



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

Report No.: 50-400/88-40

Licensee: Carolina Power and Light Company
 P. O. Box 1551
 Raleigh, NC 27602

Docket No.: 50-400

Licensee No: NPF-63

Facility Name: Harris 1

Inspection Conducted: November 21, 1988 - January 20, 1989

Inspectors:	<u><i>W. H. Bradford</i></u>	<u>2/16/89</u>
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	H. Dance, Section Chief	Date Signed
	Reactor Projects Section 1A	
	Division of Reactor Projects	

SUMMARY

Scope: This routine safety inspection was conducted in the areas of operational safety verification, surveillance observations, maintenance observations, licensee event reports, followup of events at operating power reactors, and plant nuclear safety committee meeting.

Results: Within the areas inspected two violations were identified. The first violation involved a failure to adequately perform post maintenance testing which resulted in a safety related room cooling unit being inoperable for approximately 61 days, paragraph 2.b. The second violation involved a failure to follow a clearance procedure which resulted in a loss of approximately 55,000 gallons of water from the spent fuel pool to the new fuel storage pool, paragraph 2.c.

Additionally, the licensee has established a task force to determine the root cause for the turbine driven auxiliary feedwater pump overspeed trip which occurred on January 16, 1989. Resolution of this matter is under inspector follow-up.

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REPORT DETAILS

1. Persons Contacted

- *R. A. Watson, Vice President, Harris Nuclear Project
- *C. G. Hinnant, Plant General Manager
- C. R. Gibson, Director, Programs and Procedures
- *D. L. Tibbits, Director, Regulatory Compliance
- C. S. Bohanan, Director, Special Programs
- *R. B. Van Metre, Manager, Technical Support
- *T. C. Morton, Manager, Maintenance
- J. M. Collins, Manager, Operations
- *J. R. Sipp, Manager, Environmental and Radiation Monitoring
- D. A. Braund, Supervisor, Security
- T. F. Lent, Systems Engineering
- W. R. Wilson, Reactor/Performance Engineering
- L. J. Woods, Testing and Maintenance Support
- W. H. Batts, Supervisor, Mechanical Maintenance
- *J. H. Smith, Supervisor, Operations Support
- C. S. Oleik, Supervisor, Shift Operations
- *G. L. Forehand, Director, QC/QC
- *F. E. Willet, Manager, Outages and Modifications

Other licensee employees contacted during this inspection included technicians, operators, mechanics, security force members, engineering personnel and office personnel.

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in paragraph 9.

2. Operational Safety Verification (71707)

a. Plant Tours

The inspectors conducted routine plant tours during this inspection period to verify that the licensee's requirements and commitments were being implemented. These tours were performed to verify that: systems, valves, and breakers required for safe plant operations were in their correct position; fire protection equipment and spare equipment and materials were being maintained and stored properly; plant operators were aware of the current plant status; plant operations personnel were documenting the status of out-of-service equipment; security and health physics controls were being implemented as required by procedures; there were no undocumented cases of unusual fluid leaks, piping vibration, abnormal hanger or seismic restraint movements; all reviewed equipment requiring calibration was current; and general housekeeping and control of fire

hazards were satisfactory. Tours of the plant included review of site documentation and interviews with plant personnel. The inspectors reviewed the control room operators' logs, tagout logs, chemistry and health physics logs, control boards, and panels. During these tours the inspectors noted that the operators appeared to be alert, aware of changing plant conditions, and manipulated plant controls properly. The inspectors evaluated operations shift turnovers and attended shift briefings. They observed that the briefings and turnovers provided sufficient detail for the next shift crew and verified that the staffing met the TS requirements.

Site security was evaluated by observing personnel in the protected and vital areas to ensure that these persons had the proper authorization to be in the respective areas. The inspectors also verified that vital area portals were kept locked and alarmed. The security personnel appeared to be alert and attentive to their duties and those officers performing personnel and vehicular searches were thorough and systematic. Responses to security alarm conditions appeared to be prompt and adequate.

Selected activities of the licensee's Radiological Protection Program were reviewed by the inspectors to verify conformance with plant procedures and NRC regulatory requirements. The areas reviewed included: operation and management of the plant's health physics staff, ALARA implementation, Radiation Work Permits for compliance to plant procedures, personnel exposure records, observation of work and personnel in radiation areas to verify compliance to radiation protection procedures, and control of radioactive materials. No discrepancies were noted.

Several inspector hours were spent on back shift inspections and observations. This included observing the unit coming off line and cooling down for a maintenance outage and the subsequent restart of the unit. Various other aspects of plant operation were observed and evaluated. The operators appeared to be awake, alert, knowledgeable, and competent in their duties. The licensee has developed a high degree of professionalism in the control room staff.

b. Inoperable RAB Emergency Exhaust System

During the last refueling outage the licensee replaced the bearings on 26 air handling motors. This work was performed under two Work Request (WR/JO) No. 88-AQPM2 and 88-AQPM2. A master clearance was prepared and Equipment Inoperable Records (EIRs) were initiated to track the status of the equipment.

On September 16, 1988, heating and ventilating equipment room number 2 cooling unit, AH-26 (1A-SA), was tagged out of service and on September 23, 1988, the fan motor leads were disconnected. The motor bearings were replaced on September 24, 1988, and the safety

clearance was canceled on September 28, 1988. Post maintenance testing requirements (PMTR) were prescribed which required a check for proper rotation and a check for unusual noise or vibration after the fan was started. This testing was not adequately performed, in that only the supply breaker indicating light was checked to verify fan operation.

On December 5, 1988, during preventative maintenance activities, the licensee discovered the motor leads had not been terminated on AH-26. AH-26 functions as a room cooler to support RAB Emergency Exhaust Fan E6-1A-SA (Train A) by maintaining room air temperature less than 104 degrees fahrenheit. E6-1A-SA is required to operate during a design basis loss of coolant accident to minimize the off-site dose from a postulated leak of RCS water into the RAB.

The licensee immediately declared RAB Emergency Fan E6-1A-SA to be inoperable. AH-26 motor leads were terminated, properly tested, and AH-26 and E6-1A-SA was declared operable. The licensee inspected the other 25 fan units to verify that maintenance and post maintenance testing had been properly completed. This event appears to be isolated in that it was 1 of 26 fan units which received the bearing modification and did not receive proper post maintenance testing.

The FSAR states that each train of the RAB Emergency Exhaust System consists of 100% capacity fan and filter subsystems. Upon receipt of an SIS, the normal ventilation penetrations close and both RAB Emergency Exhaust Systems are automatically energized. Either unit may then be manually stopped from the control room and placed in standby. A single active failure in any component of the RAB Emergency Exhaust System will not impair the system's ability to fulfill the objectives given in the design basis.

The licensee identified this event and reported it to NRC in LER-88-34. The licensee performed an analysis on the post accident affects on E6-1A-SA caused by loss of its associated AH-26 room cooler. From this analysis, the licensee determined that:

- (1) The E6-1A-SA fan motor qualified life would not be a factor.
- (2) The vortex damper actuator qualified life would be reduced from 1.85 years to 62.5 days.
- (3) Failure of the vortex damper would result in the damper failing open.
- (4) With the vortex damper failed open, negative pressure would be maintained greater than the TS requirement of negative 1/8-inch water with no detrimental effect to the motor or ductwork.

- (5) The dose rates at E6-1A-SA would be .25 to 2.5 mrem/hour, which would permit operators to manually control the vortex damper.
- (6) The radiation monitors on the E6-1A-SA discharge duct and on the vent stack would give warnings of any releases past the system's filter unit if possible damage were to occur.

Based on the above, the licensee concluded that the consequences of the loss of AH-26 during a post accident condition is minimal and can be safely compensated for by operator action.

TS 3.7.7 requires that two independent RAB Emergency Exhaust Systems be operable in Modes 1-4. Although the operability of AH-26 is not directly addressed in TS 3.7.7, it is required to support the long term operation of the E6-1A-SA fan, and is therefore considered to be a support system for the A train of the RAB Emergency Exhaust System. Accordingly, when the plant entered Mode 4 on October 5, 1988, E6-1A-SA was technically inoperable. This is a violation of Technical Specification 3.7.7 and 3.0.4. which require both trains to be operable before changing Modes from 5 to 4. Additionally, since AH-26 was inoperable from October 5, 1988, until December 5, 1988, approximately 61 days, the limiting condition for operation of TS 3.0.3 was exceeded.

The licensee's post maintenance testing program for fan motors requires that the rotation is verified and that the unit is monitored for unusual vibration or noise. The operations staff failed to perform the required PMTR which resulted in the unit being inoperable for approximately 61 days. Additionally, the maintenance staff failed to properly reconnect the fan motor leads during the maintenance process. The maintenance procedure for ventilation motors did not have an adequate signoff step to ensure the motor leads would be reconnected following maintenance. The licensee's failure to perform adequate post maintenance testing is considered to be a violation of NRC requirements and is identified as violation 400/88-40-01: Failure to Adequately Perform Post Maintenance Testing.

c. Loss of Spent Pool Level

At 2:15 a.m., on January 17, 1989, approximately five feet of water from the spent fuel pool was inadvertently drained to the new fuel storage pool. The event occurred during the improper restoration of clearance OP-89-0071 which had been issued to support preventative maintenance.

Maintenance Work Request MWR/JO 88-NSI404 had been issued in order to perform preventative maintenance on a spent fuel cooling pump. The clearance authorization required that valve 1SF-19, crosstie to new fuel pool, be verified "closed" before opening valve 1SF-11, crosstie

to spent fuel pool. These valves are located in the overhead and require a ladder for operation. The operator did not use a ladder and instead climbed on equipment in order to reach the valves. From his vantage point he could not see the valve position indicator for 1SF-19 and mispositioned the valve to the open position.

Valve 1SF-11 was opened as required, which crosstied the spent fuel pool to the new fuel pool. The control room received a low spent fuel pool level alarm and immediately initiated a valve lineup verification. Valve 1SF-19 was found to be mispositioned and was returned to its required position.

The loss of five feet in spent fuel pool level calculates to approximately 55,000 gallons of water. The design of the crosstie penetrations into the spent fuel pool is such that a maximum of five feet of spent fuel pool level could be lost following equipment failures or personnel errors. By design this maintains 18.5 feet of water above the spent fuel.

Technical Specification 3.9.11 requires that at least 23 feet of water shall be maintained over the top of spent fuel seated in the storage racks. Following the loss of level the action statement was followed, in that no crane operations or fuel movements were allowed. Level was restored within six hours and was considered to be timely, even though the action statement requires level to be restored within four hours.

Clearance OP-89-0071 required valve 1SF-19 to be verified closed. No valve manipulation was required, in that the valve was danger tagged in the closed position. The operator failed to follow the clearance instructions, in that he did not actually verify the position of 1SF-19 and manipulated a valve that did not require manipulation. The operator's error in not following the clearance is considered to be a violation of NRC requirements and is identified as a violation 400/88-40-02: Failure to Follow Procedures.

Two violations and no deviations were identified.

3. Monthly Surveillance Observation (71709)

The inspectors witnessed the licensee conducting surveillance test activities on safety-related systems and components to verify that the licensee performed the activities in accordance with applicable requirements. These observations included witnessing selected portions of each surveillance, review of the surveillance procedure to ensure that administrative controls were in force, determining that approval was obtained prior to conducting the surveillance test, and verifying that the individuals conducting the test were qualified in accordance with plant approved procedures. Other observations included ascertaining that test instrumentation used was calibrated, data collected was within the

specified requirements of TS, identified discrepancies were properly noted, and the systems were correctly returned to service. Portions of the following test activities were observed or reviewed by the inspectors:

OST-1013	Emergency Diesel Generator (1A-SA) Operability
OST-1023	Offsite Power Availability Verification
OST-1029	Containment Penetrations - Outside
OST-1027	ECCS Accumulator Valve Breaker Verification
OST-1026	RCS Leakage Measurement
OPT-1510	A and B Diesel Generator Daily Check
OST-1006	Boron Flowpath Verification
OST-1411	Auxiliary Feedwater (1X-SAB) Quarterly
OST-1124	6.9 kv Emergency Bus Undervoltage Trip Actuating Device Operability
EPT-031T	6.9 kv 1A-SA Emergency Bus Undervoltage Contact Actuation Procedure

OST-1124 and EPT 031T

On December 20, 1988, the licensee performed OST-1124, 6.9 kv Emergency Bus Undervoltage Trip Actuating Device Operational Test. This is a monthly test and is required in Modes 1 through 4. In this test both the 1A-SA and 1B-SB trains are tested to verify that proper alarms are actuated when primary and secondary undervoltage devices of the 6.9 kv Emergency Buses are actuated from a local test push button.

The test was successful on "B" train, but was not satisfactory on "A" train due to certain bus relays not functioning properly and resulted in an inadvertent bus loss. A similar event occurred on May 20, 1988, and was reported in LER 88-013. Following the initial failure, the licensee made several attempts to repeat the failure; however, the failure was elusive and could not be repeated. As the cause of the initial failure could not be determined, the equipment was returned to service and satisfactorily passed the monthly surveillance from June through November. Following the failure on December 20, 1988, the licensee developed a special test procedure, EPT-031T, 6.9 kv 1A-SA Emergency Bus Undervoltage Contact Instrumentation Procedure, which was performed on December 29, 1988. The inspectors observed the performance of this test procedure. The procedure instrumented certain contacts for the degraded grid and loss of offsite power relays. The test found that relays UVTX (agastat model #7014) and 2/SA (General Electric Model #12SAML1B22A) were not operating properly. These relays were replaced and OST-1124 was conducted on December 29, 1988. Proper operation of the bus undervoltage device was verified. The licensee is continuing their investigation of this matter to verify that no further hidden sporadic relay operations occur. The licensee is reporting the incident in LER 88-035. The faulty relays are part of the 6.9 kv undervoltage test circuitry and did not appear to have compromised equipment operability.

No violations or deviations were identified.

4. Monthly Maintenance Observations (62703)

Station maintenance activities of safety-related systems and components were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, industry codes and standards, and were in conformance with TS. Items considered during the review included verification that LCOs were met while components or systems were removed from service; approvals were obtained prior to initiating the work; approved procedures were used; completed work was performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials were properly certified; and radiological and fire prevention controls were implemented. Work requests were also reviewed to determine the status of outstanding jobs to assure that priority was assigned to safety-related equipment maintenance which could affect system performance.

Portions of the following activities were observed or reviewed:

- RC-103 and RC-107; Pressurizer spray valve packing leaks
- AFW-93, AFW-155, and AFW-71; Auxiliary feedwater valve packing
- HD-46; Feedwater heater #4 - packing
- RCDT; Pump shaft replacement
- Main feedwater pump seal water leak-off line replacement
- Cleaning and inspecting various 460 vac load centers
- "A" condensate booster pump fluid coupling repairs
- Rod drive urgent failure

The Shutdown Bank B Group 2 rod control cabinet experienced an urgent failure on December 20, 1988. After replacement of the phase control and firing circuit boards, it was discovered that transformer "T2" was faulty. The inspector witnessed the maintenance activities associated with removal and replacement of the "T2" transformer in an energized cabinet.

No violations or deviations were identified.

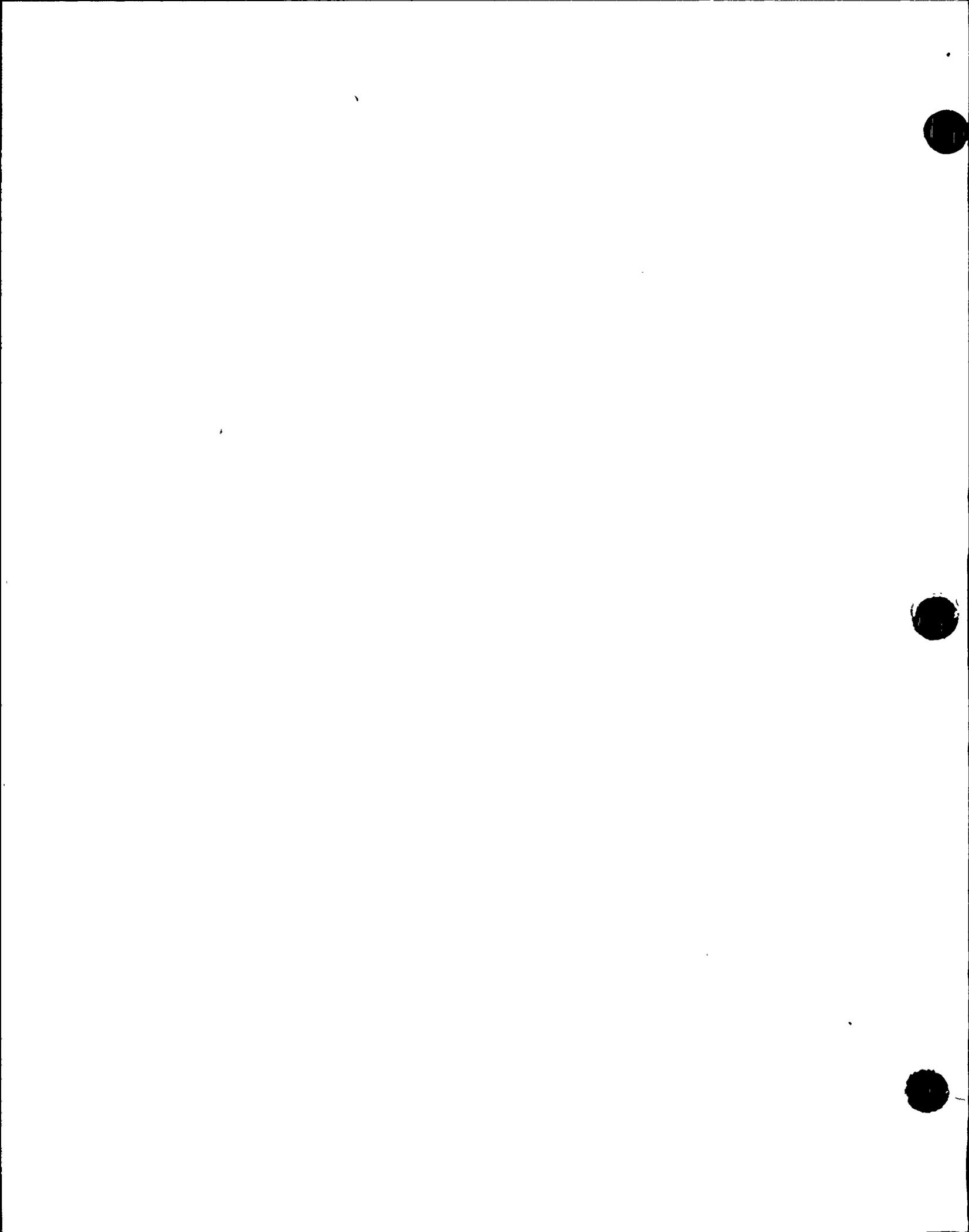
5. Licensee Event Reports (92700)

The following LERs were reviewed for potential generic problems to determine trends, to determine whether information included in the report meets the NRC reporting requirements, and to consider whether the corrective action discussed in the report appears appropriate. The licensee's action was reviewed to verify that the event has been reviewed and evaluated as required by TS; that corrective action was taken by the licensee; and that safety limits, limiting safety settings, and LCOs were

not exceeded. The inspector examined incident reports, logs and records, and interviewed selected personnel. The following reports are considered closed:

- LER-87-56 Reactor trip caused by de-energization of P-13 permissive bistable due to insufficient modification installation instructions.
- LER-87-57 Failure to implement all required in-service inspection tests for diesel fuel oil transfer pumps; procedural deficiencies.
- LER-87-58 Excessive RCS leakage due to valve failure in RCS head vent system during testing.
- LER-87-59 Loss of offsite power due to incoming line breaker opening caused by personnel error and a loss of emergency service due to procedural deficiency.
- LER-87-60 Isolation of RHR during testing of valve interlocks due to test equipment failure.
- LER-87-61 Technical Specification violation due to missed flow rate estimate caused by personnel error.
- LER-87-62 Personnel error in setting steam dump controller resulted in safety injection, main steam isolation, and reactor trip when MSIVs were opened.
- LER-87-63 Plant trip caused by loss of main feed water due to mispositioned condensate recirculation valve.
- LER-87-65 First stage turbine pressure setpoints for P-13 permissive were incorrectly set due to personnel error.
- LER-87-66 Failure to perform satisfactory actuation logic test for containment ventilation isolation due to procedural inadequacy.
- LER-87-67 Containment ventilation system isolation due to a spurious high radiation alarm while sampling at monitor.

No violations or deviations were identified.



6. Follow-up on Plant Events (92702)

- a. On December 14, 1988, the Unit was shutdown for a five day maintenance outage. Maintenance work was performed on the pressurizer spray valves, auxiliary feedwater valves, reactor coolant drain tank pump, and various other components. The Unit was returned to power operation on December 19, 1988.
- b. On January 16, 1989, at 3:18 p.m., the Unit tripped from 100% power. The trip was due to low condenser vacuum in the main condenser. The vacuum loss was due to an open vent valve on the auxiliary condensate system which allowed atmospheric pressure to the main condenser. All systems functioned as designed with the exception of the turbine driven auxiliary feedwater pump. The turbine received a start signal but tripped on overspeed. Condensate in the main steam line to the turbine was the apparent cause of the overspeed trip. The licensee has had previous problems with condensate in this line and had performed a modification to the moisture removal system during the last refueling outage. The licensee has initiated a program to periodically blowdown the condensate removal system to ensure that condensate is removed and not allowed to collect in the steam line.

On January 17, 1989, the PNSC decided that a task force would be appointed to perform a design review of the turbine driven auxiliary feedwater system to determine the root cause of the overspeed trip and to recommend action to totally resolve any problems.

The inspectors will follow the efforts of this task force. This item will remain open pending completion of the review and is identified as inspector followup item, IFI 400/880-40-03: Review Task Force Resolution of Turbine Driven Auxiliary Feedwater Pump Overspeed Trip.

No violations or deviations were identified.

7. Plant Nuclear Safety Committee (40700)

The inspectors attended one of the routine weekly plant operations review committee PNSC meetings. The PNSC was established to advise the plant general manager on all matters related to nuclear safety. Technical Specifications, Section 6.5.2 provides the requirements for the committee concerning: function, composition, meeting frequency, size and members required, authority, and in general the responsibilities assigned to the members. A quorum was present. During the meeting, Plant Change Request (PCR) 3547 - Radioactive Waste Demineralizer Skid and Draft LER-88-035 were discussed.

No violations or deviations were identified.

8. Exit Interview

The inspection scope and findings were summarized during management interviews throughout the reporting period and on January 20, 1988, with those persons indicated in paragraph 1. The inspection findings listed below were discussed in detail. The licensee acknowledged the inspection findings and did not identify as proprietary any material reviewed by the inspector during the inspection.

<u>Item Number</u>	<u>Status</u>	<u>Description/Reference Paragraph</u>
400/88-40-01	Open	Violation - Failure to Adequately Perform Post Maintenance Testing - (paragraph 2.b.)
400/88-40-02	Open	Violation - Failure to Follow Procedure - (paragraph 2.c.)
400/88-40-03	Open	IFI - Review Task Force Resolution of Turbine Driven Auxiliary Feedwater Overspeed Trip - (paragraph 6.b.)

9. List of Initialisms

AFW	-	Auxiliary Feedwater
AH	-	Air Handling
ALARA	-	As Low As Reasonably Achievable
ECCS	-	Emergency Core Cooling System
EIR	-	Equipment Inoperable Records
EPT	-	Engineering Periodic Test Procedure
FSAR	-	Final Safety Analysis Report
IFI	-	Inspector Follow-up Item
KV	-	Kilo Volt
LCO	-	Limiting Condition for Operation
LER	-	Licensee Event Report
LOCA	-	Loss of Coolant Accident
MS	-	Main Steam
MSIV	-	Main Steam Isolation Valve

MST	-	Maintenance Surveillance Test
NRC	-	NRC Regulatory Commission
OP	-	Operating Procedure
PCR	-	Plant Change Request
PMTR	-	Post Maintenance Test Requirements
PNSC	-	Plant Nuclear Safety Committee
RAB	-	Reactor Auxiliary Building
RCDT	-	Reactor Coolant Drain Tank
RCS	-	Reactor Coolant System
RHR	-	Residual Heat Removal System
RWP	-	Radiation Work Permit
SF	-	Spent Fuel
SIS	-	Safety Injection Signal
TS	-	Technical Specification
Vac	-	Volts A.C.
WR/JO	-	Work Request/Job Order