



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

Report Nos.: 50-338/87-36 and 50-339/87-36

Licensee: Virginia Electric & Power Company  
 Richmond, VA 23261

Docket Nos.: 50-338 and 50-339

Facility Name: North Anna 1 and 2

Inspection Conducted: October 20 - November 19, 1987

Inspectors:	<i>DL Coonan</i> FOR	12/28/87
	J. L. Caldwell, SRI	Date Signed
	<i>DL Coonan</i> FOR	12/28/87
	L. P. King, RI	Date Signed
Approved by:	<i>F. Cantrell</i>	12/28/87
	F. Cantrell, Section Chief - Division of Reactor Projects	Date Signed

SUMMARY

Scope: This routine inspection by the resident inspectors involved the following areas: plant status, unresolved items, licensee event report (LER followup), review of inspector follow-up items, monthly maintenance observation, monthly surveillance observation, ESF walkdown, verification of containment integrity, operator safety verification, operating reactor events, instrumentation problems related to startup of Unit 2 from refueling, and security. During the performance of this inspection, the resident inspectors conducted reviews of the licensee's backshift operations on the following days - October 21, 22, 27 and 29 and November 2, 3, 4, 6, 17 and 18.

Results: Three violations were identified: Two of these violations, one with five examples, were for inadequate procedures and failure to follow procedures (paragraphs 6, 8, 10, 11 and 13). The third violation was for changing the intent of a surveillance procedure without prior approval.

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## REPORT DETAILS

### 1. Licensee Employees Contacted

- \*E. W. Harrell, Station Manager
- R. C. Driscoll, Quality Control (QC) Manager
- \*G. E. Kane, Assistant Station Manager
- M. L. Bowling, Assistant Station Manager
- \*R. O. Enfinger, Superintendent, Operations
- \*M. R. Karisler, Superintendent, Maintenance
- \*A. H. Stafford, Superintendent, Health Physics
- J. A. Stall, Superintendent, Technical Services
- J. L. Downs, Superintendent, Administrative Services
- J. R. Hayes, Operations Coordinator
- D. A. Heacock, Engineering Supervisor
- D. E. Thomas, Mechanical Maintenance Supervisor
- G. D. Gordon, Electrical Supervisor
- \*L. N. Hartz, Instrument Supervisor
- F. T. Terminella, QA Supervisor
- J. P. Smith, Superintendent, Engineering
- D. B. Roth, Nuclear Specialist
- J. H. Leberstein, Engineer
- \*G. G. Harkness, Licensing Coordinator
- \*T. Johnson, Supervisor, Quality

Other licensee employees contacted include technicians, operators, mechanics, security force members, and office personnel.

\*Attended exit interview

NRC Regional Management Site Visit: J. N. Grace and F. S. Cantrell visited North Anna Power Station on November 19, to present certificates to recently licensed operators.

### 2. Exit Interview (30703)

The inspection scope and findings were summarized on November 19, 1987, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspectors findings. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection.

(Open) Unresolved Item (338,339/87-36-01) Potential Flooding of Safety Related Equipment (paragraph 5).

(Open) Violation (338,339/87-36-02) Violation of Technical Specification 6.8.1 for failure to follow procedures and inadequate procedures with five examples (paragraphs 6, 8, 11 and 13).

(Open) Unresolved Item (338,339/87-36-03) Potential Inadequate Post Maintenance Testing (paragraph 12).

(Open) Violation (339/87-36-04) Inadequate Procedure Resulting in the Overloading of the 2J Emergency Diesel Generator (paragraph 10).

(Open) Violation (339/87-36-05) Violation of Technical Specification 6.8.3 by changing the intent of a surveillance procedure without prior safety committee approval.

### 3. Plant Status

#### Unit 1

Unit 1 began the inspection period operating at approximately 49% power, waiting on NRC concurrence in the acceptability of steam generator repairs and the surveillance program to promptly detect steam generator tube leaks at full power. On October 26, the lower radial bearing of the "B" Reactor Coolant Pump (RCP) was damaged while manipulating the oil level to clear an alarm. The "B" RCP is being monitored by the licensee and the bearing temperature and vibration monitors indicate that the pump is stable and acceptable for continued operation (See Section 10 for details).

On November 5, the NRC issued a revised Confirmation of Action Letter (CAL) allowing the licensee to increase power to 100%. On November 9, the Region and Headquarters Staff briefed the Commissioners in Washington on the Steam Generator Tube Rupture (SGTR) event of July 15.

At the end of the inspection period Unit 1 was operating at 100% power.

#### Unit 2

Unit 2 began the inspection period in Mode 5, day 59, of the refueling outage. On October 22, the "C" accumulator was injected into the Reactor Coolant System (RCS) (which was partially drained at the time) while performing a valve stroking surveillance procedure (See Section 8 for details). On October 23, the licensee was informed by the NRC that the only acceptable retest for the overhaul of the Inside Recirculation Spray Pumps (IRSP) was a hydraulic test (See Section 7 for details). On October 26, while performing an 18-month surveillance test, the 2J Emergency Diesel Generator (EDG) was electrically overloaded due to an inadequate procedure (See Section 10 for details). Also, on October 26, while performing a valve stroking surveillance test, the operating charging pump discharge was aligned to the RCS which was solid and resulted in the lifting of the pressurizer PORV (See Section 8 for details). On October 27, the licensee satisfactorily completed the hydraulic retest of the IRSPs. On October 31, while in Mode 4 with the scram breakers closed, the engineering staff performed a surveillance test which resulted in an unexpected reactor trip signal and opened the scram breakers (See Section 11 for details).

On November 3, Unit 2 commenced a reactor startup. During the startup and performance of reactor physics testing, power range instrument N44, which had previously been made inoperable to support physics testing, was discovered by the operator to not have been placed in trip as required by technical specifications. When the instrument was placed in trip, the method used caused an inadvertent cooldown of the RCS to less than 541

degrees F which is also in noncompliance with technical specification (See Section 13 for details). On November 4 with the unit in Mode 1, less than 10% power, the licensee was unable to trip the turbine without using the local mechanical trip lever (See Section 10 for details). Also on November 4, the TS 3.0.3 shutdown statement was entered due to inoperable reactor protection system instrumentation (See Section 12 for details). This instrumentation was corrected and the shutdown was terminated at 0032 on November 5. Unit 2, as of the end of the inspection period, was operating at approximately 100% power.

#### 4. Unresolved Items

An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

Two unresolved items were identified during this inspection and are discussed in paragraphs 5 and 12.

#### 5. Licensee Event Report (LER) Follow-Up (90712 & 92700)

The following LERs were reviewed and closed. The inspector verified that reporting requirements had been met, that causes had been identified, that corrective actions appeared appropriate, that generic applicability had been considered, and that the LER forms were complete. Additionally, the inspectors confirmed that no unreviewed safety questions were involved and that violations of regulations or Technical Specification (TS) conditions had been identified.

(Closed) 338,339/P2186-03: BBC Brown Boveri K600/K800 Circuit Breakers Wire Harness Packing Gear In Contact With Wiring Harness and Wore a Hole Thru Insulation and Severed a Wire In Harness. The licensee has inspected the breakers and they were found to have no wiring harness damage.

(Closed) 338,339/P2187-01: Diaphragm Seal Plate Welded to Recirc Spray Heat Exchanger Head Flange Could Exceed Fatigue Life on a Limited Number of Overpressurizations. The licensee has replaced the diaphragm plates on Units 1 and 2 Recirculation Spray Heat Exchangers with much thicker plates.

(Closed) LER 338/85-03 and Rev. 1: Flooding Potential Not Previously Evaluated. The inspector had reviewed this LER previously and determined that the licensee had not taken any permanent corrective action. The licensee was requested to determine if any permanent corrective action was required. The licensee's evaluation concluded that a concrete wall would have to be constructed on the west wall of the turbine building to ensure the turbine building equipment and some safety related equipment would not be damaged during a worst case flood. This wall is scheduled to be constructed in 1989. In the mean time the licensee has procedures covering lake level control, shutting down the reactors if the level gets too high and emergency procedures covering damage to safety related

equipment. Long term corrective action had not been developed promptly by the licensee. This LER will be closed and identified as an Unresolved Item (338,339/87-36-01) pending further evaluation by the inspector.

(Closed) LER 339/86-09: Reactor Trip - June 29, 1986. The licensee has evaluated the 500-230KV transformers isolation. A new breaker was installed and a wiring change has been made to isolate bus 2 by taking its feed from Ladysmith line 525.

(Closed) LER 338/87-08: High Lift Pressure Setpoint on Pressurizer Safety Valves. The licensee analyzed the "as found" high lift setpoint using the most limiting overpressurization analysis. The design basis for the unit and the safety valves was still met.

(Closed) LER 338/87-05: I-131 Dose Equivalent Greater Than 1.0 Microcurie/Gram. The increase of I-131 dose equivalent specific activity was caused by minor fuel cladding defects which were present in the reactor core during a rapid power decrease.

(Closed) LER 338/87-02 (Rev. 1): Malfunctioning Cardreaders Resulted in Potential for Unauthorized/Undetected Access Into Vital Areas. The licensee has taken corrective action.

#### 6. Review of Inspector Follow-up Items (92701)

(Closed) Unresolved Item 338/87-34-02: Potential failure to follow procedure violation which resulted in the draining of the Refueling Water Storage Tanks (RWST) below the TS limit. This unresolved item is classified as a violation based on the inspector's review of the event. The operator, while securing makeup to the Unit 1 RWST from the Unit 2 blender, did not follow the lineup sequence established by 1-OP-7.7, Operation of RWST Systems. This failure to follow procedure resulted in the inadvertent draining of the RWST below the TS limits and is identified as the first example of violation 338,339/87-36-02.

#### 7. Monthly Maintenance (62703)

Station maintenance activities affecting safety related systems and components were observed/reviewed, to ascertain that the activities were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with the Technical Specifications.

The inspectors reviewed MMP-C-RS-1, the mechanical maintenance procedure for containment inside recirculation spray pumps. The inspectors also observed portions of the disassembly of the pumps. The "B" inside recirculation spray pump had a bearing replaced during the outage and both pumps were torn down for the five year inspection.

The licensee had committed to performing a hydraulic test of the pumps following the inspections. This commitment was made back in 1981. However, following this inspection the licensee informed the NRC that they were not going to flow test the pumps with water but just dry test the pumps to prove operability. This dry test is the method used by the

licensee to comply with the ASME Section II testing requirements and was submitted to the NRC as a relief request. However, this relief request had not been reviewed by the NRC. After several discussions with the Region and Headquarters staff, the inspectors informed the licensee on October 23 that the dry test was not adequate to determine operability of the pumps following major maintenance.

The inspectors witnessed the pump operability recirculation test of both inside recirculation spray pumps on October 27. This test was completed without any major impact on the outage schedule.

The 2A charging pump had been removed from service to perform maintenance on the seals and discharge check valve during performance of 2-PT-212.3. The pressure had dropped off when the discharge valve was opened indicating that the check valve was not seating. Maintenance opened up the valve and verified freedom of movement and the pump was retested. The pressure still dropped off. The pump was tagged out and the check valve blue checked. It will be ground in to reseal it and retested. Previous problems with the discharge check valve on pump 2C (Inspection Report 87-06) indicated grit in the swingarm and it was cleaned and retested.

No violations or deviations were identified.

#### 8. Monthly Surveillance (61726)

The inspectors observed/reviewed technical specification required testing and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation (LCO) were met and that any deficiencies identified were properly reviewed and resolved.

The inspectors observed 2-PT-61.4, RCS Pressure Isolation Valves Leakage Test. Portions of the test included testing of the low head safety injection discharge header valves to the hot and cold legs of the RCS. Also, the valves off the charging pump alternate discharge header were observed. No problems were identified.

On October 22, the licensee notified the inspectors that the Unit 2 "C" accumulator had been inadvertently injected into the RCS. At the time of the injection, Unit 2 was in Mode 5, with the RCS drained to approximately 10 inches above vessel nozzle center line. The injection occurred when an operator stroked the "C" accumulator discharge valve per surveillance test 2-PT-211.6. The inspector reviewed the surveillance procedure and determined that the procedure was established to perform the valve stroking with the RCS pressurizer between 800 and 1000 psig. This would prevent the accumulator from injecting into the plant. The operator had deviated the procedure to allow performance with the RCS depressurized but did not add any precautionary steps to ensure the accumulator was depressurized. This deviation, which changed the intent of the procedure, was not reviewed by the safety committee prior to performance as required by TS. Also, to complicate matters, the pressure and level instruments for the "C" accumulator were out of service for maintenance. Therefore, the operators had no idea of the actual status of the accumulator prior to stroking the discharge valve.

At the time of the valve stroking, the operators assumed that the "C" accumulator was depressurized because that was condition that had existed previously. However, earlier that day, the nitrogen system in containment had been pressurized and even though the nitrogen isolation valve to the "C" accumulator had been shut, the licensee concluded that the valve must have leaked by pressurizing the "C" accumulator to greater than 30 psig. This pressure was enough to overcome the height of the injection line and caused the "C" accumulator to inject into the depressurized RCS when the discharge valve came open. Following the injection, the licensee determined that the shutdown margin was still being maintained. Also, the licensee monitored the Residual Heat Removal (RHR) pump operation to ensure that the pump was not affected. The operating RHR pump was subsequently vented and determined not to have contained any accumulation of gases.

TS 6.8.3 states that temporary changes to procedures may be made provided the intent of the original procedure is not altered. TS 6.8.2 requires that changes which do not meet the temporary change criteria above shall be reviewed by the safety committee prior to implementation. Contrary to the above, the temporary change to 2-PT-211.6, which allowed the accumulator discharge valve to be operated with the RCS depressurized was an intent change which was not reviewed by the safety committee prior to implementation. This improper temporary change which resulted in an inadequate procedure, will be identified as a Violation (339/87-36-05) of TS 6.8.3.

The licensee informed the inspectors that on October 26, the Unit 2 Pressurizer Power Operated Relief Valve (PORV) lifted. The unit was in Mode 5 with the RCS full of water (solid plant operation) at the time of the event. The operators had just stroked MOV-2869B per 2-PT-211.2 and inadvertently aligned the operating charging pump discharge directly to the RCS through the safety injection line. This resulted in the RCS pressure exceeding the low pressure lift setpoint of the pressurizer PORV and lifting of the valve to relieve the pressure. The setpoint for the PORVs with the unit in Mode 5 is approximately 375 psig. This setpoint is established to prevent overpressurization of the RCS during low temperature and low pressure operation. The PORVs opened when the RCS pressure exceeded approximately 375 psig maintaining RCS pressure below the NDT design limits until the lineup to the charging pump was secured.

The inspector reviewed the procedure 2-PT-211.2 and determined that one of the initial conditions required all the charging pumps to be secured. The initial conditions had been established a couple of days earlier and were no longer applicable. The operator performing the procedure did not reverify the initial conditions prior to performing the valve stroking; however, he did realize the potential for overpressurizing the RCS by stroking the valve. Therefore, prior to stroking the valve, the operator reviewed the drawings associated with the charging system and incorrectly determined that the valve which he intended to stroke was isolated from the charging pump.

The failure of the operator to follow the procedure and ensure that the initial conditions were established prior to stroking the valve is a violation of TS 6.8.1. This failure to follow procedure will be identified as the second example of Violation (338,339/87-36-02).

9. ESF System Walkdown (71710), Verification of Containment Integrity (61715)

The inspectors locally observed the positioning of ten penetration valves inside and outside the containment on Unit 2. The inspectors walked down the valve alignment for the low head safety injection system on Unit 2 using 2-OP-7.1A. No problems were identified.

No violations or deviations were identified.

10. Operational Safety Verification (71707)

By observations during the inspection period, the inspectors verified that the control room manning requirements were being met. In addition, the inspectors observed shift turnover to verify that continuity of system status was maintained. The inspectors periodically questioned shift personnel relative to their awareness of plant conditions.

Through log review and plant tours, the inspectors verified compliance with selected Technical Specification (TS) and Limiting Conditions for Operations.

The inspectors kept informed, on a daily basis, of overall status of both units and of any significant safety matter related to plant operations. Discussions were held with plant management and various members of the operations staff on a regular basis. Selected portions of operating logs and data sheets were reviewed daily.

The inspectors conducted various plant tours and made frequent visits to the control room. Observations included: witnessing work activities in progress; verifying the status of operating and standby safety systems and equipment; confirming valve positions, instrument and recorder readings, annunciator alarms, and housekeeping.

The following comments were noted:

On October 28, 1987, the operators were draining oil from the Reactor Coolant Pump (RCP), 1-RCP-1B, lower radial bearing reservoir to correct a level alarm when the RCP lower radial bearing temperature went from 146 degrees F to 324 degrees F in a three to five minute period. Pump vibration was unchanged and following oil being added to the reservoir the temperature decreased back to 172 degrees F. Also during this event the seal water leakoff increased from 2.3 to 3.3 gpm at the same time as the temperature increase. Oil was added to the lower reservoir several more times.

On October 29, 1987, an oil sample was taken. Based on the sample results and the bearing temperature at the time of the event, Westinghouse informed the licensee that the bearing had been damaged. However, Westinghouse

stated that as long as the bearing temperature and vibration monitors are indicating in specification then the RCP was acceptable for continued operation. As of the end of the inspection period 1-RCP-1B bearing temperature was approximately 169 degrees F and the vibration monitor was indicating normal.

During a review of plant deviation reports on October 30, the inspector discovered that the licensee had exceeded the technical specification surveillance limits of 3000 kw during surveillance testing of the 2J Emergency Diesel Generator (EDG). On October 26, 1987, the licensee operated the 2J EDG at 3100 kw for approximately 10 minutes during the performance of 2-PT-83.4, Blackout of Emergency Bus for Shutdown Loads. This violation of TS 4.8.1.1.2.d.7 loading requirements was due to an inadequate surveillance procedure.

The surveillance procedure 2-PT-83.4 was inadequate because it incorrectly established a test equipment voltage range to be monitored which was supposed to be equivalent to 2900 to 3000 kw, but was actually equivalent to 3050 to 3150 kw. Approximately 10 minutes into the test, an engineer realized that the test equipment voltage range had been incorrectly calculated. The voltage range calculation had been based on a percentage of full scale of the kw meter which was incorrectly assumed to be 0 to 4000 kw. The engineer observed that the actual meter range was 0 to 4200 kw which made the test equipment voltage range incorrect. The diesel load was reduced to less than 3000 kw by the kw meter and the licensee determined that the EDG had been actually operating at approximately 3100 kw.

On October 30, following the discovery by the inspector, the licensee was requested to perform an engineering evaluation to determine operability of the 2J EDG. This evaluation had been committed to by the licensee as documented in Inspection Report 87-04, to be performed following an inadvertent overloading of the EDG. The evaluation which was performed and discussed with Colt on October 30 concluded that the 2J EDG was fully operable based on the original design rating of 3100 kw for 168 hours.

A review of previous violations revealed that during the last performance of 2-PT-83.4, in February 1986, the licensee received a violation for electrically overloading the 2J EDG. The corrective action for ensuring that the diesels are not overloaded during testing was to place a dedicated operator on the diesel panel to monitor the kw meter and to reduce the load anytime it exceeded the TS limits. However, even though the operator was monitoring the panel, he allowed the 2J EDG to operate at an indicated load of 3100 kw for 10 minutes because the test engineer informed him that the more accurate indication provided by the test equipment instrumentation, using the voltage data in the procedure, ensured that the diesel was not loaded above 3000 kw. The licensee determined that the data provided in the procedure was incorrect and the kw meter was actually indicating correctly.

ANSI N18.7-1976, Administrative Control and Quality Assurance for the Operational Phase of Nuclear Power Plants, Step 5.2.1, states in part that it is the responsibility of operating personnel to believe and respond conservatively to instrument indications unless they are proved to be

incorrect. This ANSI standard is implemented by the licensee in Administrative Procedure 19.26, Instrumentation and Controls, which states in part, unless an instrument, instrument channel or instrument train has been proven to be inaccurate or inoperable, it is the responsibility of operating personnel to believe the instruments. However, 19.26 goes on to say that operating personnel should not make operational decisions based solely on a single parameter indication when one or more redundant indications are available. In this case, even though the diesel kw meter had not been proven inoperable, the licensee felt the test equipment instrumentation was more accurate. Based on the requirements of ANSI N18.7-1976, Step 5.2.1 and Administrative Procedure 19.26, operators should always question instrumentation indications which are outside operating criteria and believe those indications are correct until given appropriate evidence showing the contrary.

The licensee's corrective action for violation 86-04-01 was not adequate to ensure that during subsequent performances of 2-PT-38.4, the EDGs would not be overloaded. The inadequate procedure 2-PT-83.4, which resulted in the electrical overloading of the 2J EDG is a violation of TS 6.8.1, which requires that written procedures be established, implemented and maintained. This inadequate procedure will be identified as Violation (339/87-36-04). This violation will also be identified as similar to Violation (339/86-04-01).

On November 4, 1987, at 1200 hours, with Unit 2 at 5% power and while performing 2-OP-15.1 "Main Turbine Operation", the turbine did not trip from the control room and had to be tripped locally. It was later discovered that a part of an "O" ring was discovered lodged in the auto-stop oil dump line preventing the pressure from dropping sufficiently to trip the turbine. The debris was removed and the turbine was tripped successfully from the control room at 1542 hours.

Following a discussion with the licensee and a review of the operation of the main turbine trip system, the inspector concluded that the position of the O-ring in the auto-stop oil system would not have affected the operation of the mechanical overspeed trip system, the backup master trip solenoid valve, the backup emergency trip valve or the overspeed protection solenoid valves. Consequently, for the major automatic turbine trip signals; overspeed, reactor trip, steam generator high-high water level, safety injection, feedwater pump trip, high level in feedwater heaters, low auto-stop oil pressure, EHC oil reservoir low-low level, switchyard backup lockout and main generator breaker failure, the turbine trip system would have still functioned properly and tripped the turbine. Based on the above information, the turbine trip system was still in compliance with the TS requirements.

During a review of licensee deviation reports, the inspector discovered that both of the Unit 2 EDGs were inoperable on November 10 with the unit in Mode 1 operating at approximately 45% power. The 2J EDG had been tagged out to perform preventative maintenance and was therefore declared inoperable at 0534 on November 10. The 2H EDG was operational with only one starting air tank and compressor because the other starting air tank and compressor had been blown down and tagged out. At approximately 1645 on November 10, the licensee discovered the only pressurized starting air

tank on the 2H diesel to be approximately 100 psig below the required pressure. This made the 2H EDG technically inoperable; however, the EDG would still have started according to the licensee. The licensee stated that the starting air tank was repressurized to above 240 psig within one hour, meeting the TS Action Statement 3.8.1.1.e limit of two hours. Also, the inspector reviewed a completed copy of 2-PT-80, Offsite AC Sources, that was completed within an hour of the discovery of both diesels being inoperable. This surveillance complies with the TS Action Statement 3.8.1.1.e for performing TS surveillance requirement 4.8.1.1.1.a within one hour.

11. Operating Reactor Events (93702)

The inspectors reviewed activities associated with the below listed reactor events. The review included determination of cause, safety significance, performance of personnel and systems, and corrective action. The inspectors examined instrument recordings, computer printouts, operations journal entries, scram reports and had discussions with operations, maintenance and engineering support personnel as appropriate.

On October 31, the licensee notified the NRC via the ENS phone of a Reactor Protection System (RPS) actuation on Unit 2. The unit was in Mode 4 with the scram breakers closed and the engineering staff was performing a surveillance procedure 2-PT-71.4 at the time of the actuation. The purpose of the surveillance procedure was to test the auxiliary feedwater pump time response to an automatic start signal. However, unknown to the engineer and to the reactor operator, the test signal required by the procedure not only started the auxiliary feedwater pumps, but also generated a reactor trip signal. This resulted in the unexpected cycling of the reactor trip breakers. The failure of the procedure to recognize and provide a caution that a reactor trip signal would be generated is a violation of TS 6.8.1 for an inadequate procedure. This inadequate procedure will be identified as the third example of Violation (338,339/87-36-02).

12. Instrumentation Problems Related to Startup of Unit 2 on November 4 and 5, 1987 (71707)

At 1915 on November 4 the Unit 2 "B" Loop delta T protection was placed in trip due to it being out of calibration with "A" and "C" loops. Due to a prior failure of the B loop RTD, the spare RTD was being utilized and the generic calibration data was inputted to calibrate channel "B". Also during the increase to power, neither flow indicator FI-2474 ("A" Steam Generator Steam flow Channel 3) or FI-2485 ("B" Steam Generator Channel 4) were reading on scale.

At 2153 the steam flow instruments FI-2474 and FI-2485 were declared inoperable and the licensee entered Technical Specification 3.0.3 which requires shutdown in six hours. The decision to enter Technical Specification 3.03 and not place the steam flow channels in trip was taken by the licensee as a precautionary measure. The licensee felt that with

the "B" delta T channel in trip and two steam flow channels in trip that a single channel failure could cause a safety injection and resulting reactor trip.

At 2200 shutdown was commenced per OP 2.2 and an unusual event was declared. A containment entry was made and mechanical agitation of FI-2485 sensing lines caused it to return to service.

A decision was then made to deviate 2-AP-3.7, Loss of Vital Instrumentation Steam Flow, to allow placing steam flow channel 3 FI-2474 in trip with "B" loop delta T in trip. At 0012, FI-2474 was placed in trip and at 0026, the Notification of Unusual Event was terminated. Power was returned to 20% at 0101.

At 0206, an instrument technician found the field wiring to cabinet 3 terminal board "J" contacts 10 and 11 for the FI-2474 instrument to be reversed between the cabinet and the transmitter FI-2474. The licensee is investigating to determine if this happened while the Ray Chem splices were being corrected during the overhaul. The inspectors will investigate to determine if modifications had been made without required post maintenance testing. This will be identified as Unresolved Item (338,339/87-36-03).

At 0220, FI-2474 was returned to service. The abnormal procedures were exited and the action statement cleared. The channel was removed from trip.

At 0539, new cross calibration data was used to calibrate "B" loop channel II TAVE and delta T. The action statement was cleared. This action removed the last of the channels from trip.

### 13. Plant Startup From Refueling (71711)

The low head safety injection and core flood system lineup was walked down to ensure proper lineup. The inspectors also witnessed portions of 2-PT-61.4 (See surveillance, Section 8) and 2-PT-83.1 "Simulated Blackout and SI-H-Bus".

The inspectors witnessed portions of the Unit 2 refueling outage startup physics testing. The following portions of 2-PT-94.0, Refueling Nuclear Design Check Tests, were witnessed.

- a. 4.1-Determine zero power testing flux range and establish the zero power testing flux level.
- b. 4.3-Establish initial conditions for determination of the All-Rods-Out Critical Boron Concentration.

On October 30, prior to the performance of 2-PT-94.0 "Refueling Nuclear Design Check" Instrumentation and Control (I&C) technicians connected a meter to power range instrument N44 per procedure ICP-2-N44, to support the test. At some point following the connection of this meter, N44 was adjusted to 0 which made it inoperable. Neither, the I&C procedure nor

2-PT-94.0 required N44 protection signals to be placed in trip or inform the operators that the instrument was inoperable. On November 3, 1987, with the unit in Mode 2 the operators realized that N44 was inoperable and the protection signals had not been placed in trip as required by TS. The unit had been in Mode 2 for over six hours before the operator discovered the problem. TS, Table 3.3-1 requires an inoperable power range instrument to be placed in trip within one hour when in Modes 1 or 2, to allow startup or power operation to continue. Neither the instrument department procedures nor the physics test procedures required that the channel be placed in trip. The procedures were revised to prevent a recurrence. A plant deviation was submitted for being in Mode 2 without N44 in trip. The failure of the procedures to require N44 protection signals to be placed in the trip condition resulting in the licensee being in noncompliance with TS is a violation of TS 6.8.1 for an inadequate procedure. These inadequate procedures will be identified as the fourth example of Violation (338,339/87-36-02).

Following the operator's discovery, a signal was dialed into the N44 circuitry which was the equivalent of 120% power. This was performed, instead of the requirements of Abnormal Procedure (AP) 4.3, Malfunction of Nuclear Instrumentation (Power Range), to place N44 protection signals in the trip condition. In prior tests, the instrument department had placed the channel in test when installing the meter. The steam generator (S/G) startup feedwater regulator valves for "A" and "B" S/Gs were in the auto position and opened as a result of the anticipatory power increase. This caused an inadvertent reactor cooldown which resulted in TAVE dropping below 541 degrees F which is in noncompliance of the technical specification limits. The licensee was able to increase TAVE to above 541 degrees F prior to exceeding the TS action limit of 15 minutes preventing the unit from having to be shutdown. The failure of the licensee to follow AP-4.3 when placing the power range instrument in the trip condition, resulting in an inadvertent cooldown of the RCS below the TS limits is a violation of TS 6.8.1 for failure to follow procedure. This failure to follow procedure will be identified as the fifth example of Violation (338,339/87-36-02).

The inspectors reviewed the test data on the rod drop test including the retest of rod K-8 which would not move during testing. The licensee discovered the rod circuitry had a loose connector and successfully tested the rod following correction of the loose connector.

#### 14. Unit 2 Startup Problem

Inspection Report 87-19 identified several problems associated with the Unit 1 refueling outage and startup following the outage. Examples of these problems include: reactor trip from 18% power due to an improperly performed non-safety related tagout, while at 50% power; discovery of improperly installed moisture separator reheat stop valve which prevented the valve from going fully shut as required by TS, and prior to the startup in Mode 6 core alterations were performed without a fully operable charging pump as required by TS. The licensee has conducted an aggressive study of those problems along with several others they have identified. The study has provided the licensee with several generic root causes and

the licensee is establishing corrective actions to prevent recurrence. One of the corrective actions involves increased station management involvement in plant activities and providing more supervision involvement of all levels at the job sites.

The corrective actions taken in response to the previous Unit 1 problems were not sufficiently in place to prevent the Unit 2 outage and startup errors described in this report. The licensee has had several of the personnel involved in the errors discuss the problems with the Vice President of Nuclear Operations demonstrating the significance being placed on these errors by licensee management.

The inspectors have observed that the licensee has a good system of identifying their problems and mistakes; however, corrective action to prevent recurrence needs improvement. The licensee is also trying to determine if there are any generic root causes associated with their errors. However, based on the recent experience with the Unit 1 restart attempts in June and July and the Unit 2 problems, the licensee must place increased emphasis on establishing corrective actions to prevent recurrence.

15. Security Inspection (71881)

The resident made a tour with security of all the vital areas. The inspector identified to security that the condition of the security batteries needed to be corrected. Corrosion deposits were visible on several of the terminals.

The inspectors verified that the minimum amount of armed guards required by the Physical Security Plan (PSP) were on site for each shift and that at least one of the individuals authorized by the PSP to direct security was on site each shift.

The inspectors made a tour with Quality Assurance and Security to determine the status of illumination in the protected area.

No violations or deviations were identified.