



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

Report Nos.: 50-327/92-11 and 50-328/92-11

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

Docket Nos : 50-327 and 50-328 License Nos.: DPR-77 and DPR-79

Facility Name: Sequoyah Units 1 and 2

Inspection Conducted: April 8 through May 5, 1992

Lead Inspector: *Paul Kellogg for*  
W. E. Holland, Senior Resident Inspector

5/11/92  
Date Signed

Inspectors: S. M. Shaeffer, Resident Inspector  
R. D. McWhorter, Resident Inspector

Approved by: *Paul Kellogg*  
Paul J. Kellogg, Chief, Section 4A  
Division of Reactor Projects

5/11/92  
Date Signed

### SUMMARY

#### Scope:

This routine resident inspection was conducted on site in the areas of plant operations, plant maintenance, plant surveillance, evaluation of licensee self-assessment capability, licensee event report closeout, and followup on previous inspection findings. During the performance of this inspection, the resident inspectors conducted several reviews of the licensee's backshift or weekend operations.

**Results:**

In the Operations functional area a violation was identified for failure to follow and/or inadequate procedures resulting in a loss of configuration control of the Spent Fuel Pit Coolant System. The loss of configuration control resulted in wetting down of three plant employees during maintenance activities on Unit 2 associated with positioning of the reactor vessel head (paragraph 3.c.(2)).

In the Maintenance functional area a non-cited violation was identified for failure to maintain Reactor Coolant System foreign material exclusion controls which resulted in an inflatable pipe plug being found a Unit 2 hot leg (paragraph 4.c).

In the Maintenance functional area an unresolved item was opened in regard to the determination of the root cause and corrective actions for a configuration control problem where an instrument isolation valve was found open. This condition resulted in a leak of contaminated water into the Unit 2 Refueling Water Storage Tank moat (paragraph 3.c.(1)).

Review of licensee performance continued during the second half of the Unit 2 Cycle 5 outage (paragraph 3.h). Conclusions were as follows:

**Operations -** Operator performance for the Unit 1 forced and Unit 2 planned outage activities continued to be good, with the exception of a problem in Spent Fuel Pit Coolant System configuration control. A lack of attention to detail was noted with regard to operator errors discussed in paragraphs 3.a and 5.a. Operator response to the Unit 1 reactor trip, safety injection, and subsequent restart was very good. A continuing strength was identified with regards to the preparation and control of Reactor Coolant System reduced inventory operations. The evolutions were accomplished in an excellent manner.

**Radiological Controls -** Performance in this area continues to be improved with regard to similar evolutions performed during the Unit 1 Cycle 5 refueling outage. Performance for the steam generator eddy current/shot peening work, which was completed during this period showed significant improvement and resulted in a person-rem expenditure well below projected dose. However, some poor work practices discussed in paragraphs 3.c.(1) and 3.d resulted in additional dose and personnel contaminations.

**Maintenance/Surveillance -** Outage and surveillance activities associated with the Unit 2 Cycle 5 refueling outage continued to generally be accomplished in accordance with the schedule. The as left containment integrated leak rate test appeared to be accomplished in a satisfactory manner.

Engineering/Technical Support - Overall engineering and technical support for outage activities continued to be good. However, an event involving Unit 2 Main Steam check valves (paragraph 4.d) indicated a lack of attention to detail during past outages by engineering and/or maintenance personnel with regard to the maintenance activities associated with the check valve packing glands.

Safety Assessment/Quality Verification - Accountability for outage activities at lower management levels continues to be good. However, senior management attention was still warranted in order to instill attention to detail at lower supervisory levels and among craft personnel.

In the Safety Assessment/Quality Verification functional area, a continuing strength was identified with regards to the post trip review process (paragraph 6.c).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*J. Bynum, Vice President, Nuclear Operations
- \*J. Wilson, Site Vice President
- \*R. Beecken, Plant Manager
- \*L. Bryant, Maintenance Manager
- \*M. Cooper, Site Licensing Manager
- \*M. Cutlip, Site Coordinator, Maintenance Support
- \*T. Flippo, Site Quality Assurance Manager
  - J. Gates, Technical Support Manager
- \*C. Kent, Radiological Control Manager
- \*M. Lorek, Operations Superintendent
- \*P. Lydon, Operations Manager
- \*M. Meade, Licensing Engineer
- \*P. Mincy, Unit Operator
- \*R. Newby, Site Representative, Concerns Resolution
- \*J. Proffitt, Licensing Engineer
  - R. Rausch, Modifications Manager
  - J. Smith, Regulatory Licensing Manager
- \*R. Thompson, Compliance Licensing Manager
- \*P. Trudel, Nuclear Engineering Manager
  - J. Ward, Engineering and Modifications Manager

#### NRC Employees

- B. Wilson, Chief, DRP Branch 4
- \*P. Kellogg Chief, DRP Section 4A

\* Attended exit interview.

Other licensee employees contacted included control room operators, shift technical advisors, shift supervisors and other plant personnel.

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

On April 8, the resident inspectors met with the new Engineering and Modifications Manager, Jerry Ward for an introductory discussion. The Engineering and Modifications Manager reports directly to the Site Vice President. This position had been vacant for over a year resulting in the Nuclear Engineering Manager and the Modifications Manager reporting to the Site Vice President. Mr. Ward who has been assigned to his new

management position since April 6, provided some background information on his experience. The residents provided some background information on their perspective of Sequoyah Plant performance and both parties agreed to maintain an ongoing professional dialogue with regard to plant issues.

On May 4 through May 6, the NRC Region II Section Chief, Paul J. Kellogg visited the Sequoyah Nuclear Plant. Mr. Kellogg toured the Unit 2 containment with inspectors and facility personnel after completion of refueling/maintenance activities, toured the plant with inspectors, attended the resident inspector monthly exit meeting, and met with licensee management on various issues.

## 2. Plant Status

Unit 1 began the inspection period in MODE 5 with maintenance in progress to repair defects in the feedwater lines. Maintenance was completed, and the unit entered MODE 4 at 7:59 a.m. on April 14. Startup continued and the unit entered MODE 3 at 8:48 a.m. on April 15, and MODE 2 at 9:57 p.m. on April 17. Startup was completed successfully and the unit entered MODE 1 at 3:45 a.m. on April 18. Power ascension continued, and the unit reached full power on April 22. The unit operated at full power until April 28 when an automatic reactor trip occurred. The trip is further discussed in paragraph 3.f.(4). At 10:26 p.m. on April 29 with the unit in MODE 3, an inadvertent Safety Injection (SI) occurred when the steam dump valves failed open. The SI shut the MSIVs and terminated the excess steam demand. The SI is further discussed in paragraph 3.f.(5). Following repairs to correct problems causing the reactor trip and the SI, Unit 1 entered MODE 2 at 5:42 p.m. on May 2. At the end of the inspection period, Unit 1 was in MODE 1 at approximately full power.

Unit 2 began the inspection period in day 25 of the Cycle 5 refueling outage with all fuel removed from the vessel, and regularly scheduled outage maintenance activities in progress. On April 11, the unit entered MODE 6, and fuel reload began. Refueling of the reactor was completed on April 13. From April 18 until April 22 the reactor vessel was drained to midloop level for maintenance. This reduced inventory operation is further discussed in paragraph 3.g. The reactor head was installed, and the unit entered MODE 5 at 1:17 a.m. on April 20. After completion of RCS sweeps and vents, a CILRT was conducted between April 27 and 29. At the end of the inspection period, Unit 2 was in MODE 5 with scheduled outage maintenance continuing.

### 3. Operational Safety Verification (71707)

#### a. Daily Inspections

The inspectors conducted daily inspections in the following areas: control room staffing, access, and operator behavior; operator adherence to approved procedures, TS, and LCOs; examination of panels containing instrumentation and other reactor protection system elements to determine that required channels are operable; and review of control room operator logs, operating orders, plant deviation reports, tagout logs, temporary modification logs, and tags on components to verify compliance with approved procedures. The inspectors also routinely accompanied plant management on plant tours and observed the effectiveness of management's influence on activities being performed by plant personnel.

On April 13, during a routine control room tour, the inspectors identified that the handswitch for the L-B ERCW pump (O-HS-67-440A) was in the pull-to-lock position. No configuration control tags were on the switch. The inspectors questioned operators as to why the condition existed, and operators could not initially identify a specific reason. The handswitch was returned to the automatic position by the operators and the inspector verified compliance with the applicable TS for the pull-to-lock condition. Later the same day, the inspectors were informed that the L-B pump had been taken out of service on April 9, due to a electrical maintenance request. PM 1227 and PM 1766 were both performed later on April 10 under hold order HO-1-92-426. The PMs involved electrical checkout and oil sampling the subject pump.

As a result of the identification by the inspectors, PER SQPER920149 was initiated to resolve what, if any, controls were in place to return the pump back to an operable condition. This issue was still being reviewed by the licensee when the inspection period ended.

The inspectors considered that during shift turnover operator rounds, operators did not appear to have properly questioned the reason for the pump being out of service. 2-PI-OPS-000-023.2, MODES 5-6 CONTROL ROOM UO DUTY STATION TURNOVER SYSTEM STATUS CHECKLIST, Revision 1, Attachment 1, which the operators utilize for control room panel walkdowns, indicated that operators were aware of the pull-to-lock condition. However, the reason for the activity was not appropriately pursued. This was further exhibited by a lack of operator knowledge of any ongoing maintenance activity or the status

of the L-B pumps when questioned by the inspectors. The inspectors considered this condition to be a weakness with regard to attention to detail in the operator shift turnover process.

b. Weekly Inspections

The inspectors conducted weekly inspections in the following areas: operability verification of selected ESF systems by valve alignment, breaker positions, condition of equipment or component, and operability of instrumentation and support items essential to system actuation or performance. Plant tours were conducted which included observation of general plant/equipment conditions, fire protection and preventative measures, control of activities in progress, radiation protection controls, missile hazards, and plant housekeeping conditions/cleanliness.

c. Biweekly Inspections

The inspectors conducted biweekly inspections in the following areas: verification review and walkdown of safety-related tagouts in effect; review of the sampling program (e.g., primary and secondary coolant samples, boric acid tank samples, plant liquid and gaseous samples); observation of control room shift turnover; review of implementation and use of the plan, corrective action program; verification of selected portions of containment isolation lineups; and verification that notices to workers are posted as required by 10 CFR 19.

- (1) On April 8, the inspectors learned of a discovery of an inadvertently opened valve on a level transmitter for the Unit 2 RWST (2-LT-63-52). While inspecting Unit 2 RWST level transmitters for corrosion, technicians found that water was coming out of a disconnected sensing line to the transmitters. The technicians immediately shut the root valve for the line to stop the leak. The leak allowed contaminated water from the RWST to flow into the retaining moat around the tank and fill it to approximately 3 inches (8 cm) deep. Licensee investigations revealed no apparent reason for the inadvertent opening of the valve. The valve had been shut when work began on the transmitters on April 4, and noted shut again on April 6, when other work was performed in the area. During investigations, the licensee initiated a PER to resolve a problem discovered on the delineation of responsibility for the operation of this valve, and similar valves, between the operations and instrument maintenance departments. Inspectors reviewed the subject

PER, and concluded that more information was needed to understand the possible causes of the event and the corrective actions which would be taken to prevent recurrence. At the end of the inspection period, inspectors were continuing to discuss this event and its corrective action with facility management. This issue is identified as an Unresolved Item (327, 328/92-11-01), determination of root cause and corrective actions for a configuration control problem identified when a RWST level instrument isolation valve was found open.

- (2) On April 15, the inspectors were informed of a Unit 2 evolution, in which an undetermined amount of water from the Unit 2 RWST was inadvertently drained into the reactor cavity and vessel. The event occurred while work was in progress to lower the reactor head after refueling, and operations personnel were making verifications for the final head set. With the reactor head suspended approximately two feet (0.6 m) above the flange and vessel level at approximately elevation 701 feet (210 m) (by control room indication), water was observed draining out of the sparger located inside the reactor cavity, along the wall. The sparger is normally utilized during refueling to add refueling water to the refueling cavity. Three personnel working in the area of the reactor vessel flange were sprayed by the water; however, no personnel contaminations occurred. After the water flow was observed, radiological control personnel evacuated the affected area, and the SRO in charge at the refueling floor directed the head be raised to a safe location. A small portion of the reactor head was wetted and the licensee took actions to clean the wetted areas after the RWST water was secured. The head set was then completed. The level in the reactor vessel was determined to have risen approximately 3 to 4 inches (8 to 10 cm) as a result of the event.

The licensee immediately began an event investigation to determine the cause of the event. Initial evaluation indicated that the spent fuel pit coolant system was being aligned to facilitate activities for draining the reactor refueling cavity to the RWST. Due to poor coordination of the activity, inadequate operator turnover, and a failure to follow procedures, at least three valves in the flowpath were left open when required to be shut. The evolution was poorly coordinated in that several different evolution checklists were in progress simultaneously, and signatures for verifying valve positions were being



transferred between the checklists without operators actually verifying the system's valve positions. Additionally, operators involved failed to make a detailed turnover, and failed to complete all steps in the procedure checklists in use.

Immediate licensee corrective actions included operations personnel sampling numerous system lineups and QA independent sampling for accuracy. The results of these samplings supported the conclusion that this loss of configuration control was limited to the Spent Fuel Pit Coolant System. Inspectors monitored licensee action and confirmed that an adequate verification of system configurations was accomplished.

The inspectors also reviewed the procedure, SOI-78.1, SPENT FUEL PIT COOLANT SYSTEM, Revision 41 which was in use at the time of the event. SOI-78.1, Part G provides requirements for dewatering the reactor refueling canal. Step G.IV.A.2 requires verification that valve checklist 78.1G-1 was completed. This step was verified as completed prior to performance of draining evolutions. However, during review of the completed valve checklist 78.1G-1, the inspectors noted that valve position verifications were incomplete in that more than 20 verifications had not been initialed by operators. This incomplete valve lineup directly resulted in a system alignment which allowed the Unit 2 RWST to gravity feed back to the sparger in the refueling cavity. Licensee investigations into the event to determine the root cause were ongoing at the end of the inspection period.

The inspectors reviewed the event with regard to TS 6.8.1, AI-30, NUCLEAR PLANT - INDUCT OF OPERATION, Revision 36, and AI-58, MAINTAINING COGNIZANCE OF OPERATION STATUS - CONFIGURATION STATUS CONTROL, Revision 19. TS 6.8.1 requires, in part, that written procedures shall be established, implemented, and maintained; which includes procedures for configuration control. AI-30, section 7.0 implements assignments of responsibility for all levels of licensed and non-licensed operators. The AI requires, in part, that correct performance of operating activities are accomplished including operational compliance with instructions. AI-58, section 4.1, requires, in part that all levels of licensed and non-licensed operators are responsible for ensuring that configuration control is maintained; however,

A1-58 did not specifically identify configuration control requirements for the Spent Fuel Pit Coolant System, the system involved in the event, during MODEs 5 and 6. Contrary to these requirements, the operators failed to properly use procedure SOI-78.1 and, as a result, failed to maintain configuration control for the spent fuel pit coolant system. This is identified as a violation of TS 6.8.1 for failure to provide for and/or follow procedures which are used to maintain configuration control (328/92-11-02).

The inspectors also noted that configuration control problems were previously identified by the NRC in Inspection Report 92-02. In that report, a non-cited violation was identified for failure to control a normally locked primary water valve in a locked configuration. The licensee had inadequately controlled system configuration via the same procedure utilized in the current event (SOI-78.1).

d. Other Inspection Activities

Inspection areas included the turbine building; diesel generator building; ERCW pumphouse; protected area yard; control room; Unit 1 and 2 containments; vital 6.9 KV shutdown board rooms, 480 v breaker and battery rooms; auxiliary building areas including all accessible safety-related pump and heat exchanger rooms. RCS leak rates were reviewed to ensure that detected or suspected leakage from the system was recorded, investigated, and evaluated; and that appropriate actions were taken, if required. The inspectors routinely independently calculated RCS leak rates using the NRC RCS leak rate computer program specifically formatted for Sequoyah. RWPs were reviewed, and specific work activities were monitored to assure they were being accomplished per the RWPs. Selected radiation protection instruments were periodically checked, and equipment operability and calibration frequencies were verified.

On April 10, an incident occurred where a SG shot peening hose sprayed contaminated SG shot material into the Unit 2 containment building. Two workers were externally contaminated, and three workers received minor uptakes of internal contamination. The facility investigated the incident and concluded that the cause was the improper starting of SG shot equipment during the troubleshooting of an equipment problem. While troubleshooting, operators incorrectly turned on the shot peening equipment with the end probe of the hose exposed, spraying the shot material outside the SG tubes. The facility

initiated procedure changes and reviewed the incident with personnel involved. Shot peening was subsequently completed without further contamination incidents. Also, because of several other minor personnel errors during the same time frame, the facility stopped all containment work for a half-day to allow supervisors time to review this and other incidents with outage personnel throughout the plant. This incident is also discussed in Inspection Report 92-13. The inspectors considered licensee action in response to the incident to be appropriate.

e. Physical Security Program Inspections

In the course of the monthly activities, the inspectors included a review of the licensee's physical security program. The performance of various shifts of the security force was observed in the conduct of daily activities to include: protected and vital area access controls; searching of personnel and packages; escorting of visitors; badge issuance and retrieval; and patrols and compensatory posts. In addition, the inspectors observed protected area lighting, and protected and vital areas barrier integrity.

f. Licensee NRC Notifications

- (1) On April 14, the licensee made a call to the NRC as required by 10 CFR 50.72 concerning the discovery that the Unit 2, loop 3 MSCV, would not close during MODE 6 inspections. The licensee identified that a packing stud was interfering with the swing arm preventing the arm and disc from being able to close without bending the stud. The licensee immediately verified, by visual inspection, that the Unit 1 MSCVs appeared to be unrestricted. Unit 1 was in MODE 5 at the discovery of the event, and was preparing to enter MODE 4 and above operational MODEs. The MSCVs are required to be operable in MODEs 1, 2, and 3. This event, apparent root cause, and licensee corrective actions, are further discussed in paragraph 4.d of this report.
- (2) On April 14, the licensee made a call to the NRC as required by 10 CFR 50.72 concerning an inadvertent ESF actuation. With Unit 2 in MODE 6, a CVI occurred when the power supply breaker to containment radiation monitor 2-RM-90-106 opened/tripped, and interrupted power to the monitor. The loss of power caused the output from the monitor to fail high to make up the CVI initiation logic. The licensee investigated this

event (paragraph 6.b), and could not find any problems with the breaker, or any other apparent causes. The monitor was subsequently returned to service.

- (3) On April 16, the licensee made a call to the NRC as required by 10 CFR 50.72 concerning the discovery of a degraded safety condition found while shutdown. The licensee identified that an operational problem had been identified in the interfacing circuitry for the MDAFW pump breakers and AMSAC. An investigation into the cause of problems identified during simulator training revealed that for certain plant conditions, an inadvertent AMSAC initiation might inhibit breaker operation for six minutes during a loss of offsite power. This was due to the way the AMSAC start signal was designed and installed into the MDAFW pump breaker circuitry, which would cause actuation of the anti-pumping relay during a subsequent loss of offsite power. This anti-pumping relay would prevent the breaker from shutting when automatic EDG load sequencing occurred until the AMSAC signal was discontinued six minutes after initiation. If such a situation was coincident with a failure of the TDAFW pump, a total loss of feedwater could occur.

At the time of the discovery, both units were shutdown. However, a plant startup was in progress on Unit 1. The licensee imposed a 40% limit on Unit 1 power until modifications could be made to the AMSAC circuitry. The inspectors considered this action adequate since the AMSAC system is not enabled until power is greater than 40%. The licensee completed the modifications on April 21, and power ascension continued. The licensee planned to implement modifications to Unit 2 prior to MODE 3 entry.

The licensee conducted an incident investigation (II-S 92-038) into the cause of the incorrect wiring. The licensee concluded that during the engineering design of the change to install the AMSAC system, interdisciplinary design review was inadequate to identify and correct the problem. During 1985, when the design was issued, the facility did not have formal procedures requiring interdisciplinary reviews. These requirements were established in 1986, and additional engineering review controls have been added in later years. In addition to hardware modifications, licensee corrective actions included a review of this incident with engineering personnel to stress the importance of interdisciplinary design reviews, and a check of

five other engineering changes from the same time frame which may have missed such a review. Inspectors considered that licensee investigations and corrective actions were adequate.

- (4) On April 28, the licensee made a call to the NRC as required by 10 CFR 50.72 concerning a trip of the Unit 1 reactor from 100 percent power. The reactor trip was caused by a turbine/generator trip. Following the trip, all systems functioned normally and the unit stabilized in MODE 3 at normal temperature and pressure. Facility investigations revealed that the cause of the turbine/generator trip was the failure of a sudden overpressure relay on the 1B main transformer. The relay caused a ground on the 250 VDC control circuit power supply, which actuated a "186C" protective relay to open the generator output breakers. Eighteen seconds later, the relay initiated a main transformer overpressure signal, which then directly initiated a main generator/turbine trip. The licensee's post trip review is further discussed in paragraph 6.c of this report.
- (5) On April 29, the licensee made a call to the NRC as required by 10 CFR 50.72 concerning a Unit 1 SI while in MODE 2. The unit was preparing for startup following a reactor trip (paragraph 3.f.(4)) when the controller circuitry for the steam dump valves appeared to have failed. The steam dump valves then fully opened, and a sudden drop in steam line pressure occurred. The sudden drop in pressure caused the rate-sensitive low steam line pressure SI to actuate. The SI signal also shut the MSIVs to terminate the excess steam demand. The transient lasted approximately four seconds, during which RCS temperature decreased from 547 to 538 °F (286 to 281 °C), and RCS pressure decreased from 2230 psig to 2170 psig (15.37 to 14.95 MPa). Shutdown rods were withdrawn prior to the SI initiation, and tripped into the core when the reactor tripped as a result of the SI signal. All safety systems performed as designed, and approximately 2300 gallons (8694 liters) of RWST water were injected into the RCS. Operators entered Emergency Procedures and declared a NOUE in accordance with the Emergency Plan. After determination of the cause of the event, operators secured and reset all ESF components. The NOUE was exited at approximately 3:30 a.m. on April 30. The licensee convened an incident investigation team to review this event. The initial

team report was made to the plant safety committee on May 1, and is further discussed in paragraph 6.c of this report.

- (6) On May 3, the licensee made a call to the NRC as required by TS 3.7.11.1 action statement b.2.a) concerning entry into the action statements for TS 3.7.11.1 and 3.7.11.4 due to a leak in the main High Pressure Fire Protection yard piping. The licensee took immediate corrective actions to establish backup fire protection systems, and initiate repairs to the faulted header. At the end of the inspection period, licensee investigations were ongoing into the cause and long term corrective actions for the event. The licensee will make a report on the cause and corrective actions to the NRC within 14 days of the event as required by TS.

g. Reduced Inventory Conditions - Unit 2

Unit 2 entered reduced inventory conditions on April 18, in order to remove SG nozzle dams and complete repair to check valve 63-559. The nozzle dams had been installed earlier during operations with fuel removed from the vessel. RCS level was increased out of reduced inventory condition approximately 77 hours later. Prior to entry into a reduced inventory condition, the inspectors conducted a review of the licensee's responses and implemented actions with regard to the requirements of Generic Letter 88-17, Loss of Decay Heat Removal. No discrepancies were noted during the evaluation. The specific items reviewed before and during reduced inventory operation were:

- Generic Letter 88-17 - The inspectors reviewed the subject letter including the licensee's response to the letter dated January 6, 1989 with supplemental responses dated January 25, February 2, and August 12, 1989.
- Administrative Controls - The inspectors monitored licensee meetings which reviewed the sequence of events for placing the unit in a reduced inventory condition and discussed controls and procedures in effect to establish reduced inventory operation with Operations and Plant Management. Operators received refresher training on GL 88-17 phenomena based on past events within the last three months. The inspectors noted that operations shift turnover briefings focused on operator preparations for reduced inventory operations several days before entering into the reduced inventory condition.

Containment Closure Activity - The licensee's procedures require that the status of the containment configuration be established and verified prior to entering a reduced inventory condition. The inspectors reviewed technical instruction O-TI-OXX-068-001.0, BREACHING CONTAINMENT OR THE REACTOR COOLANT SYSTEM DURING REDUCED INVENTORY OR MID LOOP, Revision 2. This procedure provided controls which specified containment closure actions and allowed for determination of times which containment closure actions and allowed for determination of times which containment closure must be accomplished. The inspectors verified that the TI was being properly implemented.

RCS Temperature - The licensee's procedures provide for at least two incore thermocouples to be maintained available as long as possible while in a reduced inventory condition. The inspectors noted that O-TI-OXX-068-001.0 requires that two exit thermocouples must be connected when the head is on the vessel with visible and audible alarms in the main control room. The inspectors verified that exit thermocouples were operable during reduced inventory operation. During a period where an alarm was not available, the licensee adequately compensated by stationing a dedicated operator to monitor thermocouple indications.

RCS Level Indication - The licensee committed to have at least two independent means of level indication operable while in a reduced inventory condition. The inspectors determined that the licensee had a sightglass monitored by a TV camera with monitors in the control room, a liquid level gauge with readout in the control room, and an ultrasonic level measurement system for midloop indication. The inspectors monitored actual level indications during reduced inventory condition, and verified operability and consistency between indications.

RCS Perturbations - The licensee has established controls to minimize RCS perturbations during reduced inventory operation. These controls are addressed in O-TI-OXX-068-001.0, and require additional operational actions in accordance with their daily requirements for reduced inventory operation. The inspectors reviewed these actions and considered that they implemented appropriate control to minimize RCS perturbation during reduced inventory operation.

RCS Inventory Addition - The licensee requires that a minimum of any two of five water supply sources ('A' or 'B' charging pumps, 'A' or 'B' SI pumps, or gravity feed from the RWST through the RHR suction line to the RCS #4 hot leg) be available during reduced inventory operation. The inspectors verified that charging pumps and gravity feed were available to perform this function.

Nozzle Dams - The licensee uses nozzle dams during inspection and repair of steam generator tubes during refueling outage periods. The nozzle dams were installed after the reactor vessel was defueled. During reduced inventory operation with nozzle dams installed, the licensee had established a vent path through the pressurizer via three openings where code safety valves had been removed. This opening has been determined to be adequate based on the requirements of O-TI-OXX-068-001.0. The inspectors verified that these vent paths were maintained during reduced inventory operations.

Contingency Plans to Repower Vital Busses - The licensee places control on evolutions which would affect switchyard activities in accordance with NS-MI-114, INSTRUCTIONS FOR ACCESS TO THE SWITCHYARD DURING MID-LOOP, Revision 1. The inspectors verified that no work took place in the switchyard during midloop operations. In addition, the inspectors reviewed the electrical power alignments for reduced inventory operation and determined that all emergency diesel generators were operable and that all normal offsite power alignments were in effect and available.

The inspectors observed that licensee management established a new method for oversight of shift operations during the midloop evolution. During the entire duration, a senior plant manager was assigned to monitor senior shift operators. The manager served to ensure that midloop work was being efficiently coordinated and that procedural requirements were being correctly implemented. The inspectors consider that licensee preparation and control of reduced inventory operations was accomplished in an excellent manner and was considered to be a continuing strength in this area.

The inspectors observed a problem in work scope planning for the midloop period. The licensee made a risk-based decision early in the outage to defer work on check valve 63-559 from the core empty midloop period until the midloop period following refueling. The initial



estimates of several hours of extension in the time required for midloop operations to accommodate this work turned out to be inaccurate. The work on 63-559 actually extended the midloop period by approximately one and one-half days beyond the original outage schedule. A more accurate initial estimate of work scope would have allowed licensee management better information to possibly choose other alternatives.

#### h. Outage Functional Area Reviews

During this inspection period, the inspectors focused on review of licensee performance during the middle portion of the Unit 2 Cycle 5 refueling outage in several functional areas. The following conclusions were reached during this period:

Operations - Operator response to the Unit 1 reactor trip, safety injection, and subsequent restart was very good. Operator performance for the Unit 1 forced and Unit 2 planned outage activities declined, as demonstrated by, the problem in the Spent Fuel Pit Coolant System configuration control (paragraph 3.c.(2)); a lack of attention to detail was noted with regard to the configuration control of an ERCW pump handswitch (paragraph 3.a); and in the operation of the 2A-A EDG (paragraph 5.a).

Radiological Controls - Performance in this area continues to be improved with regard to similar evolutions performed during the Unit 1 Cycle 5 refueling outage. Performance for the steam generator eddy current/shot peening work, which was completed during this period showed significant improvement and resulted in a person-rem expenditure well below projected dose. However, some poor work practices resulted in additional dose and personnel contaminations. Two of these activities were the release of contaminated water into the Unit 2 RWST moat (paragraph 3.c.(1)), and the release of SG shot into the lower containment area (paragraph 3.d). Cumulative exposure and personal contamination reports remained well under preplanned radiological controls outage goals at the end of the inspection period.

Maintenance/Surveillance - Outage and surveillance activities associated with the Unit 2 Cycle 5 refueling outage continued to generally be accomplished in accordance with the schedule. The as left containment integrated leak rate test appeared to be accomplished in a satisfactory manner. However, maintenance projections for the time required to repair check valve 63-559 gave inaccurate

information to management which was then used as a basis for a decision to defer the work to the post-refueling midloop operations period. Also, a problem was noted in FME controls which resulted in an inflatable pipe plug being discovered in the Unit 2 RCS hot leg (paragraph 4.e).

Engineering/Technical Support - Overall engineering and technical support for outage activities continued to be good. However, an event involving Unit 2 Main Steam check valves (paragraph 4.d) indicated a lack of attention to detail during past outages by engineering and/or maintenance personnel with regard to the as left configuration after maintenance activities associated with the check valve packing glands.

Safety Assessment/Quality Verification - Accountability for outage activities at lower management levels continues to be good. However, senior management attention was still warranted in order to instill attention to detail at lower supervisory levels and among craft personnel. This observation was based on the events which continue to occur, including those discussed in paragraphs 3, 4, and 5.

Within the areas inspected, one violation was identified.

#### 4. Maintenance Inspections (62703 & 42700)

During the reporting period, the inspectors reviewed maintenance activities to assure compliance with the appropriate procedures and requirements. Inspection areas included the following:

- a. Throughout the inspection period, inspectors monitored licensee maintenance activities associated with the resolution of problems discovered in the ice condenser of both units. The problems consisted primarily of floor slab movement due to ice formation below the floor. These problems and the associated Confirmation of Action Letter (CAL) dated March 23 were discussed in Inspection Reports 92-06 and 92-10. In accordance with item 4 of the CAL, on April 3 the licensee presented their completed action on items 1, 2, and 3 of the CAL at a meeting with NRC management. On April 13, the licensee informed the NRC that all commitments of the CAL had been completed. After conferring with NRC and the staff, the Regional Administrator released the licensee from the CAL. Inspectors entered the Unit 1 ice condenser and verified the completion of actions required prior to return to power operation. The inspectors observed the installation of a monitoring system to detect any possible future

movement of the floor of the ice condenser while the units are at power. As of the end of the inspection period, the licensee had detected slight upward floor movement, and were continuing to monitor this condition. No limits requiring action had been reached. The inspectors consider that licensee corrective actions were adequate to close out this CAL.

- b. From the beginning of the inspection period through April 26, inspectors monitored licensee activities associated with the repair of defects in the feed water transition pieces for all SGs on both units. These problems were discussed in Inspection Reports 92-06 and 92-09. Repairs were completed to Unit 1 feed lines on April 13, and to Unit 2 feed lines on April 26.
- c. On April 10, licensee inspections revealed an item of foreign material in the Unit 2 loop 3 hot leg of the RCS. Investigations revealed the object to be a 4 inch (10 cm) inflatable pipe plug with chain and ring attached. The licensee conducted an investigation (paragraph 6.b) and concluded that the plug had been left in the RHR discharge piping after work had been performed on check valve 2-63-644. The valve had been worked to correct problems found in the seating surface by contractor personnel. The licensee concluded that the cause of leaving the plug in the piping was a combination of poor control of contract services and improper use of configuration and foreign material exclusion logs. Licensee corrective actions included training on contractor control procedures, and revisions to procedures to more clearly specify how pipe plug removal was to be ensured after work completion. The inspectors considered that licensee investigation and corrective actions were appropriate.

Inspectors reviewed TS 6.8.1 and SSP-12.8, FOREIGN MATERIAL EXCLUSION, Revision 1, in regard to the incident. TS 6.8.1 requires, in part, that procedures be established and followed to control maintenance practices. SSP-12.8 implements TS 6.8.1 in that Paragraph 4.3.1 requires, in part, that the FME Control Monitor for the work ensure that all material is accounted for prior to closing the system or component, using (SSP-12.8) Appendix B (FME Accountability Log). Contrary to this requirement, prior to closing the system, the FME Control Monitor for the work did not resolve the fact that the Appendix B (Accountability Log) in use clearly showed the pipe plug remaining in the work zone. This is identified as a violation of TS 6.8.1, in that SSP-12.8 was not followed for proper control of FME in performing repairs to valve 2-63-644 (328/92-11-03). This violation will not be subject to enforcement action because the

licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the Enforcement Policy.

- d. On April 14, the inspectors were informed of a condition on Unit 2 in which the loop 3 MSCV could not be closed during MODE 6 inspections of the valve. The valve could not be closed due to a packing retainer stud extending to a point where it obstructed the movement of the external counterweight swing arm of the affected check valve (2-VLV-1-625). The condition was discovered during augmented inspections of the Unit 2 MSCVs which were required due to problems identified with the Unit 1 MSCVs in October 1991. In order to close the valve, personnel had to dislodge the packing stud from the swing arm with a sledge hammer blow. In addition, the valve's cotter pin and washer arrangement on the end of the check hinge was found to be missing.

The inspectors questioned the licensee on the applicability of the problem to Unit 1, which was, at the time, preparing to enter modes of operation where the valves would be required to function. System engineering performed an evaluation which concluded that there was no potential for interference on the Unit 1 MSCVs based on tolerance measurements taken and discussions with the valve's vendor (Atwood-Morrill). The inspectors reviewed the licensee's conclusions, and visually inspected the one stuck MSCV and all other MSCVs for both units. The inspectors confirmed the licensee's findings that the problem was isolated to the one Unit 2 MSCV, and that adequate clearances appeared to exist on all of the Unit 1 valves.

The licensee initiated an event investigation (II-S-92-035) to determine the root cause of the problem. At the end of the assessment period, the licensee's investigation was still ongoing. Initial conclusions indicated that close, as-left tolerances following replacement of the subject packing stud led to the loss of the installed cotter pin and washer and ultimately the inability of the valve to close without assistance. The inspectors agreed with the draft conclusions of the II; however, the root cause of the event will be further evaluated during the PERP on the event. The inspectors did conclude that this event was indicative of a lack of attention to detail during past outages by engineering and/or maintenance personnel after maintenance activities on the safety-related check valves.

Within the areas inspected, one non-cited violation was identified.

## 5. Surveillance Inspections (61726 &amp; 42700)

During the reporting period, the inspectors reviewed various surveillance activities to assure compliance with the appropriate procedure and requirements. Inspection areas included the following:

- a. On April 15, the inspectors monitored portions of control room activities related to 2-SI-OPS-082-007.A, ELECTRICAL POWER SYSTEM DIESEL GENERATOR 2A-A, Revision 1. The scheduled SI was conducted for the 2A-A EDG and included a non-ambient start, gradual loading, and one hour run. Communications between the control room operator and local EDG operator were good and procedure compliance during the observed activities was well coordinated.

One example of operator inattention to detail was observed; however, during the gradual loading of the diesel. In section 6.2, step 14, of the procedure, the control room operator is required to run the unit to approximately 1 MW and then allow for stabilization for five minutes before raising MWs again. By procedure, the operator tried to raise MWs by actuating O-HS-82-73, the speed controller for the unit. After approximately 15 to 20 seconds, the operator did not receive any indication on the unit MW gage O-EI-82-70A. The operator then tapped the gage and observed the MW indication rise to at least 4 MW. The operator immediately began lowering the speed controller and stabilized the unit at approximately 1 MW. The inspectors attributed the unintentional MW increase to operator inattention to detail with regard to the EDG system's expected responses.

- b. On April 21, the inspectors monitored licensee completion of O-PI-SXX-000-022.0, CALORIMETRIC CALCULATIONS, Revision 3. Unit 1 was at 98% power at the time, and the test was being performed primarily to update the  $\Delta T_0$  values in the Eagle 21 protection system following RTD calibration. The test appeared to be well planned and executed. The licensee had established good procedures for ensuring that the required secondary parameters were measured accurately and reliably. Inspectors reviewed the licensee's procedures, collected data, and calculations. The licensee generally uses detailed and well refined techniques to ensure that the final calorimetric values are as accurate as possible. The inspectors did find one minor error in the calculations which was corrected by the licensee. A feedwater pressure value used for calculations was taken from the last data point on the data sheet instead of using the average

of all collected data. This error had little effect on the final calculation.

- c. On April 28 and 29, the inspectors monitored licensee actions during performance of surveillance instruction 2-SI-SLT-088-156.0, CONTAINMENT INTEGRATED LEAK RATE TEST, Revision 0. The purpose of the instruction was to provide detailed steps to demonstrate the continuing leaktight integrity of the Unit 2 reactor building primary containment. The inspectors monitored licensee actions associated with compilation of data, and evaluation of information which could have provided erroneous information. To ensure the test was free from problems, the licensee assigned a senior manager for test oversight and assisting with coordination between the various organizations involved in the test. Preliminary results of the test indicated that acceptance criteria were met for the as left condition. The inspectors also discussed test results with engineering personnel and concluded that test results appeared to be satisfactory. The licensee will submit the final test results to the NRC as required within the next 90 days.

Within the areas inspected, no violations were identified.

#### 6. Evaluation of Licensee Self-Assessment Capability (40500)

During this inspection period, selected reviews were conducted of the licensee's ongoing self-assessment programs in order to evaluate the effectiveness of these programs. The inspectors specifically focused on several of the licensee's incident investigations during the inspection period.

- a. On April 15, the inspectors attended a licensee PERP meeting on Incident Investigation II-S-92-031. The issue involved a failure to revoke a S-1 medical clearance, which resulted in the potential for an unqualified employee to access to protected/vital areas. The employee's S-1 medical clearance was invalid due to a medical problem which was identified to the licensee on March 5. However, due to a communications problem between the group knowledgeable of the problem and the medical doctor who pulls the S-1 clearance, the employee had the potential to access protected and vital areas, although no actual access occurred. The team determined that a lack of procedure controls and informal communication were root causes for the event. Management was noted to expand corrective actions to include periodic audit by the QA organization and more frequent inactive badge reviews by security. The inspectors considered that

the II team adequately addressed the event's root cause and potential corrective actions.

- b. On April 22, the inspectors attended a licensee PERP meeting on Incident Investigation II-S-92-036. The issue involved the initiation of a Unit 2 CVI due to a loss of power to a radiation monitor (paragraph 3.f.(2)). Licensee investigation failed to reveal any conclusive causes for the opening of the breaker to the radiation monitor. Additional testing for the breaker supplying the radiation monitor was identified at the meeting, but the testing had not been completed at the end of the inspection period.

At the same meeting, II-S-92-34 was also discussed. The issue involved the discovery of foreign material in the Unit 2 RCS loop 3 hot leg (paragraph 4.c). The licensee concluded that the cause of leaving the plug in the piping was a combination of poor control of contract services, and improper use of configuration control and FME logs.

The inspectors considered that the II team adequately addressed the root causes of both events and potential corrective actions.

- c. On April 29, 30 and May 1, the inspectors attended the licensee post trip review safety committee meetings which discussed the cause and corrective actions for the Unit 1 reactor trip and SI events which occurred on April 27 and 29 respectively.

The April 27 reactor trip was determined to be caused by a ground in the sudden overpressure relay of the Unit 1 B phase main transformer. The relay caused an actuation of other relays resulting in a 100% load rejection followed approximately 18 seconds later by a turbine trip/reactor trip initiation. The reviews discussed the sequence of events related to the reactor trip event including all primary parameters associated with the event. Corrective actions were fully discussed, and MODE restraints were assigned to each.

The April 29 SI event was determined to be caused by a secondary pressure transient resulting from a momentary actuation of all 12 steam dumps. The licensee reviewed information from the event in detail and concluded that the steam dump system had caused all dumps to fully open without a valid initiating signal. The system was inspected, but no problems were found. The licensee then replaced all portions of the system from the detector to the valves, except installed wiring. Inspectors reviewed licensee action and concluded

that the licensee adequately investigated the event and took appropriate action.

The inspectors considered that both the reactor trip and the SI incident investigation team reviews were thorough and comprehensive. This review again demonstrated a continuing strength in the incident investigation process.

Within the areas inspected, no violations were identified.

7. Licensee Event Report Review (92700)

The inspectors reviewed the LERs listed below to ascertain whether NRC reporting requirements were being met and to evaluate initial adequacy of the corrective actions. The inspector's review also included followup on implementation of corrective action and/or review of licensee documentation that all required corrective action(s) were either complete or identified in the licensee's program for tracking of outstanding actions.

- a. (Closed) LER 327/91-21, Failure to Comply with Technical Specifications Because of the Deletion of a Surveillance Requirement During a Procedure Revision. This issue involved deletion of a TS required surveillance from a procedure during revision in 1988 due to personnel error. Corrective actions included review of maintenance history for battery discharges to assure batteries received appropriate testing as required. Also, all related battery surveillance instructions were revised to require the subject testing. The inspectors verified that the surveillance test instructions were revised. The licensee also intends to pursue a routine TS change to eliminate the TS requirement. The inspectors verified that this change was identified for submittal in the licensee's administrative process.
- b. (Closed) LER 328/91-07, Essential Raw Cooling Water Test Connection Valves Necessary for Containment Integrity Were Discovered to be Partially Open for an Indeterminate Reason. This event involved the finding of three ERCW test connection valves open when they were required to be shut for containment integrity. The valves were returned to the correct position, and the importance of the correct positioning of locked valves was reviewed with operations personnel. No specific cause for the valves being open was identified, and as a result, the license did not commit to any long term corrective actions.



- c. (Closed) LER 328/92-02, Limiting Condition for Operation 3.0.3 Entry Because of Inoperable Number 2 Cold Leg Accumulator Level Indication. The event involved a technician's error in incorrectly shorting across the leads of a bistable card causing a loss of power to numerous control room indications, including the only operable indication for number 2 cold leg accumulator level. Licensee corrective action included immediate restoration of power, disciplinary action for the involved individuals, and a review of periodic training needs.

Within the areas inspected, no violations were identified.

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

- a. (Closed) URI 327, 328/90-03-01, MOD Switching Affecting Control Room Annunciators. The issue involved observation of control room annunciator alarms by an inspector during switching operations. A CAQR (SQP900042) was initiated to review this issue. The CAQR identified the problem as electromagnetic interference which was induced on the annunciator bus by the MOD switching. The inspectors reviewed the corrective actions associated with the CAQR. These actions included replacement of the annunciator system with a new system which was designed to correct spurious alarm problems due to MOD induced EMI. The new system has been replaced on Unit 1 and was being replaced on Unit 2 during this inspection period.
- b. (Closed) VIO 327, 328/90-22-01, and VIO 327, 328/90-34-03, Exceeding Overtime Limits On Numerous Occasions Without Proper Authorization. This issue involved numerous occasions identified by the NRC where facility personnel worked overtime exceeding the requirements of AI-30, NUCLEAR PLANT CONDUCT OF OPERATIONS, without obtaining proper management approval. Licensee corrective actions included revisions to controlling procedures, reviews with all site personnel on procedural and TS requirements, QA audits, and site vice president review of all overtime limitation exceptions. The inspectors reviewed the implementation of licensee commitments, and found that the licensee's corrective actions had been implemented.

The inspectors reviewed the amount of overtime and the status of overtime exemptions for operations personnel during the ongoing Unit 2 Cycle 5 outage. Payroll records for operations personnel for the week of March 23 were selected and reviewed. Inspectors found that

the amount of overtime was generally less than those reported by Inspection Report 90-34. These facts support statements by licensee management that planning for the use of personnel during the Unit 2 Cycle 5 outage is improved over past outages.

Inspectors reviewed several Overtime Limitation Exception Reports for operations personnel who had exceeded TS limits on the amount of overtime during the week of March 23. It was found that the reports required when individuals exceeded the 72 hour in 7 days limit had been completed. However, for at least one individual, the reports had been approved for exceeding the 72 hour in 7 days limit over a week later than the actual dates on which the excessive overtime was worked. Additionally, approval was not specifically granted for the same individual to exceed the 24 hour in 48 hour limit. This individual was filling the critical position of refueling supervisor (SRO). Licensee management investigated the problem and determined that a lack of communication between shift clerks and operations management had resulted in a failure to closely track overtime exemptions operations personnel who left their normal shifts for outage support. Management had planned and approved the overtime, but the responsibility to ensure the forms were filled out in advance was misunderstood by the shift clerks. To prevent further misunderstandings, the Operations Manager issued a memorandum to shift clerks to more clearly define their responsibilities.

The inspectors reviewed SSP-1.7, and found that it was weak in that it did not clearly specify a requirement for the reports to be approved in advance. Interviews with licensee personnel confirmed that all were aware that the intent of the procedure was to ensure that overtime exemptions were approved in advance. In order to prevent possible future confusion on this issue, the licensee committed to clarify SSP-1.7 in a future revision to specify the requirement for exemptions to be approved in advance.

Inspectors also noted that several of the reports for personnel outside the operations department had been completed for more than three individuals simultaneously. Upon further investigation, it was learned that senior site management had noted this problem and taken action several weeks earlier for correction.

Within the areas inspected, no violations were identified.

## 9. Exit Interview

The inspection scope and results were summarized on May 5, with those individuals identified by an asterisk in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. Although proprietary material was reviewed during the inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Described and Reference</u>
327; 328/92-11-01	Unresolved item in regard to the determination of the root cause and corrective actions for a configuration control problem where an instrument isolation valve found open (paragraph 3.c.(1))
328/92-11-02	Violation for failure to follow and/or inadequate procedures resulting in a loss of configuration control of the Spent Fuel Pit Coolant System (paragraph 3.c.(2))
328/92-11-03	Non-cited violation for failure to maintain Reactor Coolant System foreign material exclusion controls (paragraph 4.c)

Strengths and weaknesses summarized in the results paragraph were discussed in detail.

Licensee management was informed of the items closed in paragraphs 7 and 8.

## 10. List of Acronyms and Initialisms

AI	- Administrative Instruction
AMSAC	- ATWS (Anticipated Transient Without Scram) Mitigation System Actuation Circuitry
CAL	- Confirmation of Action Letter
CAQR	- Condition Adverse to Quality Report
CFR	- Code of Federal Regulations
CILRT	- Containment Integrated Leakage Rate Test

CVI	- Containment Ventilation Isolation
DRP	- Division of Reactor Projects
EDG	- Emergency Diesel Generator
EMI	- Electro-magnetic Interference
ERCW	- Essential Raw Cooling Water
ESF	- Engineered Safety Feature
FME	- Foreign Material Exclusion
GL	- Generic Letter
HO	- Hold Order
II	- incident Investigation
KV	- Kilovolt
LC	- Limiting Condition for Operation
LE	- Licensee Event Report
MDAFW	- Motor Driven Auxiliary Feed Water
MOD	- Motor Operated Disconnect
MPa	- Mega-Pascal
MSCV	- Main Steam Check Valve
MSIV	- Main Steam Isolation Valve
MW	- Megawatts
NOUE	- Notice of Unusual Event
NRC	- Nuclear Regulatory Commission
NRR	- Nuclear Reactor Regulation
PER	- Problem Evaluation Report
PERP	- Plant Evaluation Review Panel
PI	- Periodic Instruction
PM	- Periodic Maintenance
PSIG	- Pounds per Square Inch Gauge
QA	- Quality Assurance
RCS	- Reactor Coolant System
RHR	- Residual Heat Removal
RTD	- Resistance Temperature Detector
RWP	- Radiation Work Permit
RWST	- Refueling Water Storage Tank
SG	- Steam Generator
SI	- Surveillance Instruction
SOI	- System Operating Instruction
SRO	- Senior Reactor Operator
SSP	- Site Standard Practice
TI	- Test Instruction
TS	- Technical Specifications
TVA	- Tennessee Valley Authority
URI	- Unresolved Item
VDC	- Volts Direct Current
VIO	- Violation