UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323

Report Nos.: 50-327/88-17, 50-328/88-17

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

Docket Nos.: 50-327 and 50-328 License Nos.: DPR77 and DPR-79

Facility Name: Sequoyah Units 1 and 2

Inspection Conducted: February 12, 1988 thru February 26, 1988

Project Engineers: _____ March 22, 1988
J. Brady, Project Engineer Date signed
R. Carroll, Project Engineer
G. Hunegs, Project Engineer
T. Powell, Project Engineer

Shift Inspectors: P. Harmon, Shift Inspector
D. Loveless, Shift Inspector
W. Poertner, Shift Inspector
G. Humphrey, Shift Inspector
W. Bearden, Shift Inspector
K. Ivey, Shift Inspector

Shift Manager Approval: _____ March 22, 1988
K. Jenison, Shift Manager Date Signed

_____ March 22, 1988
M. Branch, Shift Manager Date Signed

## Summary

Scope: This announced inspection involved onshift and onsite inspections by the NRC Restart Task Force. The majority of expended inspection effort was in the areas of extended control room observation and operational safety verification including operations performance, system lineups, radiation protection, and safeguards and housekeeping inspections. Other areas inspected included maintenance observations, review of previous inspection findings, follow-up of events, review of licensee identified items, and review of inspector follow-up items. During this period there was extended control room and plant activity coverage by NRC inspectors and managers.

Results: One violation was identified, 327,328/88-17-01; Failure to follow procedure - three examples. (paragraphs 10 and 11). An additional example of previous violation 327,328/87-78-01 was also identified (paragraph 3.b)

REPORT DETAILS

1. Persons Contacted

Licensee Employees

H. Abercrombie, Site Director
J. Anthony, Operations Group Supervisor
R. Buchholz, Sequoyah Site Representative
J. Bynum, Assistant Manager of Nuclear Power
M. Cooper, Licensing Supervisor
H. Elkins, Instrument Maintenance Group Manager
R. Fortenberry, Technical Support Supervisor
J. Hamilton, Quality Engineering Manager
*M. Harding, Licensing Group Manager
*G. Kirk, Compliance Supervisor
J. La Point, Deputy Site Director
L. Martin, Site Quality Manager
R. Olson, Modifications
R. Beecken, Maintenance Superintendent
R. Pierce, Mechanical Maintenance Supervisor
R. Prince, Radiological Control Superintendent
*H. Rogers, Plant Operations Review Staff
D. Jeralds, Electrical Maintenance Supervisor
E. Sliger, Manager of Projects
*S. Smith, Plant Manager
J. Sullivan, Plant Operations Review Staff Supervisor
B. Willis, Operations and Engineering Superintendent

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on March 9, 1988, with those persons indicated in paragraph 1. The Startup Manager described the areas inspected and discussed in detail the inspection findings listed below. The licensee acknowledged the inspection findings and did not identify as proprietary any of the material reviewed by the inspectors during the inspection.

The following new items were identified:

Violation (VIO) 327,328/88-17-01: Failure to follow procedure when returning resistance temperature detectors to service following cross-calibration, and maintenance activities associated with the volume control tank divert valve that were not adequately described or implemented. (paragraphs 10 and 11)

Unresolved Item (URI) 327,328/88-17-02: Entry into Technical Specification (TS) Limiting Conditions for Operation (LCO) without the licensee's knowledge. (paragraph 3)

An additional example of Violation 327,328/87-78-01; failure to maintain plant staff overtime limits.

NOTE: A list of abbreviations used in this report is contained in paragraph 14.

3. Sustained Control Room Observation (71715)

The inspectors observed control room activities and those plant activities directed from the control room on a continuous basis for the entire period of this report. The observation consisted of one shift inspector per shift supported by one shift manager per shift and other Office of Special Projects (OSP) management.

a. Control Room Activities Including Conduct of Operations

The inspectors reviewed control room activities to determine that operators were attentive and responsive to plant parameters and conditions; operators remained in their designated areas and were attentive to plant operations, alarms and status; operators employed communication, terminology and nomenclature that was clear and formal; and operators performed a proper relief prior to being discharged from their watch standing duties.

b. Control Room Manning

The inspectors reviewed control room manning and determined that Technical Specification (TS) requirements were met and a professional atmosphere was maintained in the control room. The inspectors found the noise level and working conditions to be acceptable. The inspectors observed no horse-play and no radios or other non-job related material in the control room. Operator compliance with regulatory and TVA administrative guidelines were reviewed. No deficiencies were identified.

In addition, the control room appeared to be clean, uncluttered, and well organized. Special controls were established to limit personnel in the control room inner area.

An inspector reviewed the shift schedule for the purpose of determining operations personnel overtime actually worked. Three of six operating crews were reviewed. It was identified that one Unit Operator (Unit 1 Licensed Reactor Operator) had not received a break of at least 8 hours between work periods without prior approval of the Plant Manager or his deputy as required by AI-30, Rev. 12, Conduct of Operations. Specifically, the individual worked until 11:49 p.m. on February 22 and was instructed to return for work at 7:00 a.m. on February 23. This failure to maintain plant staff overtime limits is a further example of prior violation 327,328/87-78-01.

c. Routine Plant Activities Conducted In or Near the Control Room

The inspectors observed activities which require the attention and direction of control room personnel. The inspectors observed that necessary plant administrative and technical activities conducted in or near the control room were conducted in a manner that did not compromise the attentiveness of the operators at the controls. The licensee has established a shift engineer office in the control room area in which the bulk of the administrative activities, including the authorized issuance of keys, take place. In addition, the licensee has established hold order (HO), work request (WR), surveillance, and modification matrix functions to release the licensnd operators from the bulk of the technical activities that could impact the performance of their duties. These matrixed activities were transformed into the Work Control Center (WCC) which is located in the Technical Support Center (TSC) spaces.

d. Control Room Alarms and Operator Response to Alarms

The inspectors observed that control room annunciator and alarm evaluations were performed utilizing approved plant procedures. Control room alarms were generally responded to in the horseshoe area with adequate attention by the operators to the alarm indications. Alarms outside of the horseshoe area had longer response times by the operators. Control room operators appeared in some cases to question the validity of some alarm indications. The inspectors identified no violations; however, this area will continue to be carefully reviewed.

e. Fire Brigade

The inspectors reviewed fire brigade manning and qualifications on a routine basis. Both manning and qualifications were found to meet TS requirements.

f. Shift Briefing/Shift Turnover and Relief

The inspectors observed that reactor operators (ROs) completed turnover checklists, conducted control panel and significant alarm walkdown reviews, and significant maintenance and surveillance reviews prior to relief. The inspectors observed that sufficient information was transferred on plant status, operating status and/or events and abnormal system alignments to ensure the safe operation of the Unit. Senior reactor operators (SROs) were observed reviewing shift logbooks prior to relief. Sufficient information appeared to be transferred on plant status, operating status and/or events, and abnormal system alignments to ensure the safe operation of the unit during SRO relief.

Shift briefings were conducted by the offgoing SRO in charge of the control room (shift supervisor). Personnel assignments were made clear to oncoming operations personnel. Significant time and effort were expended discussing plant events, plant status, expected shift activities, shift training, significant surveillance testing or maintenance activities, and unusual plant conditions.

g. Shift Logs, Records, and Turnover Status Lists

The inspectors reviewed the shift supervisor (SS), shift technical advisor (STA), and reactor operator (RO) logs and determined that the logs were completed in accordance with administrative requirements. The inspectors ensured that entries were legible; errors were corrected, initialed and dated; logbook entries adequately reflected plant status; significant operational events and/or unusual parameters were recorded; and entry into or exit from TS Limiting Conditions for Operation (LCO) were recorded promptly. Turnover status checklists for ROs contained sufficient required information and indicated plant status parameters, system alignments, and abnormalities. The following logs were reviewed:

Night Order Log
System Status Log
Configuration Control Log
Key Log
Temporary Alteration (TACF) Log

During this inspection, it was determined that the below listed Limiting Conditions for Operation (LCO) were unknowingly entered, not suitably controlled, and not appropriately logged:

(1) On February 26, 1988, at 12:38 p.m., the licensee made inoperable one train of the component cooling system (CCS) without recognizing it or entering TS LCO 3.7.3 until approximately eight hours later.

(2) On February 15, 1988, at 11:40 a.m., the licensee made inoperable both trains of Control Room Emergency Ventilation System (CREVS) without recognizing it or entering TS LCO 3.0.5 until 12:37 a.m. the next day.

(3) On February 9, 1988, at 12:30 a.m., the licensee failed to meet the time constraints of Surveillance Requirement 4.4.6.2.1.d without recognizing it or entering TS LCO 3.4.6.2.b until 5:05 a.m.

This issue is under review and is identified as Unresolved Item (URI) 50-327,328/88-17-02.

h. Control Room Recorder/Strip Charts and Log Sheets

The inspector observed operators check, install, mark, file, and route for review, recorder and strip charts in accordance with the established plant processes. There were no events that caused the immediate control room review of recorder/strip chart peaks during this inspection period. Control room and plant equipment logsheets were found to be complete and legible; parameter limits were specified; and out-of-specification parameters were marked and reviewed during the approval process.

4. Management Activities

TVA management activities were reviewed on a daily basis by the NRC shift inspectors, shift managers, and startup manager.

a. Daily Control of Plant Activities (War Room Activities)

The licensee conducted a series of plant activities throughout each day to control plant routines. These activities were referred to by the licensee as War Room activities. War Room activities were observed by the shift manager on a daily basis and were found to be an adequate method to involve upper level management in the day-to-day activities affecting the operation of the units.

b. Licensee's Response To Plant Activities and Events

During this inspection period, several events occurred that could be attributed to personnel error or procedure inadequacy:

- Inadvertent removal of a train A EDG from service with B train Control Room Ventilation inoperable. (Inadvertent entry into Technical Specification 3.0.5.)

- Inadvertently exceeding the 72 hour (plus 25%) TS time constraint for the performance of SI-137.2, RCS Water Inventory.

- Inadvertently making one train of component cooling system inoperable without recognizing it or entering TS LCO 3.7.3 until approximately 8 hours later.

- Inadvertent actuation of the Cold Overpressure Protection System (COPS) resulting in a slight (15 psi) RCS depressurization event due to the combination of an inadequate test procedure and improper procedure implementation on the part of a maintenance technician. (This item is the subject of a violation which is further discussed in paragraph 10 of this report.)

The licensee's reaction and immediate response to these specific events was considered to have been adequate. It is important to note, however, that the effectiveness of all licensee corrective actions needs to be demonstrated long term by absence of operational events induced by procedure or personnel inadequacies and errors. This must be effectively demonstrated prior to Mode 2 entry.

Observations of the licensee have been made with respect to the following five equipment malfunctions which occurred:

- Malfunction of the 2A-A Centrifugal Charging Pump due to bearing damage induced by a non-safety speed changer oil pump problem. The licensee reported this pursuant to 10 CFR 50.72 and is evaluating it for Part 21 reportability.

- Suspect cold leg Resistance Temperature Detector (RTD) performance due to inadvertent circuitry grounding in a penetration.

- o Malfunction of the Turbine Driven Auxiliary Feedwater (TDAFW) pump due to binding of the pump rotating element.

- o Inadequate Safety Injection (SI) pump room cooler performance (excessive tripping) due to undersized thermal overloads.

- o Inability of group 1 steam dump valves to respond appropriately to controller inputs.

NRC observations reflect that, to date, the licensee has adequately maintained satisfactory compliance with Technical Specifications during resolution of these problems and, in most cases, has effected reasonably prompt resolution and correction of the problems. Substantial improvement over pre-shutdown practices has been observed. Insufficient data exists to assess root cause analysis and permanent corrective actions to prevent recurrence at this time. The inspectors will continue to monitor the effectiveness of management to properly resolve equipment problems.

During the course of Mode 4 operation one problem was observed with program implementation to assure readiness for restart. This problem involved the fact that licensee personnel failed to fully recognize that some Unit 1 systems, equipment, and maintenance or modification work could have a direct effect on Unit 2 operability. This problem manifested itself in several different examples:

- o Ray-Chem splicing required for a Unit 1 electrical supply cable for a common Emergency Gas Treatment System (EGTS) unit.

- o The previously mentioned Unit 1 cable work which resulted in the inadvertent actuation of common seismic monitor.

- o The potential for preventing automatic positioning of a common EGTS damper due to herculite associated with Unit 1 work interfering with the damper handle.

- o The common vent boards (electrical panels) supplied from the Unit 1 shutdown boards had undersized input breaker trip settings, since Unit 2 accident loads were not considered during final trip setting establishment.

- o The failure to fully response time test Unit 1 ERCW pumps when these pumps would be required for Unit 2 operation. This testing was mode 3 required testing.

In each case the licensee assured and/or effected proper Technical Specification compliance. The licensee has effected action to address these problems generically prior to mode 3 entry.

5. Site Quality Assurance (QA) Activities in Support of Operations

The inspectors reviewed the activities of the WCC which includes QA oversight. No discrepancies were noted.

6. Chronology of Unit 2 Plant Operations

At the beginning of the the NRC Restart Task Force shift coverage, Unit 2 was in cold shutdown (mode 5) with three reactor coolant pumps operating and the 2A-A residual heat removal pump in service. The reactor coolant system was at 180 degrees F and 370 psig. Pressurizer level was at 26 inches. All steam generators were filled to the operating range, the condensate system was on long cycle recirculation, and there was a vacuum in the main condenser.

On February 4, 1988, the NRC approved entry into mode 4/3 (Hot Shutdown/ Hot Standby). The plant was heated using RCPs and entered mode 4 on February 6, 1988.

On February 10, 1988, RHR cooling was returned to service and the licensee suspended all non-essential testing and maintenance for about 48 hours. This was done following a series of events which included generation of a reactor trip signal, inadvertent MSIV closures and feedwater isolations, and a loss of the VCT level due to maintenance activities. During this period of licensee evaluation and corrective action, the MSIVs remained closed and the unit was maintained in Hot Shutdown using RCPs and RHR.

During this inspection period the unit was maintained in hot shutdown (Mode 4) with four reactor coolant pumps operating. The reactor coolant system was maintained between 250 degrees F/350 psig and 345 degrees F/550 psig. A number of events occurred during this inspection period and are listed below:

- February 12: 2A-A charging pump declared inoperable when speed changer overheated/smoked.

- February 13: Emergency Gas Treatment System suction damper found blocked.

- February 14: Fire on the 706' elevation of the railroad bay.

- February 16: Inadvertent spill of ERCW from outside of a C zone.

- February 18: Cold overpressure protection system unintentionally initiated causing a pressurizer PORV to open.

- February 19: Control and Auxiliary building vent boards 1A1-A and 1B1-B declared inoperable due to improper breaker trip settings.

- February 25: Loss of auxiliary boiler "A" resulting in loss of steam to secondary components.

- February 9, 15, and 26: TS LCOs entered unknowingly by licensee.

A detailed discussion of the events that occurred during this inspection reporting period is contained in paragraph 10.

7. Operational Safety Verification (71707) Units 1 and 2

a. Plant Tours

The inspectors observed control room operations; monitored conduct of testing evolutions; reviewed applicable logs, including the shift logs, night order book, clearance hold order book, configuration log, and TACF log; conducted discussions with control room operators; observed shift turnovers; and confirmed the operability of instrumentation. The inspectors verified the operability of selected emergency systems and verified compliance with TS LCOs. The inspectors verified that maintenance work requests (WR) had been submitted as required and that follow-up activities and prioritization of work was accomplished by the licensee.

Tours of the diesel generator, auxiliary, control, and turbine buildings were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, excessive vibrations, and plant housekeeping/cleanliness conditions.

No violations or deviations were identified.

b. System Walkdowns

The inspectors walked down accessible portions of the auxiliary feedwater system on Unit 2 to verify operability and proper valve alignment.

No violations or deviations were identified.

c. Safeguards Inspection

In the course of the NRC inspection 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, including: protected and vital area access controls; searching of personnel and packages; escorting of visitors; badge issuance and retrieval; patrols; and compensatory posts.

In addition, the inspectors observed protected area lighting, and protected and vital area barrier integrity. The inspectors verified interfaces between the security organization and both operations and maintenance. Specifically, the shift inspectors inspected security during the outage period and reviewed licensee security event reports. The licensee is reviewing the possible extension of the power block security concept.

No violations or deviations were identified

d. Radiation Protection

The inspectors observed health physics (HP) practices and verified the implementation of radiation protection controls. On a regular

basis, radiation work pe[illegible]ts (RWP) were reviewed and specific work activities were monitored to ensure the activities were being conducted in accordance with applicable RWPs. Selected radiation protection instruments were verified operable and within calibration frequency.

The following RWP was reviewed:

88-013 General Cleanup in Containment

No violations or deviations were identified

8. Shift Surveillance Observations and Review (61726)

The inspectors observed and reviewed TS required surveillance testing and verified that testing was performed in accordance with adequate procedures; test instrumentation was calibrated; LCOs were met; test results met acceptance criteria requirements and were reviewed by personnel other than the individual directing the test; deficiencies were identified, as appropriate, and any deficiencies identified during the testing were properly reviewed and resolved by management personnel; and system restoration was adequate. For completed tests, the inspector verified that testing frequencies were met and tests were performed by qualified individuals.

The following activities were observed and reviewed:

SI-2, Shift Log; The inspector reviewed the data package for SI-2 conducted on February 23, 1988. The inspector noted that page 1 of 5, (data sheet 1 of data package B) had not been completed by the the second shift. This data sheet performs the channel check of the 6.9 KV shutdown board loss of voltage required by TS 4.3.2.1.1. The inspector verified that the TS surveillance interval requirement had not been exceeded as a result of not performing the data sheet on the 1500-2300 shift. The inspector informed the shift engineer of the observation and determined that the deficiency would have been identified by the assistant shift supervisor's review after completion of the SI.

SI-7, Electrical Power Systems: Diesel Generators; The inspector observed portions of this SI that was performed on the 1A-A EDG from the control room. No deficiencies were identified.

SI-7.1, Diesel Generator Surveillance Frequency Unit 0. The SI was observed by the inspector and no problems were identified.

SI-37.4, 2B Containment Spray Pump. This SI was observed in part and no deficiencies were identified.

SI-90.82, Reactor Trip Instrumentation Monthly Functional Test (SSPS). Portions of this SI were observed and reviewed by the inspector. During the assistant shift supervisor's review, it was discovered that the referenced TS was wrong. This deficiency was properly corrected prior to releasing the procedure for work. No other deficiencies were noted on the portion of the procedure observed.

SI-118, Motor-Driven Auxiliary Feedwater Pump and Valve Automatic Actuation. The inspector observed that SI-118 was stopped by operations personnel. A procedure sequencing problem was identified which existed when the accident signal was reset prior to resetting the main feed pump "A" trip signal. This was resolved by instruction change form 88-0405 which added resetting the main feed pump "A" trip signal prior tc resetting the accident signal.

SI-118.1, Turbine-Driven Auxiliary Feedwater Pump and Valve Automatic Actuation. Portions of this SI were observed. During the performance of this SI, the pump shaft appeared to be binding and 2-FCV1-15 tripped on overload. The SI was stopped and repairs commenced. Further testing revealed a problem with the trip/throttle valve which was later resolved.

SI-127, RCS and Pressurizer Temperature and Pressure Limits. This SI was reviewed in part. No deficiencies were identified. This SI assures that unacceptable stresses affecting system integrity will not occur and that any operations in excess of the limits are analyzed.

SI-129, revision 28, part A, Emergency Core Cooling Safety Injection Pump Operability. Portions of this SI were observed. This SI verifies that the safety injection system (SIS) pumps, and their associated discharge check valves, miniflow check valves, and inlet check valve are operable. It is performed by starting each pump and verifying that pump inlet pressure, discharge pressure, differential pressure, flow rate, bearing temperature, vibration and lubrication level are within the acceptable range. The surveillance failed the flow test portion for SIS pump 2A-A. However, SIS pump 2B-B passed. The 2A-A pump was subsequently retested and passed the SI acceptance criteria. This subsequent test was also observed.

SI-129.1, Safety Injection Pump Casing and Discharge Venting. This SI was reviewed and no problems or deficiencies were identified.

SI-130.2, Motor-Driven Auxiliary Feedwater Pumps. The inspector observed the satisfactory performance of this SI.

SI-137.1, Reactor Coolant System-Unidentified Leakage Measurement. The inspector reviewed the data package for performance of this SI conducted February 23, 1988. No deficiencies were identified.

SI-137.2, RCS Water Inventory. The inspector performed an independent check of the SI-137.2 calculations, using an NRC computer routine. This independent check produced leakage rates consistent with what the licensee had calculated.

SI-165, Channel Functional Test of SIS Accumulator Tank Water Level and Pressure Instrumentation (Monthly). This SI was reviewed as it relates to PI63-62 on the number 4 RCS cold leg accumulator. No deficiencies were identified.

SI-166.6, Post Maintenance Testing of Category A and B Valves. This SI was observed being performed on valve 2-LCV3-164. The closing time

acceptance criterion was satisfactorily met. No deficiencies were identified.

SI-166.10, Accumulator/Safety Injection Primary and Secondary Check Valve Integrity. This SI was observed by the inspector. This SI verifies the integrity of the RHR check valves. No deficiencies were identified.

SI-166.32, AFW Check Valve Opening Test During Hot Standby and Hot Shutdown. The inspector reviewed and observed this SI. The purpose of the surveillance is to provide a method of verifying and documenting that the system check valves will fully stroke. During the review, the inspector noted that when the AFW pumps started, the blowdown valves associated with the applicable SGs went to the closed position. This feature was not addressed in the procedure and the re-opening of these valves was not addressed. In addition, the procedure does not address the starting or stopping of the AFW pumps. Notations were made in the package to require these revisions. This SI was technically adequate and no violations were identified.

SI-297, Pressurizer Heater Capacity. This SI was observed in part. Heater capacity is verified by measuring current to the heaters once every 92 days. During the performance of this procedure the operator was unable to deenergize the 2A heaters. An operator was immediately dispatched to trip the heaters locally. A malfunction of the trip coil was suspected and a WR was initiated to repair the heater breaker.

SI-488, RCS RTD Sensor Verification of Calibration. This SI is performed in conjunction with TI-60, Incore Thermocouple (TC) and RTD Cross Calibration, to gather raw RTD resistance versus temperature data from the RCS RTDs. With this data, the present RTD calibration curves are evaluated and recalculated as required. Additionally RCS Thermocouple data recorded during performance of this instruction is used as a basis for RTD/TC calibration. This SI requires that the plant remain in a stable isothermal condition with RCS temperature not drifting and no change in SG steaming rate during data acquisition. Successful performance of this instruction is dependent on a high level of coordination by the test director and operations personnel. Data is taken at each of a minimum of 4 temperature plateaus (250°F, 335°F, 450°F, and 530°F) Various revisions were made to SI-488 and additional planning occurred prior to testing at the second plateau. During the actual performance of data acquisition at 335°F, no problems were noted by the inspector. The performance of this SI is further discussed in section 10 of this report.

9. Shift Maintenance Observations and Review (62703)

a. Station maintenance activities of safety-related systems and components were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, industry codes and standards, and in conformance with TS.

The following items were considered during this review: LCOs were met while components or systems were removed from service; redundant components were operable; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures

and inspected as applicable; procedures used were adequate to control the activity; troubleshooting activities were controlled and the repair record accurately reflected what actually took place; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; Quality Control (QC) hold points were established where required and were observed; fire prevention controls were implemented; outside contractor activities were controlled in accordance with the approved Quality Assurance (QA) program; and housekeeping was actively pursued.

b. Temporary Alterations (TACF)

The following TACFs, were reviewed:

2-88-2003-68; This TACF installed temporary thermocouples on loop seals for 2-SRV68-563, 564, and 565. No discrepancies were identified.

2-88-5057-68; This TACF dealt with #3 RCP motor phase A stator RTD. No discrepancies were identified.

2-88-2005-68; This TACF replaced an existing loop 1 narrow range RTD (2-TE68-2A) with an installed spare RTD (2-TE-63-2B) by moving the cable terminations. The original RTD was determined to be inoperable as a result of data obtained during the performance of SI-488. The individual RTD calibration curves were compared for the two RTDs. The resistance values were well within the allowed difference of the Westinghouse setpoint methodology. Therefore, recalibration was not required. Additionally, the inspector reviewed the USQD associated with this TACF. Since use of the existing spare RTD does not alter the design function of the system nor change the scope of existing procedures, the inspector had no further questions.

No violations or deviations were identified.

c. Work Requests (WRs)

The following WRs were reviewed:

WR B285642 and WR B288798,initiated to repair valve 2-LCV-3-164A, were reviewed by the inspectors. SI-93, Remote Shutdown Monitoring Auxiliary Feedwater Steam Generator Level Instrumentation, was run to calibrate the valve after repair. A licensee engineering review determined that further calibration would be required. No deficiencies were identified.

WR B239447, Replace Thrust Bearing on 2B-B AFW pump. This maintenance activity was observed by the inspector and no deficiencies were identified.

WR B267211, Investigate and Repair Stiff Spot on Unit 2 Turbine-Driven Auxiliary Feedwater Pump Shaft. The TDAFW pump turbine would not roll at approximately 80 psig steam pressure. Upon disassembly the licensee found evidence of binding/galling between a pump impeller and an adjacent stationary ring. The pump rotor assembly was subsequently replaced per MI10.4.2, revision 1, Replacement of Turbine-Driven Auxiliary Feedwater Pump Rotor Assembly, Ingersoll Rand Model #5HMTA5STAGE. The inspector reviewed the associated WR and observed various portions of the disassembly and reassembly activities including QC cleanliness inspection, installation of the casing, and upper casing bolt torquing.

WR B274142, B Condensate Storage Tank. The WR was reviewed and no deficiencies were identified.

No violations or deviations were identified

d. Hold Orders (HOs)

The inspectors reviewed various HOs to verify compliance with AI-3, revision 38, Clearance Procedure, and that the HOs contained adequate information to properly isolate the affected portions of the system being tagged. Additionally the inspectors inspected the affected equipment to verify that the required tags were installed on the equipment as stated on the HOs. The following HOs were reviewed:

| Hold Order | Equipment |
|---|---|
| 2-88-002 | Incore Detectors |
| 2-88-201 | 2B-B AFW Pump |
| 2-88-218 | B Condensate Storage Tank |

No violations or deviations were identified

10. Event Follow-up (93702, 62703)

On February 9, 1988, at 12:30 a.m., the licensee exceeded the 72 hour plus 25% time constraints of SR 4.4.6 2.1.d without recognizing the fact. At 5:05 a.m. they recognized this oversight and entered LCO 3.4.6.2.b. A performance of SI-137.2, RCS Water Inventory, was run, meeting SR 4.4.6.2.1.d and allowing the licensee to exit LCO 3.4.6.2.b at 8:59 a.m. A violation was not issued because this item met the enforcement criteria for being licensee identified.

On February 12, 1988, the 2A-A centrifugal charging pump (CCP) was taken out of service when smoke was observed coming from the CCP room. It appeared that the speed changer bearings overheated and failed which caused the oil to smoke. The licensee exited TS LCO 3.1.2.2, Boration Flow Paths, and TS LCO 3.2.4, Charging Pumps, after completion of maintenance activities. Upon investigation, the licensee discovered that the sealing gland bolts on the attached oil pump of the speed changer were loose enought to allow air to enter and cause frothing of the oil. This resulted in inadequate lubrication of the speed changer, and hence the

subsequent speed changer damage. The licensee issued PRO 2-88-54 to address this problem.

On February 13, 1988, at about 3:30 p.m., the emergency gas treatment system (EGTS) suction damper from Unit 2 annulus (0-65-523) was found blocked closed by a roll of herculite. The roll had apparently been stored sitting on the damper position indicator. LCO 3.6.1.8 requires the EGTS to be operable when Unit 2 is in mode 4. The LCO was not entered because the auxiliary unit operator (AUO) immediately removed the herculite.

On February 14, 1988, at 9:10 p.m., a fire was reported on the 706' elevation of the railroad bay. Workers in the area were purging a nitrogen header using a diesel drive air compressor. The fire had been reported because of smoke coming from the air compressor. An investigation determined that the air compressor was putting atomized oil into the surrounding area which looked like smoke. The air compressor was secured and the event terminated. The licensee's response to the event appeared to be adequate.

On February 15, 1988, at 11:40 p.m., emergency diesel generator (EDG) 1A-A was removed from service to perform surveillance testing. With the B train control building emergency ventilation inoperable (2/12 entered LCO 3.7.7), the relieving STA noted that per TS 3.0.5, when the 1A-A EDG was removed from service, the A train control building emergency ventilation was inoperable. This placed Unit 2 in LCO 3.0.5. The 1A-A EDG was returned to service 57 minutes into the event. The staff is investigating how this event occurred.

On February 16, 1988, at 4:18 a.m., during the performance of SI-118, Motor-Driven Auxiliary Feedwater Pump and Valve Automatic Actuation, Data Sheet 7, titled Testing the Automatic Operation of FCV-3-116A and FCV-3-116B for AFW pump A-A, operations personnel opened valve 3-LCV-116A per procedure causing ERCW water to flow out the "tell-tale" drain and into a catch basin. The flow was so great that it overflowed the basin onto the floor of the 690' elevation in the auxiliary building. The operators quickly closed the valve which stopped the flow. HP personnel were called to evaluate the water. The water outside of the C zone was determined to be not contaminated. Immediately following this, operations opened valve 3-LCV-116B causing a greater flow from the condensate storage tank (CST) to go through the "tell-tale" drain. This time the overflowing water flowed through a "C-zone" before HP could dam the water utilizing anti-C clothing. The Plant Operation Review Staff (PORS) is reviewing this issue.

The cause of the above two events was determined to be an inadequate procedure. The procedure did not caution the operators about the amount of water flow that should be expected to flow out the tell tale drain.

On February 17, 1988, with Unit 2 in Hot Shutdown (Mode 4), average RCS temperature at 250°F, and pressure at 460 psig, the Cold Overpressure Protection System (COPS) was unintentionally initiated which resulted in the opening of a pressurizer power operated relief valve (PORV). RCS

pressure dropped to 445 psig. The inadvertent depressurization was terminated by the Unit Operator who placed the PORV in manual and closed the valve.

At the time of the event, Instrument Maintenance personnel were performing RCS resistance temperature detector (RTD) cross-calibration in accordance with SI-488 and TI-60. This evolution involves the removal of a specific RTD from service, aligning the instrument channels to a known resistance, logging the channel data, and then returning the RTD to service. The RTD is removed from service by means of a test switch in the circuit which places the channel in series with the test resistance. While in its normal position, a shorting bar is placed across the switch contacts to reduce the switch's resistance. The shorting bar should only be in place while the switch is in its normal position. The IMs removed the appropriate shorting bars, then placed the switch in the test position as required by procedure. After logging the test data, the IMs placed the shorting bars back in position prior to placing the switch in normal, in violation of the sequence specified in TI-60. This caused the instrument channel to have both the test resistance (via the test switch) and the RTD (via the shorting bars) in parallel at the same time. This resulted in the circuit experiencing low total resistance. This low resistance equates to low Tave. Tave (auctioneered low) is used to vary the setpoint of the PORVs when RCS is below 350°F. The minimum pressure setting of the PORVs is 435 psig, which was below the actual pressure at the time of 460 psig, causing the affected PORV to open.

TS 6.8.1 states that written procedures shall be established, implemented and maintained covering the activities specified in Regulatory Guide 1.33.

Contrary to the above, the sequence of returning the RTDs to service as stipulated in TI-60 was not followed, resulting in the inadvertent opening of the PORV as described. This is a violation of TS 6.8.1 and is identified as Violation 327,328/88-17-01.

This event was handled in an expeditious manner by the unit operator and by an incident investigation team from the Plant Operations Review Staff (PORS), which arrived within twenty minutes of the event. The PORS team interviewed all the IMs, operators, and test directors and took statements from all individuals involved. The IMs were instructed in following the procedure in proper sequence and the procedure was changed to caution the IMs to perform the restoration steps in sequence.

On February 19, 1988, at 1:57 a.m., control and auxiliary building (C&A) vent boards 1A1-A and 1B1-B were declared inoperable. The Division of Nuclear Engineering (DNE) had calculated that the vent boards had improper breaker trip settings. The normal feeder breaker to 1A1-A has a 400 amp setting, however, the board could be loaded to 500 amps. The normal feeder breaker to 1B1-B has a 500 amp setting and the board could be loaded at 475 amps. The board load must be at least 10% less than the feeder breaker setting. Loss of C&A vent boards 1A1-A and 1B1-B causes both trains of EGTS to be inoperable, both trains of CREV to be inoperable and both component cooling system air handling units to be inoperable along with numerous Unit 1 items. This condition was identified in SQN

SQNEEB 86124. At 2:06 a.m., February 19, 1988, C&A vent board 1A1-A was returned to an operable status by transferring to its alternate feeder breaker (set at 500 amps) and tripping the following loads:

Annulus Vacuum fan 1A
El. 669 Penetration Room Cooler Fan 1A
El. 690 Penetration Room Cooler Fan 1A
Tornado Damper Transformer
RM-90-130
RM-90-119
Primary Water Pump 1A
SI Pump Room Cooler 1A-A
Permanent $H_2$ Mitigation System (Unit 1 only)

Tripping the above loads reduced the maximum load current to less than 450 amps.

On February 19, 1988, at 2:09 a.m., C&A vent board 1B1-B was returned to an operable status by tripping the following loads:

Pipe chase cooler 1B
669 Penetration Room Cooler Fan 1B
690 Penetration Room Cooler

At the end of this reporting period the licensee was evaluating why corrective action had not been taken earlier. Further investigation into the issue of the C&A vent boards revealed the problem had been originally identified on October 9, 1986 and had been documented on SCR EEB 86124. The issue was also addressed in licensee event report (LER) 87-001. On March 4, 1987, calculations done for QIR EEB 87193 determined that rework on Unit 1 C&A vent boards was not required for Unit 2 restart. LER 87-001 was closed in Inspection Report 327,328/87-65 as follows:

> The trip setpoints for ACBs on shutdown boards that feed control and auxiliary building vent boards were incorrect due to a design error. ECN L6883 has been issued and the loads have been analyzed to determine proper trip setpoints. WP 12636 has been issued and is being worked. The work required to satisfy this LER has been completed. Licensee's corrective actions appear to be acceptable.

On February 16, 1988, the load analysis for Unit 1 C&A vent boards was reviewed. It was determined, on February 19, 1988, that the Unit 1 C&A vent boards were not capable of supporting Unit 2 operations. It appears the cause of this oversight was bad assumptions made for the calculations in QIR EEB 87193. The calculations did not apply diversity factors, and the breaker settings did not correlate with the load calculations as there was uncertainty over required loads. The licensee has issued potentially reportable occurrence (PRO) 1-88-71 to address this issue.

The licensee's corrective actions for the C&A vent board concerns included:

(1) All 480 VAC boards were reviewed. All breaker settings were above full connected loads except the C&A vent boards in question and the reactor MOV boards. This is not a problem for the reactor MOV boards because the breakers trip within 500 seconds and the loads on the board include mostly valves which should cycle within approximately 60 seconds. A USQD was performed for the C&A vent boards.

(2) All Unit 1 boards were evaluated considering normal and cycling loads as normal loads for mode 5 operations. Also, all Unit 2 accident loads were assumed. No additional problems were identified.

The auxiliary boiler is being used to supply steam to certain secondary components. On February 25, 1988 the A train auxiliary boiler was lost resulting in the licensee manually breaking main condenser vacuum. In anticipation of the protection signals resulting from breaking vacuum, the shift engineer placed the TDAFW pump in pull-to-lock and opened the secondary PORVs. The TDAFW pump is not required for mode 4. No plant transients were observed and no ESF actuations were received. The A train auxiliary boiler was returned to service at approximately 1:00 a.m. on February 26, 1988.

On February 26, 1988 the licensee unknowingly entered LCO 3.7.3 upon taking the 2A-A CCS pump out of service due to not recognizing the effect of single failure on the opposite train. Approximately eight hours later the licensee made the correct determination and entered a 72 hour action statement for LCO 3.7.3. Both trains of CCS were returned to an operable status within approximately three hours.

11. NRC Inspector Follow-up Items, Unresolved Items, Violations, Bulletins and Licensee Event Reports

(Closed) LER 327,328/87-052: Design Error Resulting in Nonrepresentative Load Testing of Emergency Diesel Generators. This LER describes a condition where the capability of EDG 2B-B to recover from the transient of the containment spray pump starting following a phase B containment isolation with other random loads connected was uncertain. A remote possibility exists that the electric board room air handling Unit could start at precisely the same time that the containment spray pump starts which would result in the speed of the EDG dropping below the five percent limitation described in the final safety analysis report (FSAR). This issue did not meet the reporting requirements of 10 CFR 50.72 but was reported voluntarily to inform the NRC. The NRC will address this issue, among others, in a safety evaluation report (SER) on electrical design calculations.

This LER is closed.

(Closed) Unresolved Item 327/328/88-02-03: Unusual Event Resulting from Maintenance on VCT Divert Valve. On February 9, 1988, with Unit 2 in mode 4 and the reactor coolant system (RCS) at approximately 250°F and 475 psig, WR B285685 was approved for performance which involved the troubleshooting and repair of VCT divert valve 2-LCV-62-118. The deficiencies which required a WR were that both valve handswitch indicator lights remained energized regardless of handswitch position and that the valve stem rotated when the valve was stroked. The intended work included checking the limit switch arm actuator for proper position and securing the device, if loose, and removing the top of the diaphragm housing to determine if the stem had been staked and locktite applied. This work required isolation of air to the valve operator but no tagging was deemed necessary. Upon removal of the valve cover, it was discovered that the stem locknut was loose and that the diaphragm was damaged requiring replacement. The ASE was notified of this finding and an expeditor was sent to power stores in an attempt to obtain a replacement diaphragm. Work ceased until a replacement diaphragm could be obtained. Maintenance began disassembly of the valve operator in order to perform the diaphragm repairs after receipt of the replacement parts. At approximately 7:20 p.m., a loss of RCS inventory was noted and LCO 3.4.6.2, RCS operational leakage, was entered. The VCT divert valve operator had been decoupled from the valve body at the stem to facilitate valve diaphragm replacement. Valve control was subsequently lost allowing the valve to move from the VCT to the divert position. At 7:22 p.m., the Maintenance foreman was notified of the urgency to return the valve to the VCT position. At 7:55 p.m., Maintenance attempted unsuccessfully to accomplish the valve positioning requested. While Maintenance was continuing to complete the work as quickly as possible, the pressurizer level dropped from 33% to 25%, which equals an approximate volume of 465 gallons. At 7:58 p.m., normal letdown and charging were isolated in accordance with SOI-62.1G, Chemical and Volume Control System, and AOI-6, Shutdown LOCA was exited. In accordance with IP-2 Emergency Plan Classification Logic, a notification of unusual event (NOUE) was declared and exited at 9:00 p.m. Letdown was reestablished at 9:35 p.m. PRO 2-88-43 was initiated as a result of the above described incident.

This event has safety implications for operational Modes 1 through 4, in that this identified leakage exceeded the LCO 3.4.6.2.d identified leakage criterion of 10 gpm. As a result of this and other events, the licensee established a work control group to perform plant operations impact evaluation in order to ensure that the scope of work is clearly defined, adequate clearances are established, and plant configuration is controlled.

Technical Specifications 6.8.1 states that written procedures shall be established, implemented and maintained covering the applicable procedures recommended in Appendix "A" of Regulatory Guide 1.33, Revision 2, February 1978. Included in these required procedures are maintenance procedures, and clearance procedures.

Standard Practice SQM2, Maintenance Management System implements these requirements through work request (WR) control and documentation of maintenance work activities.

Contrary to the above, maintenance activities conducted on valve 2-LCV-62-118 were not adequately described or implemented on WR B285685 and resulted in an inadvertent loss of approximately 465 gallons of RCS water, and an entry into LCO 3.4.6.2.d. This is identified as a second example of violation 327,328/88-17-01.

Administrative Instruction (AI)-3, Clearance Procedure, implements the requirement for an equipment clearance procedure through the use of hold orders. AI-3 states that no work shall be performed except under the applicable clearance procedure unless authorized on a case-by-case basis to perform troubleshooting on equipment which cannot be accomplished under a normal clearance or to perform work of a limited scope where full control can be provided and maintained in the immediate proximity to the involved equipment. In addition the shift supervisor shall verify that pressure is zero and equipment drained prior to issuing a mechanical clearance.

Contrary to the above, maintenance personnel and the shift supervisor failed to establish a mechanical clearance for the air supply to valve 2-LCV-62-118 or a mechanical clearance for the valve itself. They further failed to remove system pressure from a component that was disassembled, and was at a pressure greater than zero. This is identified as a third example of violation 327,328/88-17-01.

This Unresolved Item is closed.

12. Shift Inspector Follow-up Issues

| Issue Number | Description | Resolution |
|---|---|---|
| 1/23/88-2-2 | SI 166.12 needs to be revised to reflect the proper position of valves HCV-74-36 and 37. | This issue is still under review. |
| 2/11/88-1-1 | Reported vibration | This item has been |

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| | problems on train A of RHR when one train is supplying all four cold legs. | resolved and is addressed in detail in paragraph 13. |
| 2/14/88-1-1 | Problems associated with the steam dump drain tank associated with automatic valve operation as necessary for draining tank. | This item was determined not to require NRC follow-up because it is a balance of plant issue and does not affect the safety of the plant. |
| 2/14/88-2-1 | Continue observation of 2B-B AFW pump outer bearing temperature during runs of SI-118. | This item was resolved. The bearing was replaced and is currently reading within the limits of normal operation. |
| 2/15/88-1-1 | Follow-up on ability to isolate a steam generator after reset of a SI signal. | This was resolved by ICF 88-0405 to step 33 of SI-118 which added resetting the "A" MFP trip signal prior to resetting SI signal. |
| 2/15/88-2-1 | Verify method of returning pressure switches to service for SI-118 is adequate. | The licensee has provided an information package, which is under review by the NRC. |
| 2/16/88-2-1 | CR inspection items: key control, shift turn over checklists, and shift engineer log keeping practices. | This issue is still under review. |
| 2/16/88-2-2 | Follow-up on discussion items which include key control, shift turnover checklists and log keeping. | This issue is still under review. |
| 2/17/88-1-1 | During SI-488, steam dumps would only go 60% open with a signal applied which should have caused them to be 100% open. | During preoperational testing it was determined that a 1-3/4 inch stroke would give full design steam flow for the steam dump valves. Full stroke for the valves is 2-1/2 inch. This specific item is resolved. However, |

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| | | the licensee is currently evaluating with the vendor the steam dump performance. |
| 2/18/88-2-1 | Improper breaker settings on C&A Boards 1A1-A and 1B1-B. | This issue has been adequately resolved with DNE by calculation B25 8800223 803. |
| 2/19/88-1-1 | Verify Part 21 issued on 2B CCP gland bolting problem. | This issue is resolved. LER 88-005 was issued instead of a Part 21 report. |
| 2/22/88-2-1 | Determine adequacy of not running the TDAFP as a PMT for the element replacement. | This issue is resolved. TDAFP was tested following element replacement. |
| 2/23/88-2-1 | Verify temporary steam header pressure gages are removed prior to approximately 270 psig. | This item is resolved since the gages have been removed. |

13. Residual Heat Removal (RHR) System Vibration Problems

As part of the readiness for restart of Sequoyah Unit 2 the NRC reviewed the correctness of TVA's resolution of preoperational test deficiencies associated with the RHR system. The purpose of this review was to determine if any uncorrected deficiencies were being compensated for by requiring personnel to perform normally required automatic safety functions. During this inspection deficiencies associated with vibrations of the RHR pump and other system components identified during the preoperational test were reviewed. The inspector determined that the purported vibration problems were associated with the Unit 1 test and that all vibration problems associated with the Unit 2 test were properly dispositioned by the licensee as part of the preoperational test.

Subsequent to the above review, with the plant in Mode 4, the inspector noted that the licensee had entered the TS action statement for specification 3.5.3.d associated with the RHR pump safety injection mode alignment. When questioned by the inspector the licensee indicated that system vibration was the reason the alignment was off normal. The inspector's review of this alignment, allowed by SOI-74.1, which involved isolating one of the two cold leg injection branch lines which supplies two cold leg injection points determined that the reason given by the licensee was not supported by either preoperational test data on Unit 2 or review of testing by the restart test group. The licensee was requested to justify their entry into the action statement for no apparent documented basis.

Several meetings were held with the licensee for the purpose of understanding why the licensee felt that a vibration problem existed for the Unit 2 RHR system. The licensee provided the following:

During unit 1 preoperational testing vibration problems were noted when the RHR system was aligned in the cooldown mode (i.e., suction aligned to the RCS hot leg) and one pump supplying discharge to all four cold legs.

This vibration was associated with cavitation across the heat exchanger flow control butterfly valves

Resolution of this problem was to close one of the branch line isolation valve during the cooldown mode of operation and this condition was assumed to be applicable to both units. Therefore the test was not performed during unit 2 preoperational testing and the operating procedure was changed for both units.

After further discussion on this issue the licensee was requested to provide a safety evaluation (USQD) to document the above conditions and to provide the basis that the performance of the system tested during unit 2 preoperational testing (i.e., one pump to only two cold legs was acceptable). USQD PT-452 was provided to the inspector which documented the above issue. This USQD was reviewed by the inspector and found to be acceptable. The safety evaluation also provided the licensee TS interpretation that manually opening the branch line valve could be considered as manually realigning of the RHR system as allowed by TS 3.5.3.d. This position was discussed between the licensee and NRC OSP HQ staff.

14. List of Abbreviations

AI - Administrative Instruction
AFW - Auxiliary Feedwater
AUO - Auxiliary Unit Operator
AOI - Abnormal Operating Instruction
ASME - American Society of Mechanical Engineers
BIT - Boron Injection Tank
C&A - Control and Auxiliary Buildings
CAQR - Conditions Adverse to Quality Report
CCP - Centrifugal Charging Pump
CCS - Component Cooling System
CCTS - Corporate Commitment Tracking System
COPS - Cold Overpressure Protection System
CS - Containment Spray
CST - Condensate Storage Tank
DC - Direct Current
DCN - Design Change Notice
DNE - Division of Nuclear Engineering
ECCS - Emergency Core Cooling System
EDG - Emergency Diesel Generator
EGTS - Emergency Gas Treatment System
EQ - Environmental Qualification
ERCW - Essential Raw Cooling Water
ESF - Engineered Safety Feature

FCR - Field Change Request
FSAR - Final Safety Analysis Report
HO - Hold Order
HP - Health Physics
HQ - Headquarters
HVAC - Heating, Ventilation, and Air Conditioning
IDI - Integrated Design Inspection
IE - Inspection and Enforcement
IEB - Inspection and Enforcement Bulletin
IMI - Instrument Maintenance Instruction
KV - Kilovolt
LER - Licensee Event Report
LCO - Limiting Condition for Operation
LOCA - Loss of Coolant Accident
MI - Maintenance Instruction
MOVATS - Motor Operated Valve Testing
MSIV - Main Steam Isolation Valve
NEP - Nuclear Engineering Procedures
NRC - Nuclear Regulatory Commission
ODCM - Offsite Dose Calculation Model
OSP - Office of Special Projects
PD - Positive Displacement
PI - Pressure Instrument
PM - Preventive Maintenance
PMT - Post Modification Test
PORV - Power Operated Relief Valve
PORS - Plant Operation Review Staff
PRO - Potentially Reportable Occurrence
QA - Quality Assurance
QC - Quality Control
RARC - Radiological Assessment Review Committee
RCS - Reactor Coolant System
RCP - Reactor Coolant Pump
RHR - Residual Heat Removal
RO - Reactor Operator
RTD - Resistance Thermal Devices
RTI - Restart Test Instruction
RWP - Radiatic Work Permit
RWST - Reactor Water Storage Tank
SER - Safety Evaluation Report
SG - Steam Generator
SI - Surveillance Instruction
SIS - Safety Injection System
SMI - Special Maintenance Instruction
SOI - System Operating Instructions
SRO - Senior Reactor Operator
STI - Special Test Instruction
TACF - Temporary Alteration Control Room
TAVE - Average Reactor Coolant Temperature
TDAFP - Turbine Driven Auxiliary Feedwater Pump
TS - Technical Specifications
TSC - Technical Support Center
TVA - Tennessee Valley Authority
UHI - Upper Head Injection

USQD - Unresolved Safety Question Determination
VCT - Volume Control Tank
WCC - Work Control Center
WP - Work Plan
WR - Work Request