior to the licensee's completion of corrective action on LER 89-032 (paragraph 8.c). The corrective actions taken in response to both events appeared to be sufficient. The licensee also trained the I&C personnel on this event.

f. (Closed) LER 90-001: Isolation of an RCIC valve due to human error.

This event was caused by a technician lifting an incorrect lead. The licensee provided the individual with counseling and training on this event was scheduled for all I&C foremen and technicians.

g. (Closed) LER 90-004, Revisions 1 and 2: ESF actuations due to tripping of a Topaz inverter unit.

The plant experienced a partial ESF actuation following an equipment problem with a Topaz inverter. The actuation resulted in the Division II low pressure coolant injection valves unexpectedly stroking open. This was a significant event that was mitigated by the proper operation of in-line check valves.

An NRC augmented inspection team (AIT) was dispatched to investigate the incident and the findings are discussed in NRC Inspection Report 50-458/90-05. This event is also addressed in NRC Inspection Report 50-458/90-04.

The initial LER discussed the evaluation efforts to identify the root cause of the voltage spike on the 125-Vdc bus that resulted in the actuation of the injection valves. Based on these efforts by the licensee, the following corrective actions were implemented:

- The preventive maintenance (PM) instructions for the associated battery chargers were revised.
- The chargers were checked weekly until troubleshooting could be performed during the March 1990 midcycle outage.
- PM instructions were to be developed for the three Topaz inverters that would include checking the trip setpoints.
- Load lists were developed for the inverters and were incorporated into procedures.
- Personnel were to be trained on the procedures and the hardware prior to the startup from the third refueling outage.

Revision 1 to the LER, issued in May 1990, stated that GSU's ongoing evaluation revealed that the high-voltage trip setpoint of the inverter unit had drifted below the equalizer voltage of the charger. This, they reported, was the root cause of the event.

Revision 2 to the LER, issued in January 1991, reported that GSU had concluded that the trip of the inverter unit had been adequately addressed and that replacement or modification of the Topaz inverters was not required. Training of applicable personnel on revised procedures and hardware had been implemented through a diagnostic simulator training scenario that duplicated the event. These actions addressed the AIT conclusions and findings.

h. (Closed) LER 90-008: Reactor scram due to main turbine generator loss of field relay malfunction.

A controlled shutdown was in progress when the unit tripped in response to a generator trip. Protective relay action occurred when a field relay malfunctioned, thus tripping the generator. The relay was reworked and the unit returned to service.

This event was previously reviewed and documented in NRC Inspection Report 50-458/90-08. The report noted that the licensee had compl[illegible] the appropriate corrective actions.

i. (Closed) LER 90-011 and Revision 1: ESF actuations initiated by circuit breaker trip due to a transformer failure.

This event involved the failure of the 13.8-kV/480-Vac 1NJS-X1A auxiliary building transformer that was caused by a faulted condition and resulted in the loss of Load Centers 1NJS-LDC1C and -LDC1D. The resulting breaker trips caused numerous ESF actuations.

This event was previously reviewed, as documented in NRC Inspection Report 50-458/90-08. The report noted that the appropriate corrective actions had been taken.

j. (Closed) LER 90-026: RWCU isolation due to a short circuit during jumper manipulation.

The RWCU system isolated when a wrong terminal was inadvertently touched during jumper installation. This short circuit caused an ESF isolation.

The licensee reported that all systems performed as designed and that this LER would be required reading for applicable maintenance personnel.

k. (Closed) LER 90-029: Safety relief valve (SRV) air supply system removed from service resulting in violation of the TS.

The COF authorized the removal of the SRV air supply system from service and did not recognize that this action also rendered the high pressure core spray (HPCS) suppression pool level transmitters inoperable and would have defeated the automatic HPCS suction transfer function.

The licensee reported that all licensed operators received training on this event, the requirements of TS 3.3.3.b, and the main steam system procedure, which had been revised to provide guidance for SRV air supply shutdown.

The inspector reviewed this LER and determined that the corrective actions appeared adequate for this event. It was also noted by the inspector that the subsequent alertness of the operators resulted in a licensee-identified issue regarding the operability of the automatic depressurization system SRVs which led to a special inspection by the NRC on January 8-10, 1991. That issue is discussed in detail in NRC Inspection Report 50-458/91-04.

l. (Closed) LER 90-046: Isolation of a RCIC system valve because of the failure of a differential temperature switch.

An unplanned ESF actuation occurred when a spurious trip signal was received from the RCIC equipment room high differential temperature instrumentation. This resulted in the RCIC turbine main steam supply line inboard containment isolation valve closing.

The licensee reported that the faulty switch was replaced and a new switch installed, calibrated, and tested. Since the switch was replaced, no further problems have occurred.

m. (Closed) LER 90-047: Reactor scram during turbine valve testing because of a low pressure transient in the electrohydraulic control (EHC) system.

The combined intermediate valves were being tested when an RPS actuation signal was generated on low EHC system pressure. The actuation resulted in a reactor trip.

Corrective actions were reported by the licensee to include the installation of orifices on all emergency trip system (ETS) supply ports to the turbine control and stop valves and the combined intermediate valves. This LER also discussed the installation of a transmitter on the turbine front standard to verify ETS pressure.

These items were reviewed by the inspector at the time of the occurrence of this event, as documented in NRC Inspection Report 50-458/90-34.

9. <u>TMI Action Plan (NUREG-0737) Requirement Followup (TI 2515/065)</u>

(Closed) Item II.E.4.2.(7): Containment Isolation Dependability - Radiation Signal on Purge Valves

a. <u>Item Discussion</u>

Item II.E.4.2.(7) requires that containment purge and vent isolation valves close on a high radiation signal.

The RBS Updated Safety Analysis Report (USAR) states, in Section 6.2.4.3.7, that "the containment purge supply and exhaust lines are automatically isolated on high radiation. This isolation is required in addition to isolation on diverse containment isolation signals per Position 1." Additionally, Table 6.2-40 specifies the valves that are required to meet this requirement.

NUREG-0989, "Safety Evaluation Report Related to the Operation of River Bend Station," concluded that "the applicant has provided a containment high radiation signal for the automatic isolation of containment purge valves to satisfy the standard review plan section 6.2.4 and NUREG-0737 Item II.E.4.2 requirement for automatic isolation, on high radiation signal, of all lines that provide an open path from the primary containment to the environs."

The safety evaluation report also stated that the staff concluded that the applicant has complied with the requirements of NUREG-0737 for this item.

b. Verification of Installation

The inspector reviewed the following system diagrams and manuals:

- PID-22-1B - System 403, Heating, Ventilation, and Air Conditioning (HVAC) - Containment Building
- 12210-EK-15K-3 - Radiation Monitoring - Reactor Building
- CH-12210-2032 - "Control System Description for Reactor Plant Ventilation Containment/Drywell Purge"
- ADM-0036 - "Containment Purge Information"
- 3247.250-329-016.c.3 - "GA Technologies - Area Monitors Equipment Manual"
- SOP-59 - "Containment HVAC System (Sys #403)"

The radiation monitors which fulfill the detection and actuation function for purge isolation are 1RMS*RE21A (RE-21A) and 1RMS*RE21B (RE-21B). The inspector walked down the accessible portions of the radiation monitor trains and determined that they appeared to be installed in accordance with the vendor manual and the appropriate plant drawings.

Based on the reviews performed by the inspector, it appeared that the installation meets the licensee's commitments, as specified by the USAR, and the NRC's approval of this item, as specified by NUREG-0989.

c. Control of Equipment Changes

The RBS was constructed following the requirements for modifications to meet the TMI Action Plan. The containment isolation design was licensed with the action plan items already in place. Therefore, approval and control of equipment changes is not applicable for this review.

d. Verification of As-Built Drawings

As discussed above, the inspector verified that the as-built system matched the associated drawings. The specific drawings reviewed were PID-22-1B, 12210-EK-15K-3, and the vendor manual drawings. No discrepancies were noted.

e. Verification of Procedures

The inspector reviewed completed copies the following procedures:

- STP-000-0001 - "Daily Operating Logs," for September 1, 1990, January 24 and March 8, 1991
- STP-257-4201, "RMS - Primary Containment Purge Isolation Radiation - High Activity Monitor, 18 Month Channel Calibration; 18 Month LSFT (1RMS*RE21A)," for April 28, 1989, and September 17, 1990
- STP-257-4202, "RMS - Primary Containment Purge Isolation Radiation - High Activity Monitor, 18 Month Channel Calibration; 18 Month LSFT (1RMS*RE21B)," for April 12, 1989 and August 27, 1990
- STP-257-4501, "RMS - Primary Containment Purge Isolation Radiation - High Activity Monitor, Monthly Channel Functional (1RMS*RE21A)," for September 9 and December 26, 1990
- STP-257-4502, "RMS - Primary Containment Purge Isolation Radiation - High Activity Monitor, Monthly Channel Functional (1RMS*RE21A)," for July 19 and December 27, 1990

The inspector reviewed the above procedures to ensure that they met the requirements of TS Surveillance Requirement 4.3.2-1.1.c for: channel check, channel functional, and channel calibration. The inspector noted that the surveillances had been performed on a routine basis to maintain the equipment operable and that the equipment was in calibration. The inspector noted that the monitors were documented to be operable in the as-found condition during each surveillance. This indicated that the equipment is reliable.

f. Verification of Training

The inspector reviewed personnel training associated with the maintenance of the system. The training reviewed included the wide-range gas monitor, digital radiation monitor, and RM-11 computer courses.

Recent [illegible]s were reviewed and it was verified that the work had been performed by trained individuals. The inspector noted that maintenance and surveillance performed on the system utilized appropriate documentation and equipment, and that instrumentation was in calibration at the time of the performance.

g. Verification of Preoperational Testing

The inspector reviewed the following preoperational tests performed on the system:

- 1-PT-511-1 - "Digital Radiation Monitoring System Preoperational Test"
- 1-G-CAL-12 - "Instruments and Control Component and Circuit Installation Checkout"
- 1-G-EE-14 - "Category I Molded Case Circuit Breakers"
- 1-G-CAL-04 - "Category I Survey of Generic Tests"
- 1-G-CAL-01 - "Instrument of Control Component Checkout Calibration"

All tests, related to RE-21A and RE-21B, passed their acceptance criteria during initial testing with the exception of Test Exceptions TE-73 and TE-74 to 1-PT-511-1. These test exceptions were cleared and appropriate testing was accomplished. The inspector verified that adequate testing appeared to have been accomplished.

In addition to this testing, the STPs referenced in paragraph 9.e (above) were also performed prior to initial licensing.

h. Verification of Equipment Calibration

The inspector reviewed the completion documents for STP-257-4201 and STP-257-4202 that implement the 18-month channel calibrations for RE-21A and RE-21B, respectively. These instruments were found to be within calibration during each surveillance interval for the life of the plant.

The inspector also reviewed the completion documents for STP-257-4501 and STP-257-4502 which implement the monthly channel functional testing for RE-21A, and RE-21B, respectively. The channels were found to be operable during each surveillance interval that the inspector reviewed. This included each STP performance from January 1990 to the present.

In addition, the inspector reviewed a portion of the maintenance history for RE-21A and RE-21B. No trends or major items were noted that would question the operability of the system. These observations indicated that the system was reliable and remained in calibration.

i. Verification of Equipment Operability

During walkdowns of the system, the inspector noted that the system was operating. Control room logs are reviewed on a regular basis by the inspectors to verify that station equipment is operable. Additionally, as required by the TS, the STPs referenced in paragraphs 9.e, 9.g, and 9.h (above) are performed to verify the operability of the system. All of these indicators show that the system is now operable and should operate reliably.

j. Verification of Operational Procedures

The inspector reviewed SOP-0059 and ADM-0036, the above referenced STPs, and RPP-0005, "Posting of Radiologically Controlled Areas." All of these procedures addressed the operation of this system and have been reviewed and approved by the licensee for use.

10. Exit Interview

An exit interview was conducted with licensee representatives identified in paragraph 1 on March 28, 1991. During this interview, the inspectors reviewed the scope and findings of the report. The licensee made two commitments involving the control rod drive HCUs, as discussed in paragraph 3.b. The licensee did not identify as proprietary, any information provided to, or reviewed by, the inspectors.

Attachment

Acronyms and Initialisms

ADM - administrative procedure
AIT - augmented inspection team
AWG - American wire gauge
COF - control operating foreman
CR - condition report
dc - direct current
DG - diesel generator
EHC - electrohydraulic control
ESF - engineered safeguard feature
ETS - emergency trip system
GE - General Electric
GSU - Gulf States Utilities
HCU - hydraulic control unit
HPCS - high pressure core spray
HVAC - heating, ventilation, and air conditioning
I&C - instrumentation and control
kV - kilovolt
LER - licensee event report
MR - modification request
MWO - maintenance work order
OSP - operations section procedure
PEP - plant engineering procedure
PM - preventive maintenance
psid - pounds per square inch differential
RBNG - River Bend Nuclear Group
RBS - River Bend Station
RPP - radiological protection procedure
RCIC - reactor core isolation cooling
RPS - reactor protection system
RWCU - reactor water cleanup system
SOP - system operating procedure
SRV - safety relief valve
SS - shift supervisor
SSW - standby service water
STA - shift technical advisor
STP - surveillance test procedure
SWP - service water piping
TMI - Three Mile Island
TS - Technical Specification
USAR - updated safety analysis report
Vac - alternating current voltage
Vdc - direct current voltage