

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.: 50-317/90-34; 50-318/90-34
License Nos.: DPR-53/DPR-69
Licensee: Baltimore Gas and Electric Company
Post Office Box 1475
Baltimore, Maryland 21203
Facility: Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Location: Lusby, Maryland
Inspection Conducted: November 25, 1990 through January 12, 1991
Inspectors: Larry E. Nicholson, Senior Resident Inspector
Allen G. Howe, Resident Inspector
C. Fred Lyon, Reactor Engineer
Herbert J. Kaplan, Senior Reactor Engineer
Approved by: Robert J. Summers for
Curtis J. Cowgill, Chief
Reactor Projects Section No. 1A

1/30/91
Date

Inspection Summary:

This inspection report documents routine and reactive inspections during day and backshift hours of station activities including: plant operations; radiological protection; surveillance and maintenance; emergency preparedness; security; engineering and technical support; and safety assessment/quality verification.

Results:

No conditions adverse to safety were identified. An Executive Summary follows.

EXECUTIVE SUMMARY

Plant Operations: (Modules 71707, 93702) The inspectors observed that operations at power; during a controlled shutdown; and, during a restart of Unit 1 were performed without operator error. However, during the heatup of Unit 1, operators failed to challenge the operability of the No. 12 emergency diesel generator since its respective output breakers had outstanding post maintenance testing required.

Radiological Protection: (Module 71707) Routine review in this area identified no noteworthy findings.

Surveillance and Maintenance: (Modules 61726, 62703) Reviews of maintenance activities identified mixed results. Good practices were noted during maintenance observations. Inadequate restoration of a flange in the Unit 2 chemical and volume control system resulted in a spill of about 300 gallons of water. The inspectors concluded that licensee investigation of this spill and the corrective actions were thorough and appropriate. Weaknesses were observed in the program interface between operations and maintenance regarding post-maintenance testing.

Emergency Preparedness: (Module 71707) Routine review in this area identified no noteworthy findings.

Security: (Module 71707) Routine review in this area identified no noteworthy findings. The licensee discovered a guard that was inattentive to duty during this inspection period and initiated proper corrective actions. This event was reported to the NRC.

Engineering and Technical Support: (Modules 71707, 90712, 92700) The inspectors concluded that efforts to determine and correct the root cause of the inadvertent lift of the power operated relief valve were thorough. Good cooperation was observed among the disciplines involved. Efforts to identify design process weaknesses, involved in the safety injection tank weld failures, represent a willingness to improve the design process. Weaknesses were identified in the administration of the engineering test procedure program. A final review of the Unit 2 pressurizer heater sleeve replacement project was performed and this issue was closed.

Safety Assessment/Quality Verification: (Modules 71707, 30703) The licensee demonstrated a conservative safety awareness in their decision to shutdown Unit 1 for a nitrogen leak on the safety injection tanks. Strong self-evaluations were observed regarding the problems associated with this nitrogen leak.

DETAILS

1.0 SUMMARY OF FACILITY ACTIVITIES

At the start of the inspection period, Unit 1 was at full power. On December 1, 1990, a controlled shutdown was performed to allow repairs of nitrogen leaks on the safety injection tanks and to add oil to the No. 12B reactor coolant pump. On December 21, 1990, Unit 1 was restarted and subsequently placed on the grid. No abnormal transients were experienced. Unit 1 was at 80% power at the end of this inspection period pending resolution of apparently excessive check valve seat leakage into the safety injection tanks from the ECCS flowpath.

Unit 2 was refueling at the beginning of the inspection period. Core loading was completed on November 28, 1990. The reactor vessel head was tensioned on December 12, 1990, and the unit commenced cold shutdown operations.

2.0 PLANT OPERATIONS

2.1 Operational Safety Verification

The inspectors observed plant operation and verified that the facility was operated safely and in accordance with licensee procedures and regulatory requirements. Regular tours were conducted of the following plant areas:

- control room
- primary auxiliary building
- radiological control point
- electrical switchgear rooms
- auxiliary feedwater pump rooms
- security access point
- protected area fence
- intake structure
- diesel generator rooms
- turbine building

Control room instruments and plant computer indications were observed for correlation between channels and for conformance with technical specification (TS) requirements. Operability of engineered safety features, other safety related systems and onsite and offsite power sources were verified. The inspectors observed various alarm conditions and confirmed that operator response was in accordance with plant operating procedures. Routine operations surveillance testing was also observed. Compliance with TS and implementation of appropriate action statements for equipment out of service was inspected. Plant radiation monitoring system indications and plant stack traces were reviewed for unexpected changes. Logs and records were reviewed to

determine if entries accurately depicted equipment status or deficiencies. These records included operating logs, turnover sheets, system safety tags, temporary modifications, and the jumper and lifted lead book. Plant housekeeping controls were monitored, including control and storage of flammable material and other potential safety hazards. The inspectors also examined the condition of various fire protection, meteorological, and seismic monitoring systems. Control room and shift manning were compared to regulatory requirements and portions of shift turnovers were observed. The inspectors found that control room access was properly controlled and that a professional atmosphere was maintained.

In addition to normal utility working hours, the review of plant operations was routinely conducted during evening shifts and also weekend and midnight shifts. Coverage was provided for 6 and 11 hours respectively on these backshifts. Operators were alert and attentive to duty.

2.2 Followup of Events Occurring During Inspection Period

During the period, the inspectors provided onsite coverage and followup of unplanned events. Plant parameters, performance of safety systems, and licensee actions were reviewed. The inspectors confirmed that the required notifications were made to the NRC. During event followup, the inspectors reviewed the corresponding CCI-118N (Calvert Cliffs Instruction, "Nuclear Operations Section Initiated Reporting Requirements" documentation, including the event details, root cause analysis, and corrective actions taken to prevent recurrence. The following events were reviewed:

a. Inadvertent Opening of a Power Operated Relief Valve

During the shutdown of Unit 1 on December 2, 1990, power operated relief valve (PORV) 402 inadvertently opened. The plant was in operational mode 4 at the time with reactor pressure at approximately 375 psia. Nominal lift pressure for the valves during these plant conditions is 450 psia. Initial operator response to verify the inadvertent lift and to close the block valve was appropriate. The licensee initiated troubleshooting to determine the root cause of the lift. This effort is detailed in Section 7.2 of this report.

b. Safety Injection Tank Relief Valve Piping Weld Failure

During power operation the licensee experienced greater than normal nitrogen leakage from the Unit 1 Nos. 11B and 12B safety injection tanks (SITs). Effort to locate and correct the leaks met with some success but the elevated leak rate persisted. Licensee management became concerned that the quantity of nitrogen introduced into the containment would make the atmosphere unsafe for personnel. Further corrective actions while at power were considered but rejected due to the risk to personnel and the complexity of work while wearing self contained breathing apparatus. Licensee management decided that the most prudent course of action was to perform a controlled plant shutdown (and cooldown) and to purge the containment to allow correction of the nitrogen leaks. The reactor was safely shutdown and cooled down on December 2, 1990.

On December 4, 1990, during maintenance, the licensee discovered failed welds on the relief valve piping for Nos. 11B and 12B SITs. The welds are located at the connection between the top of the SITs and the relief valve piping. The licensee declared the tanks inoperable, vented the tanks, entered technical specification action statement 3.4.10.b., and notified the NRC of the condition via the Emergency Notification System. The Nos. 11A and 12A SITs were checked and no failures were identified. Licensee analysis is reviewed in Section 7.3 of this report.

The inspectors concluded that licensee actions to shutdown the unit and correct the leaks demonstrated a good safety perspective. Appropriate actions were taken when the failed welds were identified on Unit 1 and plans were made to review the Unit 2 SITs for possible similar problems.

c. Undersized Safety-Related Fuses

On December 6, 1990, the licensee discovered that the fuses for the control circuitry of safety-related motors would have blown before the degraded-voltage relays could time out and switch the power source to the emergency diesel generators (EDGs). The cause of this condition was determined to be from a calculation error in the design package that installed the 4160-volt bus power voltage protection relays in 1977. All undersized fuses for both units were replaced with properly rated fuses during this inspection period. This error was reported to the NRC via LER 318-90-27, dated January 7, 1991.

d. Steam Generator Tube Leak

The inspectors monitored the licensee actions to address a primary to secondary tube leak that appeared in the No. 11 steam generator after the restart of Unit 1. The leak appeared to settle out at approximately 15 to 20 gallons per day. The licensee was taking appropriate precautions by using enhanced monitoring and evaluation of the condition. No further concerns were identified.

e. Safety Injection Tank Check Valve Leakage

With Unit 1 at 100% power, testing revealed an approximate 20-25 gpm leak past a check valve into the No. 12B safety injection tank (SIT). The valve is a 12 inch, 1500 pound soft-seated check valve manufactured by the Atwood and Morrill Company. A second check valve, of a different design, is installed between this valve and the reactor coolant system (RCS). RCS leakage past this valve is within allowable technical specification leakage limits.

The licensee determined that the most limiting concern in the above condition was the possible diversion of high pressure safety injection (HPSI) flow during a small break LOCA. Since the Calvert Cliffs safety analysis credits an additional 15 gpm flow from the charging pumps when reactor power is less than 80%, the licensee decided to reduce power to less than 80% and gain this additional margin until this issue was resolved. The unit operated at less than 80% power for the remainder of this inspection period.

The inspectors observed the licensee actions to resolve this issue which were considered to be appropriate. A conference call between the licensee and NRC Region I and Headquarters was conducted to better understand the circumstances. The NRC expressed concerns regarding the failure mechanism of the valve; the possible adverse impact of a catastrophic valve failure; and continued operation with the potentially degraded high pressure safety injection system coupled with a known steam generator tube leak. The licensee was adequately addressing these issues in their evaluation of the problem.

3.0 RADIOLOGICAL CONTROLS

During routine tours of the accessible plant areas, the inspectors observed the implementation of selected portions of the licensee's Radiological Control Program. The utilization and compliance with special work permits (SWPs) were reviewed to ensure detailed descriptions of radiological conditions were provided and that personnel adhered to SWP requirements. The inspectors observed controls of access to various radiologically controlled areas and use of personnel monitors and frisking methods upon exit from these areas. Posting and control of radiation areas, contaminated areas and hot spots, and labelling and control of containers holding radioactive materials were verified to be in accordance with licensee procedures. Health Physics technician control and monitoring of these activities were determined to be adequate. No unacceptable conditions were identified.

4.0 MAINTENANCE AND SURVEILLANCE

4.1 Maintenance Observation

The inspectors observed maintenance activities, interviewed personnel, and reviewed maintenance orders (MOs) and other records to verify that work was conducted in accordance with approved procedures, technical specifications, and applicable industry codes and standards. The inspectors also verified that: redundant components were operable, administrative controls were followed, tagouts were adequate, personnel were qualified, correct replacement parts were used, radiological controls were proper, fire protection was adequate, quality control hold points were adequate and observed, adequate post-maintenance testing was performed, and independent verification requirements were implemented. The inspectors independently verified that selected equipment was properly returned to service.

Outstanding work requests were reviewed to ensure that the licensee assigned appropriate priority to safety-related maintenance. The inspectors observed/reviewed portions of the following maintenance activities.

a. MO 200-339-097A, "Relocate Relief Valve on 11B Safety Injection Tank"

The inspectors observed implementation of good work practices by the mechanics involved.

b. Procedure RV-3b, "Reactor Vessel Closure Head Stud Tensioning"

The inspectors noted that the stud tensioning process was well controlled and supervised for closure of the Unit 2 reactor vessel head. Effective measures were taken to ensure that the measurements of head bolt elongation were independently taken.

c. 2-CVC-500 Valve Repair

At 1:23 PM on December 11, 1990, approximately 350 gallons of water were spilled from the Unit 2 shutdown cooling system into the auxiliary building via a leaking flange in the Unit 2 chemical and volume control system (CVCS). The RCS was depressurized and partially drained to an initial level of 43.3 feet by refueling level indication. Purification was aligned through the shutdown cooling system to maintain proper chemistry control of the RCS. Maintenance was being performed on the air solenoid valves for 2-CVC-510 and 2-CVC-511, which required isolating a portion of the instrument air system. Securing this air source also isolated instrument air to 2-CVC-500, the volume control tank (VCT) inlet control valve, permitting the valve to travel from its initial position (directing water from CVCS purification to the waste processing system) to its failed position which opens to the VCT.

This allowed water to drain from CVCS purification to the VCT. The piping downstream of 2-CVC-500 had been removed and reinstalled earlier in the outage in order to overhaul this valve and actuator, but the flanged portion of the piping downstream of 2-CVC-500 was reassembled with the studs and nuts only hand tight. Water leaked from this flange to the VCT valve alley in the auxiliary building. The refueling level indicator alarm was received in the control room, as well as a report of water spilling on the 5 foot level of the auxiliary building. Instrument air was restored to 2-CVC-500, repositioning the valve to waste processing, and stopping the spill. The RCS level decreased to 42.9 feet during the event.

The event was investigated by the Supervisor of Mechanical Procedures and Support and an Operations Safety Analyst. In addition, the licensee's Independent Safety Evaluation Unit (ISEU) investigated the event. The inspectors discussed the event with the investigators, reviewed the maintenance procedures, the initial problem report and the investigation report, and attended the Plant Operations Safety Review Committee (POSRC) discussion of the event, its safety implications, and its generic concerns.

The root cause of the event was inattention to detail on the part of the personnel performing and supervising the overhaul of 2-CVC-500. Although the maintenance procedure does not specifically address the flange reassembly and torquing, there is a procedure in place and a promulgated policy which cover this deficiency and which were not followed by the maintenance personnel. Additionally, the Control Room Supervisor exhibited inattention to detail by not verifying the actual failure position of 2-CVC-500 upon loss of instrument air, though he did brief and position personnel to mitigate the consequences of the valve failing to the VCT position.

Corrective actions were taken by the licensee as a result of the investigation. Disciplinary action was taken against the personnel who performed the overhaul of 2-CVC-500; training on the event was scheduled for all operations and mechanical maintenance personnel emphasizing the need for operations personnel to verify proper system response prior to establishing special plant conditions; and, the maintenance procedure was modified to include proper assembly of the downstream flange. The inspectors concluded that the licensee response was appropriate and thorough.

d. Post Maintenance Testing

On December 19, 1990, prior to Unit 1 entering mode 2, the inspectors questioned the status of post maintenance testing for Unit 1 components. A review of tags in the control room indicated that the post maintenance testing had not been performed on the normal output breaker for the No. 12 emergency diesel generator (EDG) to the applicable Unit 1 4kv safety bus. Investigation revealed that this breaker had been removed from service and a preventive maintenance overhaul performed on November 28, 1990. Although the specific post maintenance test for the breaker (PMT 62) had not been performed, the EDG was started on November 30, 1990, and the above breaker was successfully closed onto the appropriate Unit 1 bus.

Based on the identification of the above concern, the licensee delayed restart of Unit 1 until a comprehensive evaluation of the problem was performed. A similar problem was discovered by the licensee regarding the post maintenance testing of the No. 11 EDG output breaker. The cause of the problems appeared to be primarily interface weaknesses between operations and maintenance. The methods for tracking preventive maintenance activities had not been fully integrated into the post maintenance program. The inspectors reviewed the licensee investigation and corrective actions and considered them appropriate. No further questions or concerns were identified.

e. Replace 1-SV-105 (Pressurizer Vent Solenoid Valve)

In order to isolate the maintenance area for work, the licensee closed the Unit 1 pressurizer power operated relief valve (PORV) block valves to install a blank in a branch line and then reopened the PORV block valves. This process was repeated upon restoration. Closing the PORV block valves disabled the PORV's low temperature overpressure function. Prior to closing the block valves, the licensee discussed its plans with NRC Region I personnel via a conference call. The purpose of the conference call was to determine if the licensee had reviewed all safety aspects of the block valve closure. The licensee's POSRC reviewed the block valve closure process and determined that all safety aspects were properly assessed. The inspectors concluded that licensee actions were appropriate.

4.2 Surveillance Observation

The inspectors witnessed selected surveillance tests to determine whether properly approved surveillance test procedures (STP) were in use, technical specification frequency and action statement requirements were satisfied, necessary equipment tagging was performed, test instrumentation was in calibration and properly used, testing was performed by qualified personnel, and test results satisfied acceptance criteria or were properly dispositioned. Portions of the following activities were reviewed.

a. Auxiliary Feedwater (AFW) Check Valve Test

On December 8, 1990, the inspectors witnessed portions of the backleakage test of the Unit 1 main steam supply check valves to the steam driven AFW pumps. This test was performed in accordance with Engineering Test Procedure ETP-88-22, revision 1, change 3, dated February 16, 1990. The check valve backleakage was verified to be acceptable.

The inspectors reviewed the above completed procedure and noted numerous administrative problems with the procedure.

As a result of these discrepancies, the inspectors reviewed a sample of completed Engineering Test Procedures for format and procedural compliance. This review included the following procedures:

- ETP 90-44, "FCR 90-64 Low Pressure Post Modification Testing".
- ETP 90-18, "Slow Stroke of 11 MSIV".
- ETP 90-40, "LPSI Check Valve Slam".
- ETP 90-07, "Setting of Unit 1 SDC HX Inlet Valves For Maximum Flow Condition".
- ETP 90-45, "FCR 90-64 High Pressure Post Modification Testing"

The inspectors concluded that the administration of the engineering test program lacked sufficient emphasis. The specific requirements for developing and conducting engineering tests are detailed in administrative procedure CCI-132. The inspectors identified numerous examples where the administrative requirements of CCI-132 were not followed regarding the processing of test revisions. These concerns were conveyed to the appropriate licensee staff who conducted an investigation and validated the findings. The inspectors considered the subsequent licensee evaluation and corrective actions to be appropriate. No further concerns were identified.

b. Main Steam Isolation Valve (MSIV) Partial Stroke Test

The inspectors witnessed portions of the partial stroke test of No. 11 MSIV for Unit 1. This test was performed in accordance with surveillance test procedure STP O-47-1. No discrepancies or concerns were identified.

5.0 EMERGENCY PREPAREDNESS

The inspectors routinely toured the onsite emergency response facilities and discussed program implementation with the applicable personnel. The resident inspectors had no noteworthy findings in this area.

6.0 SECURITY

During routine inspection tours, the inspectors observed implementation of portions of the security plan. Areas observed included access point search equipment operation, condition of physical barriers, site access control, security force staffing, and response to system alarms and degraded conditions. These areas of program implementation were determined to be adequate. No unacceptable conditions were identified.

The licensee discovered a guard that was inattentive to duties during this inspection period. The guard was relieved of duties. An investigation indicated that there was not a breach of security as a result of the incident. This event was reported to the NRC.

7.0 ENGINEERING AND TECHNICAL SUPPORT

The inspectors reviewed selected design changes and modifications made to the facility which the licensee determined were not unreviewed safety questions and did not require prior NRC approval as described in 10 CFR 50.59. Particular attention was given to safety evaluations, POSRC approval, procedural controls, post-modification testing, procedure changes resulting from this modification, operator training, and Updated Final Safety Analysis Report (UFSAR) and drawing revisions. The following activities were reviewed:

7.1 Engineering Test Procedures

The inspectors conducted a review of the engineering test program as a result of problems observed during the witnessing of a test. The results of this inspection are detailed in Section 6 above.

7.2 Power Operated Relief Valve Lift Troubleshooting

During the shutdown of Unit 1 on December 2, 1990, pressurizer PORV No. 402 inadvertently opened. The licensee initiated troubleshooting efforts to determine the cause of the inadvertent lift of the PORV. As a result of a similar event that occurred on September 23, 1990, the licensee had previously instrumented the circuit that controls the valve when it is enabled for low temperature overpressure protection. Review of chart recorder data from the instrumentation identified periodic pressure spikes in the circuit. Further efforts identified that operation of General Electric HFA151 relays to control the charging pumps that are located near wiring associated with the PORV circuit was producing radio frequency (RF) interference in the pressure sensing circuit of the PORV. One of the relays had degraded contacts which contributed to excessive "chatter" and lengthened the time of the RF interference. This interference produced false high pressure signals in the PORV circuit and caused the valve to lift.

To minimize the (RF) interference, the licensee performed a modification that replaced the charging pump relays with smaller Westinghouse BF44F relays. The root cause analysis and corrective actions were reviewed and approved by the POSRC. As an additional measure to ensure that the problem has been corrected, the licensee plans to install instrumentation for this circuit prior to the next shutdown.

The inspectors reviewed portions of the troubleshooting and evaluation and concluded that the licensee review of this problem was thorough. Various licensee organizations were involved in this effort and they appeared to work in a cooperative manner to understand and correct the root cause.

7.3 Safety Injection Tank Weld Failure

As a result of the discovery of the weld failures on the SITs, the licensee initiated a root cause analysis of the weld failures. The analysis concluded that the weld failures were due to high cycle, low frequency fatigue which resulted from the cantilevered configuration of the relief valves. To correct the problem, the licensee has relocated the relief valve on the four tanks to eliminate the failure condition and replaced the affected welds on all four SITs.

The currently installed relief valves, which are much heavier than the original valves, were installed in February 1990, per FCR 89-98, to replace the previous ones because they did not satisfy code requirements. When the replacement was made, the cantilever effects were not recognized and thus not anticipated in the design. The licensee initiated an independent review to determine why the design process did not recognize this condition as a potential failure mechanism. This review identified weaknesses in the design process which appear to be programmatic and made several recommendations to address these weaknesses.

The inspectors concluded that the determination of the root cause of the weld failure and corrective actions to relocate the relief valves were appropriate. The independent review of the earlier design was thorough and objective.

8.0 SAFETY ASSESSMENT AND QUALITY VERIFICATION

8.1 Plant Operations and Safety Review Committee

The inspectors attended several POSRC meetings. TS 6.5 requirements for required member attendance were verified. The meetings' agenda included procedural changes, proposed changes to the TS, facility change requests, and minutes from previous meetings. Items for which adequate review time was not available were postponed to allow committee members time for further review and comment. Overall, the level of review and member participation was adequate to fulfill POSRC responsibilities. No unacceptable conditions were identified.

8.2 Startup Review Board

The inspectors attended the licensee Startup Review Board (SURB) conducted on December 13, 1996. The purpose of this meeting was to discuss and close selected SURB Planning Meeting items regarding the restart of Unit 2.

Many of the items discussed had concerns that had not been completely resolved. These concerns were clearly identified and appropriate actions were assigned. The inspectors noted that the meeting was focused on restart and safety issues and that this meeting provided an effective means to address these issues.

9.0 FOLLOWUP OF PREVIOUS INSPECTION FINDINGS

Licensee actions taken in response to open items and findings from previous inspections were reviewed. The inspectors determined if corrective actions were appropriate and thorough and previous concerns were resolved. Items were closed where the inspectors determined that corrective actions would prevent recurrence. Those items for which additional licensee action was warranted remained open. The following items were reviewed:

9.1 (Closed) NC4 50-317/89-28-03

This violation concerned the failure to adequately perform surveillance testing of the spent fuel pool exhaust fans as required by technical specification (TS) 4.9.12.a. Licensee corrective actions included the development of a separate procedure to test the fans, reviews of procedures to ensure the TS requirements are met, surveillance test procedure (STP) program management improvements, and quality assurance program improvements.

The inspectors reviewed licensee actions and concluded that measures have been implemented to improve management and control of the STP program. These measures and the improved quality assurance audit processes appear to be effective. As a further enhancement, the licensee plans to perform detailed procedure reviews for technical adequacy as well as design basis information to identify any problems or needed improvements. This item is closed.

9.2 (Closed) UNR 50-317/90-80-04 & 50-318/90-80-03

The inspectors questioned the licensee method for compliance with Technical Specification 4.8.2.3.2.e, which requires demonstrating that the battery chargers are capable of recharging the battery at a rate of less than or equal to 400 amperes while supplying normal dc loads. The present test procedure applies the bus load in a step profile which is not the same loading the charger would see under actual conditions of return from a station blackout.

The NRC reviewed the licensee method for testing and determined that the load profile used during the surveillance test procedures meets the requirements of the above technical specification requirement. This review, as documented in a Safety Evaluation from the staff, was transmitted via a letter to the licensee, dated November 21, 1990. This item is closed.

9.3 (Closed) UNR 50-317/90-12-01 and 50-318/90-11-01

This issue involved an engineering review of the final resolution to the biofouling of the service water heat exchangers. Inspection Report 50-317/90-17 and 50-318/90-15 discussed the item and requested a licensee response detailing their corrective actions. Future inspections involving the salt water fouling issues will be performed under this item. The unresolved items listed in Inspection Report 50-317/90-12 and 50-318/90-11 are duplicate items and are therefore closed.

9.4 (Closed) STI-15, Alternate Safe Shutdown Control Room Evacuation Procedure

This issue involved the licensee's actions to develop and implement an effective Alternate Safe Shutdown procedure. The issue was previously reviewed in NRC Inspection Report 50-317/90-05 and 50-318/90-05. The inspectors concluded during that inspection that the corrective actions were adequate for the shutdown of Unit 1 from outside the control room. The issue remained open pending review of the licensee's determination for a technical specification change in shift staffing requirements, performance of modifications for Unit 2, a two unit validation walkdown of the most challenging procedure, and a review of the technical bases document.

The above outstanding issues were reviewed during this inspection. The inspectors concluded that these actions have been appropriately addressed by the licensee. Unit 2 modifications for safe shutdown were not yet complete, but the inspectors verified that adequate measures were in place to ensure completion prior to a startup of Unit 2. The inspector observed portions of the licensee's procedure validation process, which included a walkdown of Abnormal Operating Procedure 9A, "Control Room Evacuation and Safe Shutdown Due to a Severe Control Room Fire." The inspector concluded that the procedure validation process was a strength and that the participants and observers identified several improvements as a result. This item is closed.

9.5 (Closed) UNR 50-317/89-200-11 and 50-318/85-200-11

This issue involved the discovery that minor field changes to surveillance tests were not being subsequently corrected prior to the next performance of the test. These changes involved correction of typographical errors and format discrepancies. The licensee has revised the appropriate administrative procedures to require that a permanent change request be promptly submitted whenever a field change is initiated. The inspectors sampled this process and determined that the issue is adequately resolved. This item is closed.

9.6 Unit 2 Pressurizer Heater Sleeve Replacement

As the result of finding leakage in Unit 2, alloy 600 (Inconel) pressurizer heater sleeves in May 1989, the licensee initiated a program to remove and replace the existing sleeves with a more corrosion resistant nickel base material (alloy 690). The cracking in the old sleeves was caused by primary water stress corrosion cracking as the result of excessive residual stress imparted to the inside diameter surface of the sleeve by the vessel manufacturer (Combustion Engineering) during fabrication. The residual stress was generated by a reaming operation in order to accommodate the heaters.

During the end of the replacement program, the inspectors reviewed all aspects of the removal and replacement activities including design, material procurement, welding and nondestructive testing as performed by the licensee's subcontractor (Eabcock and Wilcox). The program's salient features were: (1) utilization of a new design consisting of an outer and inner sleeve installed from the outside of the pressurizer head; (2) welding the outer sleeve to a prebuttered Inconel layer of weld metal, deposited on the outside diameter surface around each penetration of the vessel, using a sanctioned ASME Code welding technique (Temper Bead) to avoid stress relieving; (3) using careful installation techniques to avoid fit-up problems requiring reaming; (4) using a more corrosion resistant material (alloy 690) for the new sleeves, and (5) most of the welding was performed with automatic equipment.

The inspectors' final review of the program indicated that the replacement activities were completed satisfactorily.

The inspectors concluded that the heater sleeve replacement project was successfully accomplished by the licensee's subcontractor under an effective QA program. The licensee maintained close scrutiny of all activities.

10.0 MANAGEMENT MEETING

During this inspection, periodic meetings were held with station management to discuss inspection observations and findings. At the close of the inspection period, an exit meeting was held to summarize the findings of the inspection. No written material was given to the licensee and no proprietary information related to this inspection was identified.

On January 3, 1991, Mr. Thomas T. Martin, Regional Administrator, toured the site and met with various members of licensee management. Mr. Curtis J. Cowgill, NRC Region I Section Chief, accompanied Mr. Martin on his visit.

A Management meeting was held at the NRC Region I office on January 7, 1991, with representatives from Baltimore Gas & Electric (BG&E) management. The licensee presented their assessment of the Unit 2 readiness for restart. The NRC meeting attendees acknowledged the information presented and agreed that the meeting was beneficial. The licensee's presentation slides and a list of meeting attendees are attached to this inspection report.

10.1 Preliminary Inspection Findings

No violations, deviations or unresolved items were identified during this inspection period.

10.2 Attendance at Management Meetings Conducted by Region Based Inspectors

<u>Date</u>	<u>Subject</u>	<u>Inspection Report No.</u>	<u>Reporting Inspector</u>
1-11-91	Health Physics	50-317/91-01 50-318/91-01	J. Furio
1-11-91	Engineering	50-317/91-02 50-318/91-02	A. Lohmier

ATTACHMENT 1

JANUARY 7, 1991 MANAGEMENT MEETING

LIST OF ATTENDEES

U.S. Nuclear Regulatory Commission

T. Martin, Regional Administrator
C. Hehl, Director, Division of Reactor Projects
J. Wiggins, Deputy Director, Division of Reactor Projects
M. Hodges, Director, Division of Reactor Safety
R. Capra, Chief, Project Branch I-1, NRR
J. Linville, Chief, Projects Branch No. 1, Division of Reactor Projects
L. Bettenhausen, Chief, Operations Branch, Division of Reactor Safety
C. Cowgill, Chief, Reactor Projects Section 1A, Division of Reactor Projects
D. MacDonald, Project Manager, NRR
L. Nicholson, Senior Resident Inspector, Calvert Cliffs
A. Howe, Resident Inspector, Calvert Cliffs
L. Briggs, Senior Operations Engineer, Division of Reactor Safety
D. Silk, Senior Operations Engineer, Division of Reactor Safety
W. Maier, Operations Engineer, Division of Reactor Safety
F. Lyon, Reactor Engineer, Division of Reactor Projects
R. Freudenberger, Resident Inspector, Maine Yankee
R. Summers, Project Engineer, Division of Reactor Projects

Baltimore Gas & Electric Company

C. Poindexter, Vice-Chairman
G. Creel, Vice President, Nuclear
R. Denton, Plant General Manager
M. Milbradt, Compliance

CALVERT CLIFFS

UNIT 2 RESTART READINESS

January 7, 1991



AGENDA

INTRODUCTION

Mr. Creel

STARTUP PROCESS
AND STATUS

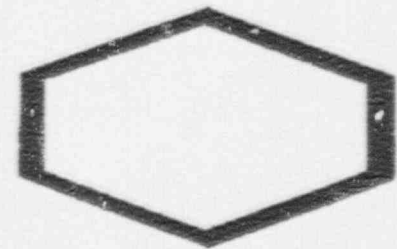
Mr. Denton

SUMMARY

Mr. Creel

CONCLUSION

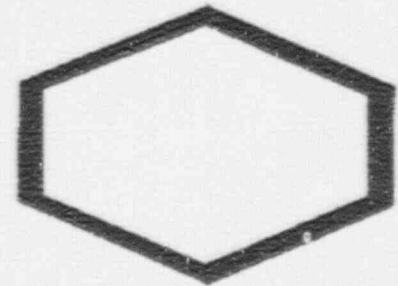
Mr. Poindexter



UNIT 2 STARTUP

GOAL

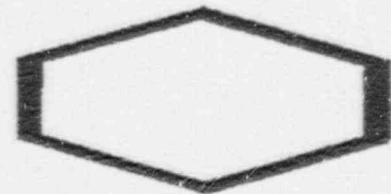
MAINTAIN SAFETY AND QUALITY AS
THE PRIORITY, AND CONDUCT AN
"EVENT FREE" STARTUP



U-2 STARTUP

PROCESS

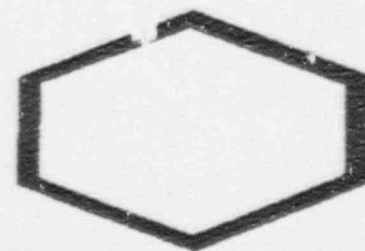
- WILL USE STARTUP REVIEW BOARD (SURB) PROCESS TO OVERSEE PREPARATIONS
- SURB CHAIRED BY PLANT GENERAL MANAGER, 5 OTHER MANAGERS ARE MEMBERS
- FORMAL STARTUP PLAN WILL BE USED
- WILL CONCENTRATE ON SAFELY STARTING UP UNIT 2 WHILE SAFELY OPERATING UNIT 1



SURB ITEMS

- EVALUATIONS:

- UNIT 1 SURB/INDEPENDENT ASSESSMENT RESULTS
- CAL/STI/RATI ITEMS
- CIA PROJECT ITEMS
- PIP VERTICAL SLICE REPORTS
- INPO PLANT EVALUATION
- UNIT 1 OPERATING EVENTS REVIEW

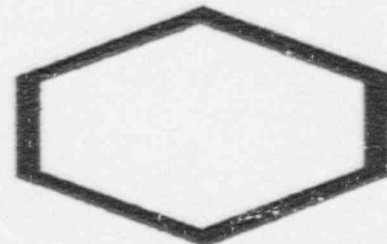


U-2 STARTUP

PROCESS

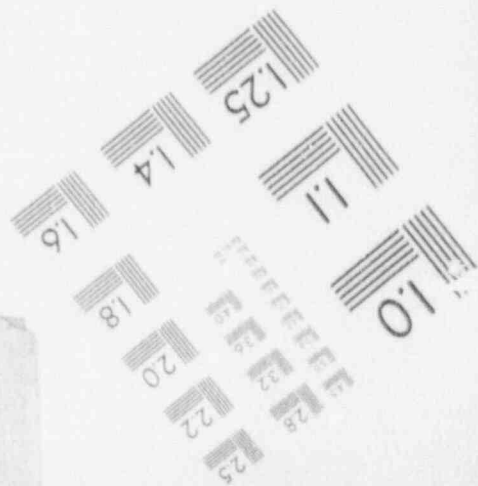
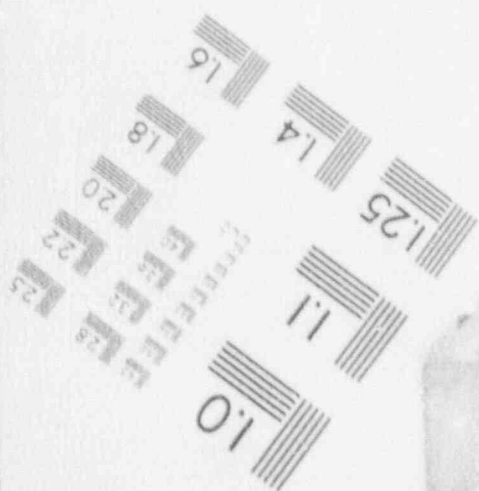
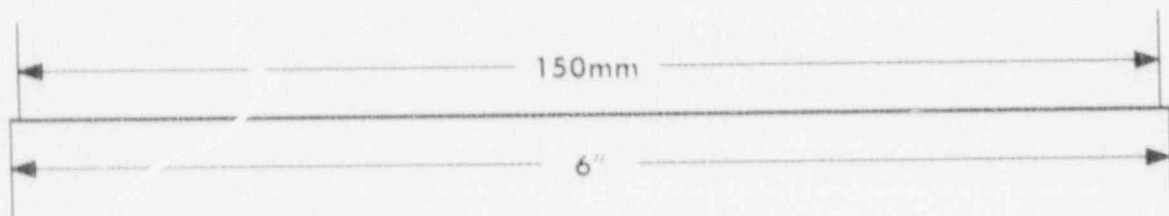
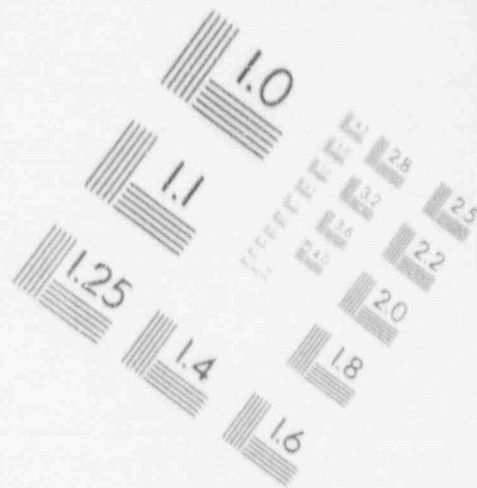
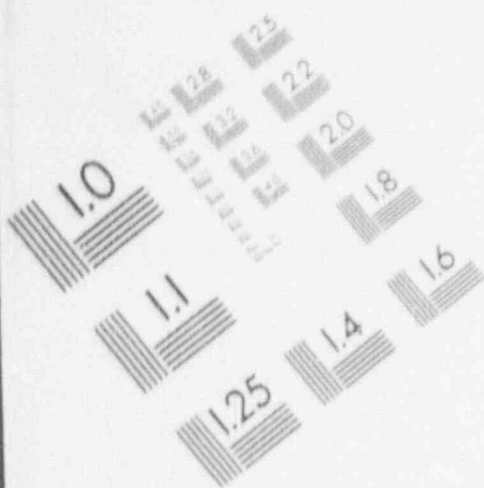
- TO DATE, SURB HAS REVIEWED 13 OF THESE ITEMS AND DETERMINED DISPOSITION OR ADDITIONAL ACTION
- OTHER PROCESSES THAT FEED THE MANAGEMENT PROCESSES AND SURB
 - POSRC OIs
 - NCRs (MODE RESTRAINING)
 - OUTAGE SCHEDULE (PHYSICAL WORK)
 - OP-6 (PRE STARTUP CHECKLIST)

MOST ITEMS ARE DISPOSITIONED TO THESE PROCESSES FOR CLOSURE



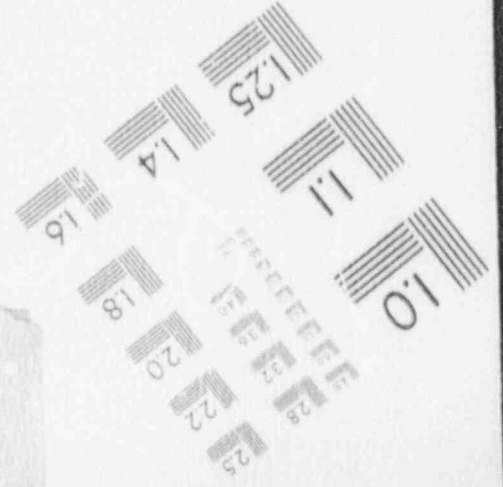
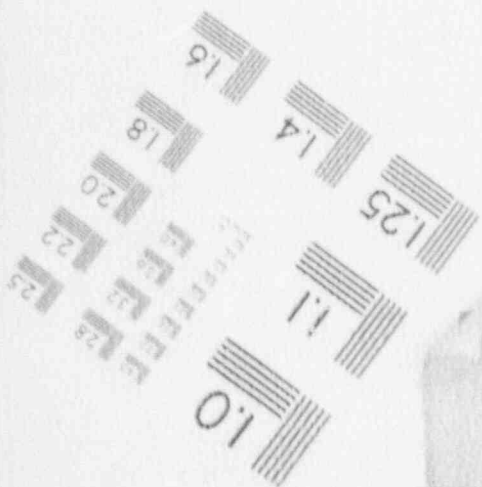
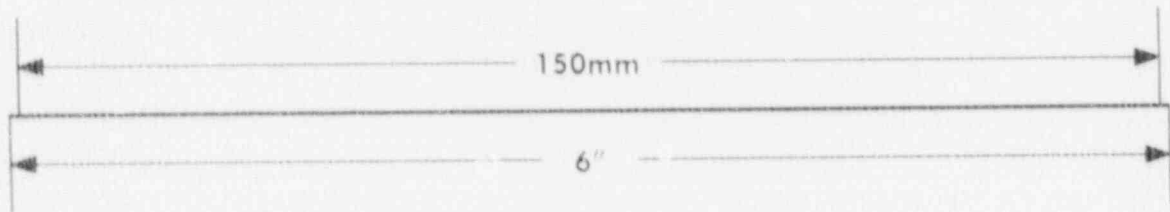
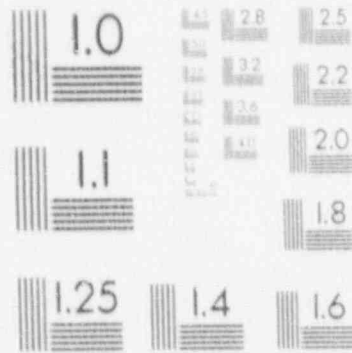
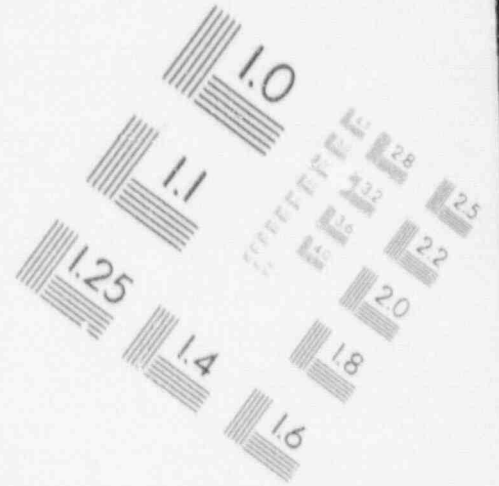
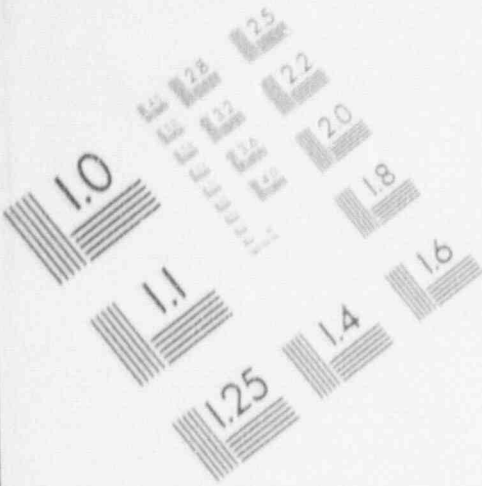
1

IMAGE EVALUATION TEST TARGET (MT-3)



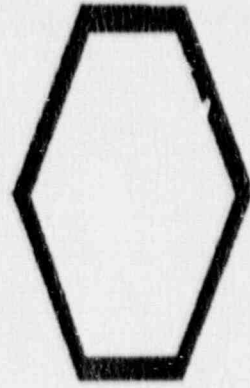
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IMAGE EVALUATION TEST TARGET (MT-3)



SURB ITEMS STAFFING

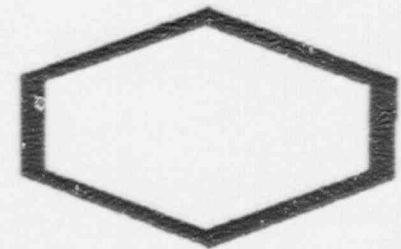
- OPERATIONS
- SYSTEM ENGINEERING



SURB ITEMS

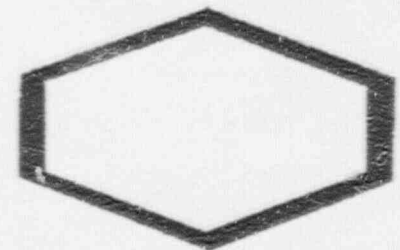
MAINTENANCE/MATERIAL READINESS

- MAINTENANCE BACKLOG PROGRESS
- TEMPORARY MODIFICATIONS
- PRI-B MAINTENANCE ORDERS
- PARTS AVAILABILITY
- PROBLEM REPORTS
- RESIN INTRUSION
- SYSTEM WALKDOWN ITEMS



SURB ITEMS PROCEDURES/DRAWINGS

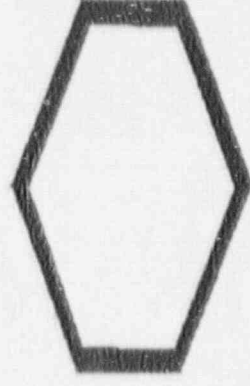
- VERIFY U2 OPERATING PROCEDURES
- VERIFY U2 STP'S
- REVIEW DRAWING IMPROVEMENT PROGRAM



SURB ITEMS

SPECIAL TOPICS

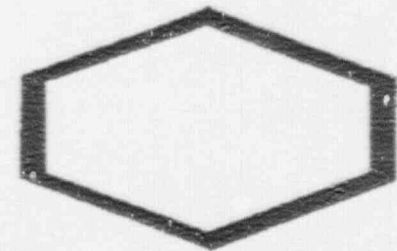
- PZR PROJECT
- AOP-9 ITEMS
- LTOP ITEMS
- UNIT 1 EVENTS REVIEW



OPERATING EXPERIENCE REVIEW

UNIT 1 EVENTS REVIEW

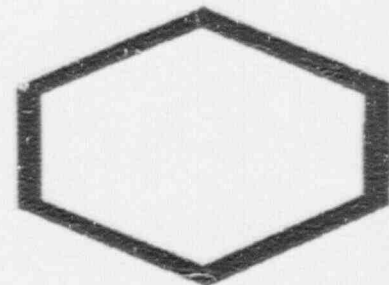
- NO ONE OR TWO FACTORS "EXPLAIN" OBSERVED EVENTS - NO CLEAR UNDERLYING CAUSE
- INVESTIGATION DID IDENTIFY AREAS FOR ATTENTION, SYNERGISTIC EFFECTS OF SEVERAL FACTORS:
 - INFORMATION PROCESSING
 - ATTENTION TO DETAIL AND INITIATIVE ARE REQUIRED
 - PROACTIVE LEADERSHIP



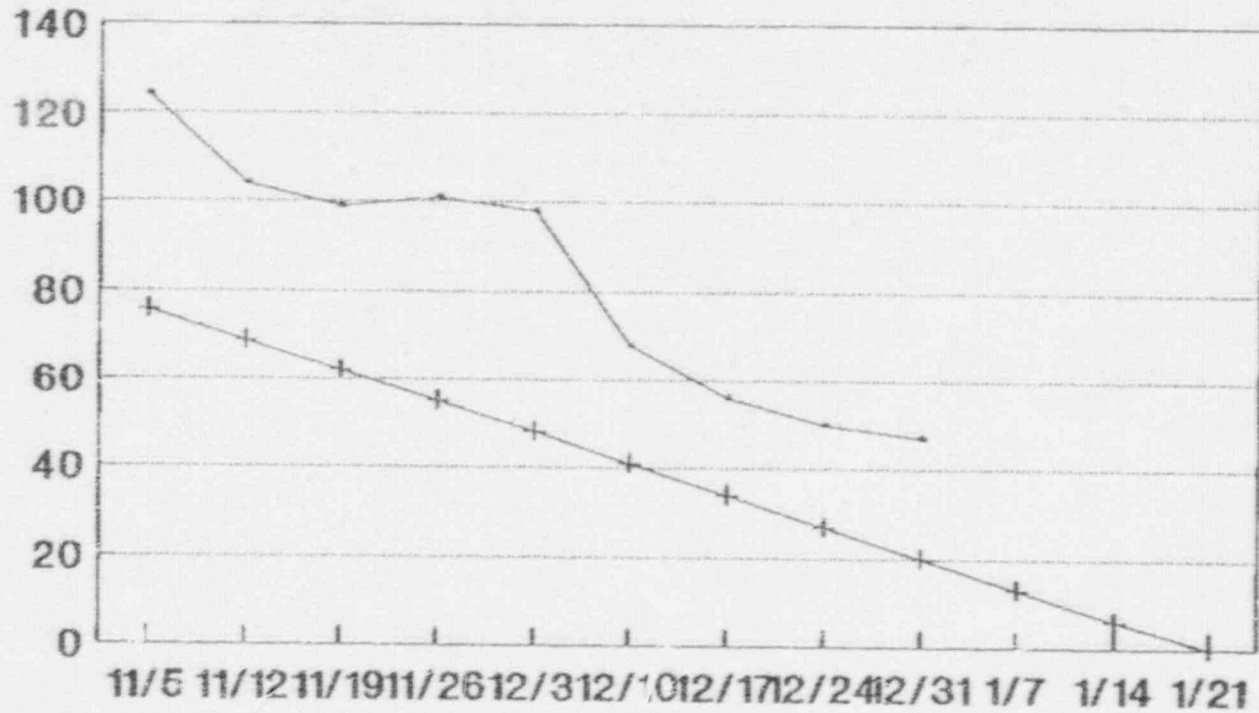
U-2 STARTUP

STATUS/SCHEDULE

- CURRENT SCHEDULE:
 - PRESSURIZER BUBBLE ----- 1/21/91 -----
 - RCS HEATUP ----- 2/2/91 -----
 - REACTOR CRITICAL ----- 2/12/91 -----
 - PARALLEL ----- 2/16/91 -----
- MAINTENANCE TRENDS
 - FINAL SCOPE IS WELL DEFINED
 - ✓ MO'S INITIATED WEEKLY
 - ✓ PARTS DELAYS
 - ✓ UNPLANNED MO'S
 - ✓ ENGINEERING DELAYS
- WORK IN PROGRESS
 - APPROXIMATELY 800 ITEMS REMAIN



PRI A MO'S UNPLANNED

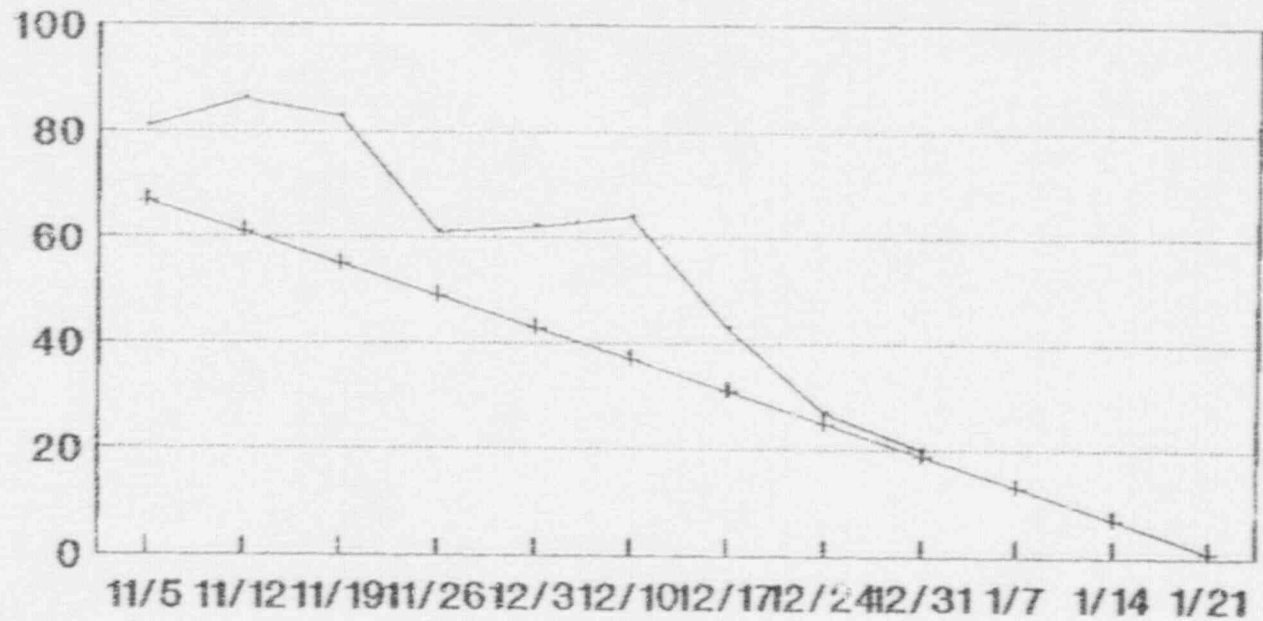


ACT MO CNT	124	104	99	101	98	68	56	50	47			
PROJ MO CNT	76	69	62	55	48	41	34	27	20	13	6	0

—●— ACT MO CNT —+— PROJ MO CNT

DEC 31 1990

PRI A MO'S WITH ENGINEERING DELAYS

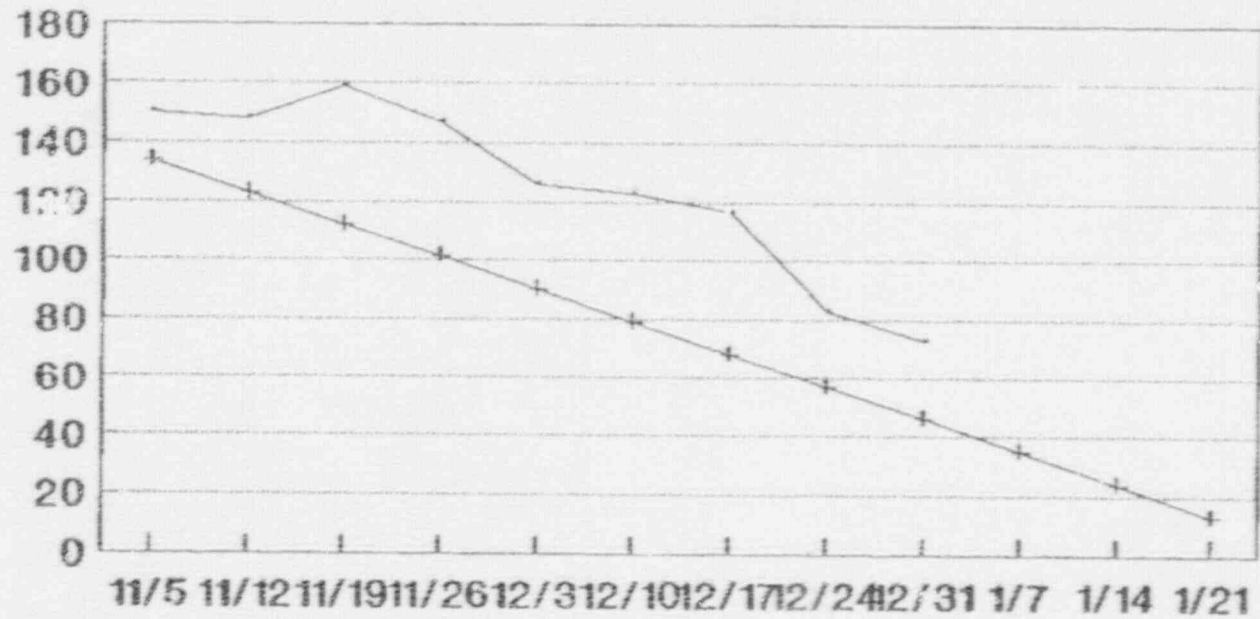


ACT MO CNT	81	86	83	61	62	64	43	27	20			
PROJ MO CNT	67	61	55	49	43	37	31	25	19	13	7	1

— ACT MO CNT + PROJ MO CNT

DEC 31 1990

PRI A MO'S WITH PARTS DELAYS

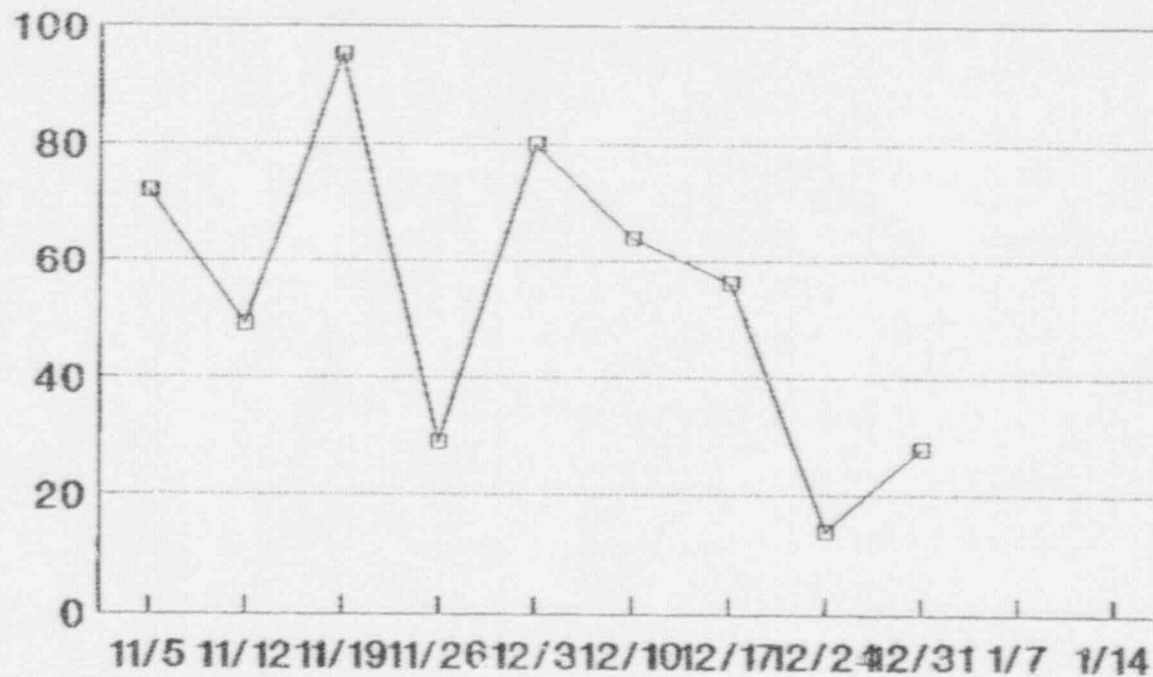


ACT MO CNT	150	148	159	147	126	123	117	83	73			
PROJ MO CNT	134	123	112	101	90	79	68	57	46	35	24	13

— ACT MO CNT + PROJ MO CNT

DEC 31 1990

UNIT 2 PRIORITY A MO' INITIATED WEEKLY



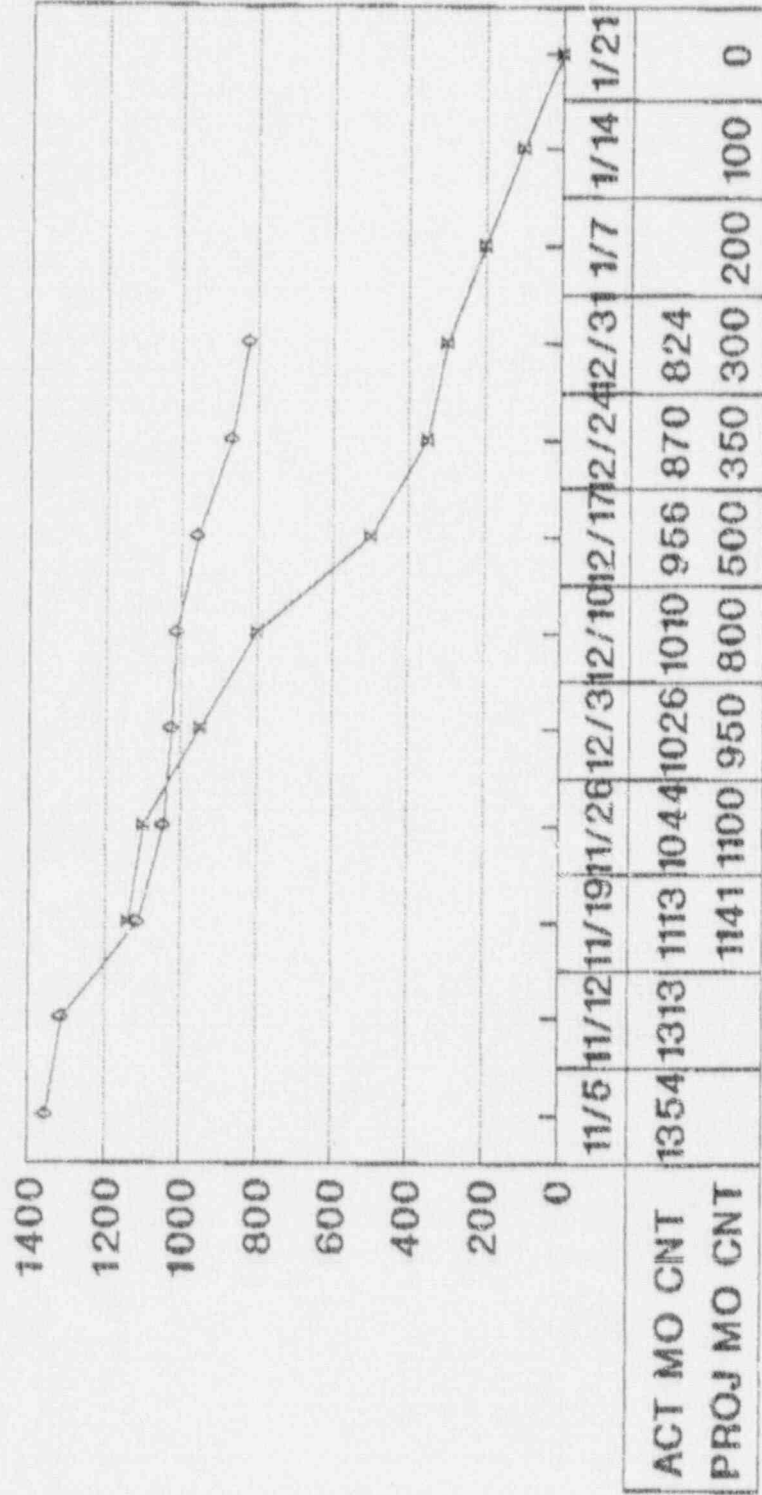
INITIATED WEEKLY 72 49 95 29 30 64 56 14 28

—□— INITIATED WEEKLY

DECEMBER 31 1990

PRI A MO'S STATUS 1-4

WORK IN PROGRESS

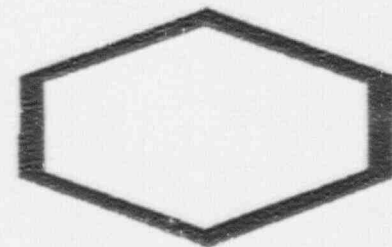


—◇— ACT MO CNT —x— PROJ MO CNT

DECEMBER 31 1990

PLANT OPERATING INDICATORS

- NUMBER/DURATION OF ACTION STATEMENTS
- OPERATIONS CONCERNS LIST
- BACKLOG OF RUNNING MAINTENANCE



U2 STARTUP SUMMARY

SURB PROCESS IS IN PLACE TO ENSURE

- U2 MATERIAL, STAFFING, AND PROCEDURES ARE READY TO SUPPORT RESTART
 - PROVED EFFECTIVE DURING PAST TWO UNIT 1 STARTUPS
 - INCLUDES LESSONS LEARNED FROM PAST USE

