

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report Nos. 50-387/87-18; 50-388/87-17  
Docket Nos. 50-387; 50-388  
License Nos. NPF-14; NPF-22  
Licensee: Pennsylvania Power and Light Company  
2 North Ninth Street  
Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station

Inspection At: Salem Township, Pennsylvania

Inspection Conducted: October 1, 1987 - November 15, 1987

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Section No. 3B, DRP

12-14-87  
Date

Inspection Summary:

Areas Inspected: Routine resident inspection of plant operations, physical security, plant events, previous inspection findings, surveillance, maintenance, refueling activities, and open item followup.

Results: No violations or deviations were identified.

TABLE OF CONTENTS

	<u>Page</u>
1.0 Followup on Previous Inspection Findings . . . . .	1
2.0 Routine Periodic Inspections . . . . .	3
2.1 Operational Safety Verification	
2.2 Station Tours	
3.0 Summary of Facility Activities . . . . .	4
3.1 Unit 1 Summary	
3.2 Unit 2 Summary	
3.3 Spill in The Radwaste Building	
3.4 Inactive Status SROs Supervising Refueling Operations	
4.0 Licensee Reports . . . . .	8
4.1 In-Office Review of Licensee Event Reports	
4.2 Onsite Followup of Licensee Event Reports	
4.3 Review of Periodic and Special Reports	
5.0 Surveillance and Maintenance Activities . . . . .	11
5.1 Monthly Surveillance Observations	
5.2 Monthly Maintenance Observations	
6.0 Unit 1 Third Refueling and Inspection Outage . . . . .	12
7.0 Management Meetings . . . . .	13

## DETAILS

### 1.0 Followup on Previous Inspection Findings

#### 1.1 (Closed) Violation (388/84-19-01): Bypassed SRM While Loading Fuel in Operational Condition 4

On April 10, 1984, core alterations were conducted in core quadrant 'A' with Source Range Monitor (SRM) Channel 'A' in bypass violating the Technical Specifications. Despite the fact that there was annunciator indication in the control room that SRM 'A' was bypassed, the condition was allowed to exist through two shift turnovers, while core alterations were in progress. An enforcement conference was held on May 7, 1984, and a Civil Penalty was issued on July 6, 1984.

The licensee responded to the enforcement action on August 3, 1984 (PLA-2250). Corrective action taken by the licensee included operator training, personnel action, and revision of shift turnover practices. The event was incorporated into the license operators requalification program, and all shifts completed the training. Licensee management took appropriate personnel actions in regard to personnel conduct. The shift turnover practices were revised to include several overlapping panel walkdowns. In addition, the administrative procedure for shift routine was revised to require the operators to record panel alarms and the reason for each alarm.

The licensee also conducted several reviews of operations performance to assess the quality of operations. Reviews were conducted by management personnel, NSAG, an INPO assistance visit, and an independent consultant. A number of items identified during these reviews were incorporated into an Operations Enhancement Program. The program has resulted in significant improvement in the operations performance and control room environment, as discussed in the previous SALP report.

The inspector reviewed the violation response, the revised administrative procedures, and observed control room operations since implementation of the revised programs. The corrective actions taken, coupled with the continuing Operations Enhancement Program, should prevent recurrence of similar events.

#### 1.2 (Closed) Unresolved Item (388/84-28-03): Technical Specifications Require Correction to Reflect As-Built Plant

In July 1984, the inspector identified that the Unit 2 Technical Specifications were inconsistent with the Unit 1 Technical Specifications concerning the number of fire detectors in several common fire zones.

The licensee submitted Proposed Amendment 40 to License No. NPF-22 on August 5, 1986. The proposed Amendment corrects the Fire Detection Instrumentation Table 3.3.7.9-1 to be consistent with the Unit 1 Technical Specifications and the as-built condition. The inspector reviewed the submitted proposed Amendment and verified the items of concern had been corrected.

1.3 (Closed) Deviation (388/84-34-03): Compliance With Regulatory Guide 1.47

In July 1984, the inspector identified that commitments in FSAR Section 3.13.3 regarding Regulatory Guide 1.47, "Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems" were not satisfied. The Regulatory Guide requires automatic indication in the control room for each deliberately induced inoperable status that renders safety systems or their auxiliaries unable to perform their safety function, if this occurs more frequently than once per year.

In response to the Deviation, the licensee installed a modification which permits surveillance testing of the degraded grid voltage protection relaying without disabling the automatic 4KV bus transfer to alternate power sources on loss of power. The Unit 1 modifications were reviewed previously in Inspection Reports 50-388/85-10 and 50-388/86-11. The Unit 2 modification, PMR-3114 was later installed during the First Refueling Outage.

The applicable surveillance procedures SM-104(204)-009-012 have been revised to include the new modification. The inspector verified the surveillance procedure revision.

1.4 (Closed) Inspector Followup Item (388/85-16-01): RHR Checkoff Lists Did Not Reflect Status of Containment Boundary Valves

In June 1985, the inspector noted that of four recently installed containment boundary valves in the RHR system, only two were indicated locked closed and none of the valves were indicated as containment isolation valves. The licensee revised the associated checkoff list to properly reflect the administrative controls required for these containment boundary valves. The inspector verified that the checkoff lists reflected the proper status of the valves (i.e. locked closed).

1.5 (Closed) Violation (388/85-17-01): Not Locking Closed RCIC Containment Isolation Valve

On July 9, 1985, the inspector noted that RCIC valve 249F055, a 1-inch manual LLRT test valve which is a containment isolation valve, was closed but not locked. Administrative procedure, AD-QA-302, "System Status and Equipment Control", Section 6.1.3 specified that manual containment isolation valves (including LLRT test valves) were

to be locked. A previous violation in 1984 had occurred for not locking closed manual LLRT test valves which are containment boundaries. The licensee modified the checkoff lists, locked the valve, and initiated a review of all containment penetrations.

The licensee responded to the violation on September 13, 1985 (PLA-2532). The licensee stated that a comprehensive review and analysis was conducted to identify containment boundary valves. The valves were compared to the checkoff lists, and the associated drawings were revised to clearly identify containment boundary valves. In addition, the licensee developed a position that while test, vent, or drain valves located on the penetration barrier are not containment isolation valves in the strict sense, they should provide positive isolation of the penetration using at least two physical barriers. Therefore, in each line which connects directly to a containment penetration (i.e., the line is connected between the two containment isolation valves, or inboard of a single isolation valve), there must be one locked closed valve and either a second closed valve under strict administrative control or a threaded cap. For those test, vent and drain valves located outboard of single containment isolation valves where a closed loop is used as the second barrier, the valves are not required to be locked, but under strict administrative controls.

The inspector reviewed the licensee's analysis of the containment isolation valves, selected checkoff lists and system drawings, and the revised administrative procedure, and verified the corrective action taken. In addition, the inspector held discussions with NRR staff members and Region I management and confirmed that the licensee's approach was acceptable. The inspector noted that the Administrative Procedure, AD-QA-302, lacked clarity in its incorporation of the position taken during the above-described review. The licensee revised the procedure on October 20, 1987.

## 2.0 Routine Periodic Inspections

### 2.1 Operational Safety Verification

The inspector toured the control room daily to verify proper manning, access control, adherence to approved procedures, and compliance with LCOs. Instrumentation and recorder traces were observed and the status of control room annunciators was reviewed.

Nuclear Instrument panels and other reactor protection systems were examined. Effluent monitors were reviewed for indications of releases. Panel indications for onsite/offsite emergency power sources were examined for automatic operability. During entry to and egress from the protected area, the inspector observed access control, security boundary integrity, search activities, escorting and badging, and availability of radiation monitoring equipment.

The inspector reviewed shift supervisor, plant control operator and nuclear plant operator logs covering the inspection period. Sampling reviews were made of tagging requests, night orders, the bypass log, Significant Operating Occurrence Reports (SOORs), and QA nonconformance reports. The inspector observed several shift turnovers during the period and routinely attended work planning meetings. In addition, the inspector conducted midnight shift inspections on October 6, 1987 and weekend/holiday coverage on October 17, 1987.

## 2.2 Station Tours

The inspector toured accessible areas of the plant including the control room, relay rooms, switchgear rooms, cable spreading rooms, penetration areas, reactor and turbine buildings, diesel generator buildings, ESSW pumphouse, the security control center, and the plant perimeter. During these tours, observations were made relative to equipment condition, fire hazards, fire protection, adherence to procedures, radiological controls and conditions, housekeeping, security, tagging of equipment, ongoing maintenance and surveillance and availability of redundant equipment.

No unacceptable conditions were identified.

## 3.0 Summary of Facility Activities

### 3.1 Unit 1 Summary

Unit 1 continued with its Third Refueling Outage which commenced on September 12, 1987. Core reloading commenced on October 18 and was completed on October 24 with the replacement of 524 irradiated fuel bundles and 240 new bundles. The reactor vessel head was replaced and tensioned with Condition 4 being reached on November 5. The Operational Hydrostatic Leak Test (1,000 psig) was completed on November 7.

At 4:20 p.m. on November 1, electrical switching to restore from the Unit 1 Refueling Outage auxiliary bus work was in progress when a momentary half-scrum from the 'B' RPS side occurred and a Division II containment isolation signal was received. At the time, the 'A' RHR pump was in shutdown cooling and the 'B' RPS system was aligned to its alternate power supply. As a result of the containment isolation signal, the outboard shutdown cooling isolation valve (HV-151-1F008) closed and the 'A' RHR pump tripped on a loss of suction. The cause of the occurrence was a momentary voltage transient which was induced by the untying of load centers 1B250 and 1B260 under Permit No. 1-87-2438. The 'B' RPS alternate supply is fed from 1B260, as is the isolation signal for 1F008, thus the 'B' RPS half-scrum and closure of 1F008. The half-scrum and isolation signals were reset and RHR shutdown cooling restored.

At 3:38 a.m. on November 5, while conducting the 18 Month Functional Test of Primary and Secondary Containment Isolation (SE-159-200) a Zone III isolation occurred which caused actuation of the 'B' train of Standby Gas Treatment, Control Room Emergency Outside Air Supply, and Zone III Recirculation Fan Systems. Investigation by the licensee determined that apparent personnel error resulted in the placement of a jumper in panel 1C611 instead of panel 1C623 as called for in SE-159-200 step 6.10.5, which placed the reactor water sample valve isolation logic switch AU/0214-522D in test. The jumper was relocated to the correct panel, all affected systems restored to standby, and testing resumed.

At 8:17 p.m. on November 13, during the performance of the 18 Month Containment Instrument Gas System (CIG) Remote Position Indicator (RPI) checks (SO-215-015), a blown fuse (F4-79) in the control logic for solenoid operated valve SO-12605 at the Remote Shutdown Panel, caused it to close and trip the 'A' CIG compressor. The blown fuse was apparently caused by a momentary short to ground when the cover was removed from the solenoid operator. The fuse was replaced, the valve reopened, the compressor restarted, and testing resumed.

The inspector concluded that the licensee responded to the above events by implementing appropriate immediate corrective action and restoring safety systems in a timely manner. Safety systems functioned as designed for the initiating signal(s) and reporting requirements of 10 CFR 50.72 were met. Licensee Event Reports (LERs), detailing the licensee's evaluation of root causes and long-term corrective actions are required for these events. These reports are routinely reviewed by the inspector.

### 3.2 Unit 2 Summary

Unit 2 operated at or near full power for most of the inspection period. Scheduled power reductions were conducted throughout the period for control rod pattern adjustments, surveillance testing and scheduled maintenance.

At 8:30 a.m. on October 28, an internal electrical arc-over of the 'A' auxiliary boiler caused an overcurrent trip of its 13.8 KV supply breaker and resultant electrical transient on the T-10 startup transformer. As a result, the Division I Containment Atmosphere Control (CAC) valves received a spurious signal to close. In addition, the Reactor Building Chiller switched from the 'A' to 'B', the reactor building particulate-iodine-noble gas monitor tripped and the 'A' reactor feedwater pump speed controller switched to manual. Following the event, all affected systems were returned to normal service.

Cause of the arc-over was determined to be due to a combination of low boiler pressure and high conductivity.

The inspector concluded that the licensee responded to this event by implementing appropriate corrective action and restoring safety systems in a timely manner. Safety systems functioned as designed for the initiating signal and the reporting requirements of 10 CFR 50.72 were met.

### 3.3 Spill in The Radwaste Building

During the Unit 1 Third Refueling Outage, the instrument air system was removed from service in order to perform preventive maintenance and the service air system used as its normal backup source. At 6:20 a.m. on October 5, the licensee was preparing to precoat the 'B' liquid radwaste (LRW) filter. Fluctuations in service air pressure caused the low air pressure alarm to annunciate on the radwaste control panel. This alarm originates from a pressure switch in the air supply to the valve operators which also causes air operated valves HV-06227A & B to drive close when low air pressure is sensed. HV-06227A & B are 16 inch, 4-way solenoid air operated knife gate valves at the outlet of the A & B LRW filters in line to the A & B waste mixing tanks. Prior to precoating the filter, the filter cake discharge valve is opened to allow backflushing to the waste mixing tank. The valve is then shut prior to precoating the filter to prevent draining the precoat to the waste mixing tank. During this event, the operator completed backflushing the 'B' filter but did not return the HV-06227B control switch to the close position since upon observation the valve was already in the close position. The operator, although aware that low air pressure existed due to the alarm, did not connect the fact that HV-06227B was closed due to the low air pressure and not due to control switch position. The operator then commenced precoating the 'B' radwaste filter. During the precoat operation, Instrument Air was returned to service, air pressure

increased, and as a result HV-06227B opened allowing the filter medium to flow to the 'B' waste mixing tank. The waste mixing tank overflowed to floor drains which backed up on the 646 foot elevation of the Radwaste Building inside the personnel decontamination room, resulting in approximately 400 square feet of area becoming contaminated to levels of 22 mR/hr and 25 mRad/hr. No personnel were contaminated. The overflow was stopped immediately upon receipt of the high level alarm on the 'B' waste mixing tank by terminating the pre-coat and closing HV-06227B. Decontamination activities were promptly initiated and access to the area restored.

The licensee elected to issue a press release describing the spill and made an ENS notification due to the press release. In addition, a Significant Operating Occurrence Report (SOOR) (1-87-279) was issued to investigate and resolve the event.

The licensee has taken action to assure that the operators are aware of the effect of air pressure fluctuations on these valves and has instituted a policy that directs the operators to terminate any processes in operation if a low air pressure alarm is received. During discussions with the licensee, the inspector addressed previous problems with these valves and requested the licensee consider other potential long-term corrective actions which may be appropriate.

The licensee's corrective actions will be reviewed in a subsequent inspection (387/87-18-01).

#### 3.4 Inactive Status SROs Supervising Refueling Operations

On September 18, the licensee discovered that two assistant unit supervisors (AUS's) with SRO licenses, assigned to fuel handling operations did not meet the requirements of 10 CFR 55.53(f)(2) in that AUS's do not normally perform the functions of an SRO to maintain active status per 10 CFR 55.53(e). The two AUS's had performed fuel handling operations from 3:23 a.m. to 3:00 p.m. on September 18. This also was a violation of the requirements of Technical Specification 6.2.2.d in that no active SRO was directly supervising core alterations during this period. Although Technical Specification 6.2.2.d does not specifically state that the SRO must be in active status, that is the intent of this specification. The licensee stated that prior to the latest revision of 10 CFR 55, dated March 31, 1987, the AUS was considered to be actively licensed for fuel handling operations only. The AUS position was routinely assigned to refueling operations and the two individuals involved have extensive operating experience on the refuel bridge as both RO's and SRO's.

The licensee took prompt action to place an active status SRO on the refueling floor to supervise and observe the AUS's for an 8 hour shift before they were allowed to resume the duties of a refueling SRO. Prior to this event, the licensee had initiated consolidation of the procedures governing "Return to Shift" training in an effort to simplify and clarify the "Return to Shift" process. This, in addition to operator training on the event should help to prevent a recurrence. The licensee also stated that they are considering a program which would assure that all AUS's with SRO licenses maintain an active status.

The inspector reviewed the Significant Operating Occurrence Report (SOOR) (1-87-257) and its resolution and discussed the event and its significance with the licensee. This occurrence was promptly identified and corrected by the licensee. The licensee also evaluated this event for reportability per 10 CFR 50.73. The licensee initially determined that no LER was required. He based this determination on NUREG-1022, Supplement I, (February 1984), which provides NRC guidance on reportability. The licensee characterized this event as a violation of an administrative requirement of Technical Specifications, which is not reportable per NUREG-1022, Supplement 1. The inspector stated that the event more closely approximates a violation of shift manning requirements, for which the NUREG recommends submitting an LER. On November 25, 1987, the licensee agreed to submit an LER by December 25, 1987. This item is unresolved pending review of the licensee's submittal of the followup Licensee Event Report (387/87-18-02).

#### 4.0 Licensee Reports

##### 4.1 In-Office Review of Licensee Event Reports

The inspector reviewed LERs submitted to the NRC:RI office to verify that details of the event were clearly reported, including the accuracy of description of the cause and adequacy of corrective action. The inspector determined whether further information was required from the licensee, whether generic implications were involved, and whether the event warranted onsite followup. The following LERs were reviewed:

##### Unit 1

87-026 Reactor Building Heating, Ventilating and Air Conditioning Zones I & III Cross-tied

\*87-027 Entry Into L.C.O. for Modification Implementation

\*Further discussed in Detail 4.2

87-028 Primary Containment Isolation Valve Closure Due to Spurious High Shutdown Cooling Flow Signal

86-018 Rev. 1, Division I LOCA Isolation When 'A' Reactor Protection System Bus Power Lost

Unit 2

\*\*87-009 Reactor Water Cleanup Isolation From High Room Differential Temperature Signal

\*\*87-010 Auxiliary Boiler Arc-Over Causes Primary Containment Isolation Valve Closure

87-011 Common Loads on 125 VDC Battery Were Not Transferred Per Procedure

\*Further discussed in Detail 4.2

\*\*Previously discussed in Inspection Report 50-387/87-16; 50-388/87-16

4.2 Onsite Followup of Licensee Event Reports

For those LERs selected for onsite followup (denoted by asterisks in Detail 4.1), the inspector verified that the reporting requirements of 10 CFR 50.73 had been met, that appropriate corrective action had been taken, that the event was adequately reviewed by the licensee, and that continued operations of the facility was conducted in accordance with Technical Specification limits. The following findings relate to the LERs reviewed on site:

4.2.1 LER 87-027: Entry Into LCO 3.0.3 for Modification (Unit 1)

On September 10, 1987, with Unit 1 operating at 100 percent power, Technical Specification LCO 3.0.3 was entered intentionally for 23 minutes. This was a planned evolution for the purpose of performing wiring modifications which included temporarily declaring the Division I 4KV busses inoperable due to deenergization of control power through their degraded grid voltage protection circuitry. The licensee subsequently recognized that an alternate method of performing the modifications could have precluded entry into the LCO. The modifications were performed to increase the reliability of the LOCA load shed logic circuitry.

Following the event, the inspector discussed the intended application of LCO 3.0.3 with station management. LCO 3.0.3 is not intended to be used as an operational convenience which permits redundant safety systems to be out of service for a limited period of time. Its intended purpose is to provide guidance on the time limits for an "orderly" shutdown when the individual LCO or Action Statements in other specifications cannot be complied with. Generic Letter 87-09 was recently issued to clarify the basis and intent of LCO 3.0.3. The inspector provided the licensee with a copy of Part 9900 of the NRC Inspection Manual concerning STS Section 3.0.3.

In the LER, the licensee stated that they recognized that LCO 3.0.3 was not intended to be used as an operational convenience in lieu of other alternatives that would not result in redundant systems or components being inoperable. The licensee's corrective action consisted of the compliance group preparing a summary of the basis and intended use of LCO 3.0.3 and reviewing it with senior station managers and PORC.

#### 4.3 Review of Periodic and Special Reports

Upon receipt, periodic and special reports submitted by the licensee were reviewed by the inspector. The reports were reviewed to determine that they included the required information; that test results and/or supporting information were consistent with design predictions and performance specifications; that planned corrective action was adequate for resolution of identified problems; and whether any information in the report should be classified as an abnormal occurrence.

The following periodic and special reports were reviewed:

- Monthly Operating Report - September 1987, dated October 14, 1987.
- Monthly Operating Report - October 1987, dated November 11, 1987.

The above reports were found acceptable.

## 5.0 Surveillance and Maintenance Activities

### 5.1 Surveillance Observations

The inspector observed the performance of surveillance tests to determine that: the surveillance test procedure conformed to Technical Specification requirements; administrative approvals and tag-outs were obtained before initiating the test; testing was accomplished by qualified personnel in accordance with an approved surveillance procedure; test instrumentation was calibrated; limiting conditions for operations were met; test data was accurate and complete; removal and restoration of the affected components was properly accomplished; test results met Technical Specification and procedural requirements; deficiencies noted were reviewed and appropriately resolved; and the surveillance was completed at the required frequency.

These observations included:

- SM-102-C03, 18 Month Channel 'C' 10630 125 VDC Battery Electrical Parameter Test and Inspections, Battery Service Discharge and Battery Charger Capability Test, performed on October 15, 1987.
- SO-151-002, Quarterly Core Spray Flow Verification, performed on October 7, 1987.

No unacceptable conditions were identified.

### 5.2 Maintenance Observation

The inspector observed portions of selected maintenance activities to determine that the work was conducted in accordance with approved procedures, regulatory guides, Technical Specifications, and industry codes or standards. The following items were considered during this review: Limiting Conditions for Operation were met while components or systems were removed from service; required administrative approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and QC hold points were established where required; functional testing was performed prior to declaring the particular component operable; activities were accomplished by qualified personnel; radiological controls were implemented; fire protection controls were implemented; and the equipment was verified to be properly returned to service.

These observations included:

- WA S63545, Reinstallation of Standby Liquid Control System (SLCS) Squib Valves 148F004A & B, performed on October 17, 1987.
- Reinstallation of Steam Separator and Torqueing of Shroud Head Bolts, performed on November 2, 1987.

No unacceptable conditions were identified.

## 6.0 Unit 1 Third Refueling and Inspection Outage

### 6.1 Underwater Repair Welding of Unit 1 Steam Dryer

Repairs to the Unit 1 steam dryer began on October 6 to the crack discovered on September 18 in a type 308 weld joint between the 1/8 inch thick curved dryer hood and 1/4 inch thick end plate at 215° azimuth.

Welding was performed underwater to minimize irradiation effects on eight diver/welders from Global Co., Louisiana using the manual shielded metal arc process (WPS-GWPS-SMAW). After repair of the seam, the area was reinforced by welding a 3/16 inch thick plate to the hood and end plates as in the repairs performed in 1983 on the 45° weld seam location and on all four locations on the Unit 2 dryer. Instrumentation placed on the Unit 1 dryer following the 1983 failure exhibited stresses which exceeded the design endurance limit of 10 KPSI to 22 KPSI without the stiffener plate; however, stresses were reduced to 2 KPSI with the stiffener plate installed. Stiffener plates were also added to the other two susceptible weld seams at 130° and 310°, thus providing stiffness to all four identical joints.

Underwater repairs were completed on October 11.

The inspector discussed the problem with the licensee and reviewed the analysis previously performed by G.E. for repairs instituted during the outage in 1983. The inspector had no further questions on this subject.

### 6.2 Main Steam Isolation Valve (1F028D) Failed Leak Rate Tests and Rework (Unit 1)

On October 12, the licensee performed Local Leak Rate Tests (LLRT) (SE-159-021, 022, 023, and 024) of the Main Steam Isolation Valves (MSIVs), as required by Technical Specification Section 4.6.1.2.f., during the unit's third refueling outage. The MSIVs are 26 inch ATWOOD and MORRIL pneumatic-operated WYE-type valves. Excessive

leakage was exhibited through the 'D' Main Steam Line (MSL) penetration X-7D, which is bounded by the inboard and outboard MSIV valves 141F022D and 141F028D and the 'D' inboard MSIV Leakage Control System (LCS) blower outboard isolation valve 139F001P. As-found leakage was measured at 24.7 Standard Liters Per Minute (SLM) at 23.1 psig. The valves were then stroked several times with resulting leakage of 16.9 SLM at 22.6 psig, still above acceptable limits. The licensee determined that the majority of leakage was through the outboard MSIV (141F028D) and then removed the valve's internals and machined the seat and disk of the main valve. Subsequent testing on October 31 continued to show excessive leakage. As a result the licensee disassembled the pilot valve, checking for alignment and machined the pilot seat. The following LLRT on November 10 failed grossly.

On November 12, the licensee commenced disassembly of the valve for the third time checking the seating of the main disk with a different tool than previously used and discovered a depressed area in the seat where the disk was not making contact. In addition, the holddown tool used for pretesting the valve was checked for proper operation and determined that it was exerting a force of approximately 8,000 pounds in excess of that which the valve would see if it had to close. This caused the pretest to appear satisfactory by forcing the disk into the depressed area in such a way that dye tests showed the disk making contact on the complete seating area.

Valve repairs and reassembly were completed on November 17, with the final LLRT performed on November 18 exhibiting a leak rate of 3.45 SLM at 22.6 psig. The inspector discussed the problem and the licensee's action with the licensee and reviewed the results of the various leak rate tests performed on penetration X-7D. The inspector had no further questions.

#### 7.0 Management Meeting

On December 4, 1987, the inspector discussed the findings of this inspection with station management. Based on NRC Region I review of this report and discussions held with licensee representatives, it was determined that this report does not contain information subject to 10 CFR 2.790 restrictions.