UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report No.: 50-400/94-22

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: September 29 - November 12, 1994

Inspectors: _____ for 11/29/94
S. Elrod, Senior Resident Inspector Date Signed

_____ for 11/29/94
D. Roberts, Resident Inspector Date Signed

Approved by: _____ for 11/30/94
H. Christensen, Chief Date Signed
Reactor Projects Section IA
Division of Reactor Projects

SUMMARY

Scope:

This routine inspection was conducted by two resident inspectors in the areas of plant operations, review of nonconformance reports, followup of onsite events, maintenance observation, surveillance observation, design changes and modifications, plant housekeeping, radiological controls, security, fire protection, review of licensee event reports, and licensee action on previous inspection items. Numerous facility tours were conducted and facility operations observed. Backshift tours and observations were conducted on October 29, November 2 and 3, and November 5 - 12, 1994.

Results:

Three violations were identified including one with three examples.

Operational Safety

An inspector followup item was identified involving a turbine driven auxiliary feedwater pump overspeed event, paragraph 3.b.

A weakness was noted in the area of procedures for verifying pressure switch settings in turbine runback circuitry, paragraph 3.a.(3).

Good operator performance was noted during shutdown and startup activities associated with the preplanned forced outage, paragraph 3.a.(3).

Maintenance

One violation example was identified involving the failure to properly implement battery surveillance procedures, paragraph 4.c.

Another violation example was identified involving inadequate procedures to maintain Target Rock brand solenoid valves, paragraph 5.c.(2).

Engineering Activities

One violation was identified involving the failure to maintain safety-related pipe seismic supports within specifications, paragraph 5.c.(1).

An inspector followup item was opened to follow the licensee's actions to update the Target Rock solenoid valve vendor manual, paragraph 5.c.(2).

Weaknesses were identified in engineering efforts to restore the "A" feedwater isolation valve 1FW-159 to operable status, paragraph 5.b.(3).

The new Engineering Service Request (ESR) process was recently implemented which replaced the Plant Change Request (PCR) process, paragraph 5.a.

Plant Support

One violation example was identified in the fire protection area involving improper control of flammable liquids, paragraph 6.d.

Another violation was identified in the security area involving inadequate corrective actions for preventing vehicle control violations, paragraph 6.c.

REPORT DETAILS

1. PERSONS CONTACTED

Licensee Employees

*D. Batton, Manager, Work Control
*D. Braund, Manager, Security
*B. Christiansen, Manager, Maintenance
*J. Collins, Manager, Training
*J. Dobbs, Manager, Outages
*J. Donahue, General Manager, Harris Plant
*R. Duncan, Manager, Technical Support
*M. Hamby, Manager, Regulatory Compliance
D. McCarthy, Manager, Regulatory Affairs
R. Prunty, Manager, Licensing & Regulatory Programs
*W. Robinson, Vice President, Harris Plant
G. Rolfson, Manager, Harris Engineering Support Services
H. Smith, Manager, Radwaste Operation
*B. White, Manager, Environmental and Radiation Control
*A. Williams, Manager, Shift Operations

Other licensee employees contacted included office, operations, engineering, maintenance, chemistry/radiation and corporate personnel.

NRC Employees and Contractors

S. Black, Branch Chief, Quality Assurance and Maintenance Branch, NRR
P. Kellogg, Section Chief, Division of Reactor Safety, NRC Region II
W. Shafer, Section Chief, Division of Reactor Safety, NRC Region III
A. Coello, Spanish Nuclear Safety Council
*S. Elrod, Senior Resident Inspector, Shearon Harris
P. Fillion, Reactor Inspector, Division of Reactor Safety, NRC Region II
T. Foley, Engineer, Reliability and Maintenance Section, NRR
E. Ford, Senior Resident Inspector, Waterford-3
C. Petrone, Engineer, Reliability and Maintenance Section, NRR
G. Repogle, Reactor Inspector, NRC Region III
*D. Roberts, Resident Inspector, Shearon Harris

*Attended exit interview

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

2. PLANT STATUS AND ACTIVITIES

a. Plant Operating Status over the Inspection Period

The plant began this inspection period in power operation (Mode 1). On October 29, 1994, the unit was taken off-line and a plant shutdown performed to commence a scheduled maintenance outage. A plant cooldown was subsequently performed and on October 30 the

unit was placed in the cold shutdown (Mode 5) condition. On November 3 an RCS heatup was commenced and the hot standby condition (Mode 3) was finally reached on November 7 following repairs to two main feedwater isolation valves. On November 8 at 7:56 a.m., the reactor was taken critical. The plant entered Mode 1 at 3:10 p.m. that same day. The plant operated at power for the duration of the inspection period.

b. Other NRC Inspections or Meetings at the Site

During this period, an inspection of the Station Blackout Rule and maintenance of electrical systems was conducted on October 3-7 and 24-28 by Mr. P. Fillion of NRC Region II. The results were documented in IR 400/94-20.

During this period, a pilot team inspection of Maintenance Rule implementation was conducted on October 24 - 28 by a team led by Mr. R. Corriea, Chief, Reliability and Maintenance Section of the NRC Office of Nuclear Reactor Regulation. Additional NRC team members and contractors are listed above. The team exit meeting was attended by Ms. S. Black, Chief of the Quality Assurance and Maintenance Branch, NRR. The team intended to issue a combined lessons-learned report in 1995 following completion of all the scheduled pilot inspections.

3. OPERATIONS

a. Plant Operations (71707)

(1) Shift Logs and Facility Records

The inspector reviewed records and discussed various entries with operations personnel to verify compliance with the Technical Specifications (TS) and the licensee's administrative procedures. The following records were reviewed: shift supervisor's log; control operator's log; night order book; equipment inoperable record; active clearance log; grounding device log; temporary modification log; chemistry daily reports; shift turnover checklist; and selected radwaste logs. In addition, the inspector independently verified clearance order tagouts.

The inspectors found the logs to be readable, well organized, and provided sufficient information on plant status and events. Clearance tagouts were found to be properly implemented. No violations or deviations were identified.

(2) Facility Tours and Observations

Throughout the inspection period, facility tours were conducted to observe activities in progress. Some of these observations were conducted during backshifts. Also, during this inspection period, licensee meetings were attended by the inspectors to observe planning and management activities. Facility tours and observations encompassed the following areas: security perimeter fence; control room; emergency diesel generator building; reactor auxiliary building; waste processing building; turbine building; fuel handling building; emergency service water building; battery rooms; electrical switchgear rooms; and the technical support center.

During these tours, observations were made regarding monitoring instrumentation. Observations included equipment operating status, electrical system lineup, reactor operating parameters, and auxiliary equipment operating parameters. Indicated parameters were verified to be in accordance with the TS for the current operational mode. The inspectors also verified that operating shift staffing was in accordance with TS requirements and that control room operations were being conducted in an orderly and professional manner. In addition, the inspector observed shift turnovers on various occasions to verify the continuity of plant status, operational problems, and other pertinent plant information during these turnovers. The licensee's performance in these areas was satisfactory.

During plant tours, the inspector observed multiple examples of three conditions involving plant configuration or design control that warranted closer inspection. The subjects were small-bore pipe support installations, electrical conduit installations, and installation of caps on Target Rock brand solenoid valves. These subjects are discussed in report Section 5.

(3) Plant Shutdown for a Short Notice Outage

During a plant shutdown commencing October 28, for repair of RHR Loop Isolation Valve 1RH-1 and subsequently Feedwater System Containment Isolation Valves 1FW-159 and 277, the inspectors observed various elements of plant operations. Procedures observed during the shutdown and restart activities included the following:

- GP-002, Normal Plant Heatup from Cold Solid to Hot Subcritical (Mode 5 to Mode 3).

- GP-004, Reactor Startup (Mode 3 to Mode 2).

- GP-006, Normal Plant Shutdown From Power Operation to Hot Standby (Mode 1 to Mode 3).

- GP-007, Normal Plant Cooldown (Mode 3 to Mode 5).

During the plant and reactor shutdown on October 28 per procedure GP-006, Revision 6, Change 6, the inspectors particularly observed procedure adherence, cooldown rate, control rod manipulations, management and control within the control room, and communications. The shutdown started at 9:20 p.m., the turbine was tripped at 12:02 a.m., on October 29, and the reactor was shutdown 44 minutes later, entering Mode 3 at 12:46 a.m. Although control room operations were conducted smoothly, one procedural weakness was identified. Specific observations are discussed in the following two paragraphs.

Procedure GP-006 step 5.1.9, verifying reset of a turbine first stage pressure switch that enables a loss-of-feedpump runback, did not specify how to verify the condition and did not include acceptance criteria. The verification was actually performed per WR 94-AMSI1 by measuring voltage across terminals in the termination cabinets adjacent to the control room. The work request also did not include acceptance criteria. The measured voltage was 55 volts vice 120 volts across an "open" contact in a 120 volt system. The technician also read 65 volts vice 0 volts across some "closed" contacts in the same circuit. The voltage measured across the "open" switch contacts appeared inconclusive, especially considering a lack of acceptance criteria. Though initially attributed to "induced voltage," subsequent licensee research found that another contact in the circuit was also open as required in that condition and that the voltages observed were actually appropriate. The inspector judged that lack of acceptance criteria was a procedural weakness in GP-006.

During the shutdown, the control board operator identified that valve 1FW-159, Main feedwater Isolation Valve for "A" SG, was slow to shut during normal operation. Troubleshooting and repair of this valve extended the shutdown for a week and is discussed in paragraph 5.b.(3) of this report. The inspector judged that the operator was diligent in identifying this adverse condition.

The inspectors observed the subsequent cooldown from Mode 3 to Mode 5 per GP-007, revision 6. The cooldown started at 4:00 p.m., on October 29, the reactor entered Mode 4 at 11:00 p.m., and Mode 5 at 9:05 a.m., on October 30. Control room observations showed a maximum cooldown rate of 76.9 degrees F per hour and an average of 52.7 degrees F per hour, well within the TS limit of 100 degrees F per hour.

With the plant in Mode 5, the inspectors also focused on the status of the source-range nuclear instrumentation high flux at shutdown alarm. The shift operators verified that the alarm setpoint was maintained less than two times the actual source range flux level. This was done in conjunction with requirements in procedure GP-002 and commitments contained in the plant FSAR Chapter 15 analysis discussing inadvertent boron dilution events.

The inspectors observed the reactor plant heatup from Mode 5 to Mode 3 on November 3 and 4 per GP-002, Revision 6, Change 9. This observation included solid plant pressure control and RCS heatup, and pressurizer heatup and drawing a bubble in the pressurizer. During this heatup, several plant components were found not operating properly, were declared inoperable, troubleshot and subsequently returned to service. Components included "A" SG PORV 1MS-58, and "C" MSIV bypass valve 1MS-85. Troubleshooting did not always include an actual repair if the component functioned properly the second time.

Startup on November 8 per GP-004, Revision 6, Change 8, and from Mode 3 to Mode 2 was performed smoothly. The reactor reached critical operation within the predicted control rod band.

The inspectors considered that the operators performed well during shutdown and startup activities, as well as while maintaining solid plant pressure control.

b. Effectiveness of Licensee Control in Identifying, Resolving, and Preventing Problems (40500)

Adverse Condition and Feedback Reports (ACFRs) were reviewed to verify that TS were complied with, corrective actions and generic items were identified, and items were reported as required by 10 CFR 50.73.

ACFR 94-3178 reported that on October 24, 1994, during a monthly surveillance test, the turbine-driven auxiliary feedwater (TDAFW) pump tripped on overspeed. Minutes later, an unsuccessful attempt to restart the pump resulted in a second overspeed trip. The pump had been already declared inoperable for testing and remained inoperable until troubleshooting and maintenance activities could be completed. Maintenance included replacing the ramp generator signal convertor (RGSC) logic card associated with the electronic governor on the Terry Turbine. Following maintenance activities, the pump was successfully run several times before being declared operable on October 27. The inspectors observed two of the post-maintenance and troubleshooting pump tests including the most

recent on November 10 during which several key attributes, including governor valve linkage motion and pump speed, were monitored by licensee personnel.

The inspector noted that the TDAFW pump had tripped on overspeed twice in 1994 prior to the October 24 event. This was also noted by licensee personnel who initiated an Event Review Team to investigate the root cause of the overspeed events. One of the earlier pump trips had originally been attributed to the same faulty logic card. The inspector considered that several industry events related to governor valve stem binding on turbine-driven pumps had resulted in the issuance of NRC Information Notice 94-66. In addition, the inspector noted recent problems with a moisture level control switch for a drip-leg serving the TDAFW pump steam supply line. Moisture collecting in the turbine steam supply line is a widely known cause of overspeeding. The licensee indicated that all of the above issues were being considered in its root cause investigation. The inspector concluded that this issue warranted further attention and will track the licensee's root cause actions as an inspector followup item.

Inspector Followup Item (50-400/94-22-01): Follow the licensee's activities to determine the root cause of the TDAFW pump overspeed events.

The inspectors' overall conclusion was that plant operations were conducted in an effective manner. The licensee's decision to take the plant off-line to fix the RHR valve leak (with about 7 GPM margin remaining on the TS identified leakage limit) was considered conservative. Operators were diligent in anticipating problems during shutdown and startup activities. The licensee's initiative to commission an event review team for the TDAFW pump overspeed events was appropriate.

4. MAINTENANCE

a. Maintenance Observation (62703)

The inspector observed/reviewed maintenance activities to verify that correct equipment clearances were in effect; work requests and fire prevention work permits were issued and TS requirements were being followed. Maintenance was observed and work packages were reviewed for the following maintenance activities:

- WR/JO 94-ACNF1, Adjust linkage arm on valve 1SW-1208, and replace Hydramotor actuator if necessary.

- WR/JO 94-ANPR1, Install trace recorder for monitoring TDAFW pump to monitor performance. Run pump in accordance with procedure OP-137 to establish baseline data and monitor governor valve stem travel.

- WR/JO 94-AMIS1, Verify switch setting associated with loss of main feedwater pump turbine runback during performance of GP-006.

- WR/JO 94-ANEH1, Troubleshoot failure of feedwater isolation valve 1FW-159 to close within 5 seconds. It was during the performance of this work ticket that the valve's actuator was damaged in an attempt to verify the valve's stroke time. Further discussion of licensee's efforts to return 1FW-159 to service are provided in paragraph 5.b.(3) below.

- WR/JO 94-ANGA1, Install actuator on valve 1FW-159 in accordance with procedure CM-M0059, Feedwater Isolation Valve Actuator Disassembly and Maintenance.

In general, the performance of work was satisfactory with proper documentation of removed components and independent verification of the reinstallation. At the close of the inspection, hard copies of work packages with appropriate signatures were not available for all of the tickets associated with the feedwater isolation valves. Instead, the inspector reviewed tickets in the field and information contained in the Automated Maintenance Management System database which documented actions performed in the field. No violations or deviations were identified.

b. Surveillance Observation (61726)

Surveillance tests were observed to verify that approved procedures were being used; qualified personnel were conducting the tests; tests were adequate to verify equipment operability; calibrated equipment was utilized; and TS requirements were followed. The following tests were observed and/or data reviewed:

- MST-I0124, Pressurizer Pressure P-0457 Operational Test.

- OST-1049, RAB Emergency Exhaust System Train "B" Operability.

- OST-1111, Auxiliary Feedwater Pump 1X-SAB Operability Test, Monthly Interval. The inspectors observed this surveillance test following the TDAFW pump overspeed event discussed in paragraphs 3.b and 5.b.(2) of this report. The performance of this test was one of several surveillances used to demonstrate operability following the event.

- OST-1087, Motor Driven Auxiliary Feedwater Pumps Full Flow Test, Quarterly Interval. The "A" Motor driven pump was tested in Mode 5 on November 4 to demonstrate full flow to the "C" steam generator via various AFW system check valves. The performance of this test actually took steam generator "C" indicated level from 50% to 75% and resulted in a slight cooldown on the "C" loop. Indicated RCS cold leg

temperature dropped on loop "C" by approximately 2 degrees Fahrenheit. These results were anticipated by operators and were considered not to have any adverse effect on plant equipment. The inspector verified that pump performance data, such as vibration, flow, and differential pressure, met the stated acceptance criteria.

The performance of these procedures was found to be satisfactory with proper use of calibrated test equipment, necessary communications established, notification/authorization of control room personnel, and knowledgeable personnel having performed the tasks. No violations or deviations were observed.

c. Followup - Maintenance (92902)

(Open) URI 400/94-21-04: Adequacy of procedures and procedure adherence in the area of battery surveillance.

This item addressed both the implementation of procedure MST-E0010, 1E Battery Weekly Test, on September 21, 1994, and the adequacy of the various battery surveillance procedures themselves when compared to the vendor technical manual.

- Regarding implementation of procedure MST-E0010, Technical Specification 6.8.1.a required written procedures to be established, implemented, and maintained covering the procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Appendix A, paragraph 8.b required implementing procedures for each surveillance test, inspection, or calibration listed in Technical Specifications. Procedure MST-E0010 implemented portions of Technical Specification 4.8.2. Procedure MST-E0010 step 7.0.4 required that if any AS FOUND data exceeded the allowable range, notify the shift supervisor immediately and have the shift supervisor sign off on the data sheet.

  On September 21, 1994, when the cell temperature for 1A battery pilot cell 37 was 86 degrees Fahrenheit and above the allowable range of >70 and <85 degrees Fahrenheit, the temperature was recorded but the shift supervisor was not notified and the signature space for the notification was marked N/A. This action was contrary to the above requirements and is considered to be a violation.

  Violation (400/94-22-02, example 1): Failure to adhere to battery surveillance procedures.

- Regarding adequacy of the surveillance procedures, an event occurred subsequent to this inspection which further led inspectors to question the content of procedures MST-E0010 and MST-E0011, 1E Battery Quarterly Test. This event, which will be discussed in IR 400/94-23, is also being reviewed by

a licensee event review team.

URI 400/94-21-04 remains open pending completion of licensee and NRC reviews in this area.

5. ENGINEERING

a. Onsite Engineering - Engineering Organization and Program Changes (37551)

The licensee recently began implementing several changes to its engineering program including a reorganization and relocation of the Harris Engineering Support Section (HESS) and a modification to the Plant Change Request (PCR) process. The reorganization came about as a result of changes to the licensee's Nuclear Engineering Department and an effort to have the design engineering support functions located at each of the licensee's three nuclear sites. As a result of the reorganization, HESS now includes three functions which were once in separate organizations. The design engineering unit functions to provide such duties as outage support, design basis control, engineering procurement and modification development. The technical support unit continues to provide expertise in system engineering, reactor engineering, maintenance support, and engineering testing programs (i.e., ISI, HVAC testing, ASME code repairs, etc.). The projects and engineering services unit provides project management, planning and scheduling of modification work, and administrative support. The activities of the new HESS organization are defined in engineering procedure ENP-001, Harris Engineering Support Section Conduct of Operations.

The PCR process was recently revamped into the new Engineering Service Request (ESR) program. This program is defined in plant program procedure PLP-650, Engineering Service Requests. Effective September 19, 1994, all engineering services for which a written response was required, including modifications and engineering evaluations, were to be conducted under the newer program. Engineering Service Requests are divided into five response types. Two types mentioned above include engineering evaluations and modifications, formerly handled under the PCR program. Other types include the commercial change ESR, the non-technical change ESR, and the engineering reply ESR. Commercial changes primarily involve modifications to structures which are not part of the power block, but whose change could affect a plant document or program. Non-technical change ESRs involve administrative changes to design documents or those which do not affect design inputs. Both of these types were also handled under the old PCR process. The engineering reply ESR is a reply-only document that may be used to communicate existing design information obtained from a design document or to provide operability determinations in accordance with NRC Generic Letter 91-18, Information To Licensees Regarding Two NRC Inspection

Manual Sections On Resolution Of Degraded And Nonconforming Conditions And On Operability. The engineering reply ESR cannot be used to change existing design documents or design configurations in the field. Operability determinations of this type were formerly handled under procedure TMM-408, Operability Determination.

The inspector reviewed procedure PLP-650 and discussed aspects of the latest reorganization and the new ESR process with licensee personnel. The ESR procedure contained guidance on how to initiate, log, revise, void, and answer ESRs. Responsibilities of personnel involved in the process were also defined in the procedure. Minimum approval levels were outlined for the five types of ESRs. The forms for documenting responses to the various types of ESRs were contained as attachments to the procedure. Although the licensee will continue to perform engineering work for design changes that were initiated under the PCR process prior to September 19, engineering management indicated that it plans to phase out all PCRs by the end of 1994 and have existing PCRs incorporated into the new ESR format.

The inspector concluded that it was too early to determine the effectiveness of these recent program changes but will continue to monitor the licensee's performance in this area.

b. Onsite Engineering - Design/Installation/Testing of Modifications (37551)

Engineering Service Requests involving the installation of new or modified systems were reviewed to verify that the changes were reviewed and approved in accordance with 10 CFR 50.59, that the changes were performed in accordance with technically adequate and approved procedures, that subsequent testing and test results met approved acceptance criteria or deviations were resolved in an acceptable manner, and that appropriate drawings and facility procedures were revised as necessary. ESR's documenting engineering evaluations were also reviewed. The following engineering evaluations, modifications and/or testing in progress were inspected.

(1) ESR 9400345 Containment Walkdown Pipe Hanger As-Built Issues, and

ESR 9400331 Operability Evaluation for Pipeline 3F01-1/2-62SA-1.

The above ESRs were developed following several plant walkdowns in which the inspector identified deficiencies with small-bore (less than four-inches diameter) pipe supports. The results of these walkdowns and the ESRs are discussed in paragraph 5.c.(1) below.

(2) ESR 9400333 Operability Determination for Turbine-Driven Auxiliary Feedwater Pump.

As discussed in paragraph 3.b of this report, the TDAFW pump tripped on overspeed on October 24. Engineering Service Request 940333 was initiated to provide an operability determination for the pump following troubleshooting efforts which were unsuccessful in identifying, with certainty, a sole root cause for the overspeed event. The ESR contained a failure mode/effects analysis which ultimately ruled out several probable causes for the October 24 event. These included excessive condensation in the steam supply line resulting in erratic governor valve performance, loss of speed input signal to the electronic governor, governor valve stem binding, governor oil problems, and loss of a speed reference signal from the RGSC logic card. All but the latter were ruled out. The RGSC card was replaced after it failed to meet acceptance criteria during a calibration procedure. The ESR concluded that the pump was operable following four successful tests after the card was replaced. It added that the increased testing frequency of the pump would provide assurance that a time dependent failure mode (such as the others described above) did not exist. The inspectors considered the above operability determination to be adequate but that continued attention to and trending of the pump's performance is warranted. An inspector followup item was opened in paragraph 3.b of this report to track the licensee's continued activities to determine the root cause of the recent overspeed events.

(3) ESR-9400351 Relocation of Feedwater Isolation Valve Operator, and ESR-9400353 Repair of Damaged Feedwater Isolation Valve Actuator.

As mentioned in the operations section of this report, the plant was shutdown for a preplanned outage which was extended due to problems with main feedwater isolation valve 1FW-159. On October 28 during downpower evolutions, 1FW-159, which is a containment isolation valve, exceeded the 5 seconds allowed by technical specifications to shut. The valve was declared inoperable and added to the scope of the outage work.

Valve 1FW-159 is a 16-inch tilting disk gate valve with a hydraulic operator which relies on nitrogen gas pressure to close. During initial troubleshooting activities, plant personnel considered that the valve's slow closure on October 28 was potentially caused by two solenoids in the hydraulic actuating system. Licensee personnel replaced the solenoids, along with various filters and associated o-rings in the hydraulic fluid system, and commenced post-maintenance testing for operability. During the testing,

the valve's actuator was damaged when the hydraulic system was accidentally overpressurized. This required that the outage be extended to allow time for receiving a new actuator from another utility and refurbishing it to meet Harris design requirements.

ESR 9400353 was developed to allow using the actuator received from the other utility to repair the damaged actuator for 1FW-159. Because of the layout in the steam tunnel where the feedwater isolation valves are located, ESR 9400351 was also developed to allow for swapping the actuator on the "B" FWIV (1FW-277) with the refurbished actuator for 1FW-159. This was determined by licensee personnel to be necessary to reduce outage time since the 1FW-277 actuator would have to be removed in order to get the actuator for 1FW-159 out of the steam tunnel for repairs. The ESR analysis considered that there were "minor internal differences" between the two actuators and concluded that either actuator would operate either valve.

On November 5, after both valves' actuators were swapped, operators unsuccessfully attempted to stroke the valves open from the main control room. During each attempt, a small pump located inside the hydraulic fluid reservoir cavitated. This pump was designed to increase hydraulic pressure under the actuator piston which forces the valve open. It was determined during subsequent troubleshooting that the internal piping differences and the differences in orientation between the two FWIV actuators would not allow them to be interchanged. The fact that the valve actuators were not interchangeable was not identified during the ESR 9400351 analysis. This analysis did not consider that by swapping the actuators, suction piping for each of the hydraulic pumps would be oriented such that after partial valve stroke, hydraulic fluid level would fall to below the suction line of the small pumps, causing them to cavitate. Upon discovery, licensee personnel voided ESR 9400351 and initiated Revision 2 to ESR 9400353 to return the valve actuators to their original locations. On November 6, the valves were stroked successfully and declared operable. The safety significance of the valve's actuators being swapped was minimal at the time because the plant was still in cold shutdown, and the valves' ability to be placed in their accident conditions was not compromised.

Although the safety significance of this incident was minimal, the inspectors considered that engineering efforts associated with valve 1FW-159 repair were inadequate. During discussions with cognizant personnel, the inspectors learned that engineers referred to vendor technical manual "MZU" (Valves and Operators by Borg-Warner Corporation) for guidance while developing ESR 9400351. The manual contained

Drawing Number 39311, Revision H, Sheets 1 and 2, Reservoir Assembly - Hydraulic Operator. This drawing depicted the actuator internals along with a parts list for each of the three FWIVs. The drawing contained a note which attempted to explain internal differences between the actuators on the three feedwater isolation valves. However, the drawings were of poor visual quality and the note was vague in meaning. Engineers relying on the note had no idea what it meant. The inspector noted other deficiencies with the vendor manual that were unrelated to the FWIV swapping event. These included a rough schematic of the hydraulic system with a footnote stating that the solenoids shown in the sketch were energized to close the valve of the operator. The solenoids on the valve actuators at Harris actually deenergize to close the FWIVs. Other discrepancies included a drawing which had not been revised to include a pressure gage which had been installed on the actuators in the field.

Overall, the inspectors observed the following weaknesses with respect to the engineering efforts to return FWIV 1FW-159 to service:

1) Vendor manual "MZU" for these safety-related valve actuators was of poor quality, both in information content and material condition.

2) There was little questioning attitude among cognizant personnel when the vendor manual discrepancies were encountered while developing ESR 9400351.

Although the above weaknesses were observed, the inspectors did not identify any violations or deviations.

c. Onsite Engineering - System Engineering (37551)

(1) During plant walkdowns of the EDG building, the inspector observed several examples of questionable as-found configurations associated with safety-related small-bore pipe supports. The inspector requested that licensee personnel accompany him on subsequent walkdowns to identify and document these and other examples of pipe support deficiencies. The initial walkdowns were restricted to the CSIP rooms and the mechanical penetration area in the 236 foot elevation of the RAB. Twenty-six support deficiencies were documented in ACFR 94-3199. The walkdown was later extended to the containment structure following the October 29 plant shutdown. Nine deficiencies identified inside the containment building were documented in ACFR 94-3212. It should be noted that all but one of the hanger discrepancies affected piping less than four inches in diameter which, by definition, is not included in the

licensee's inservice inspection program. The following is a summary of the conditions identified by the inspector.

- Safety-related struts with possible excessive angularity between the strut paddle and the pipe clamp/welded beam attachment. These included supports for safety injection, charging, residual heat removal, component cooling, service water, and reactor coolant system piping.

- Safety-related hanger with ears spread on the clamp, and no space existing between the clamp ears on the opposite end.

- Safety-related struts with disengaged spherical bearings, missing washers, or spherical washers installed backwards.

- Fire protection piping with construction-era temporary supports installed which were not removed when permanent seismic supports were installed.

- Non-safety related and non-seismic pipe hangers not adequately supporting the pipe.

- Non-safety related hangers U-bolted to support steel using 1/4" diameter threaded rod material. This application of threaded rod material is not approved for pipe supports.

The findings above were documented in ACFR 94-3199 which included preliminary operability evaluations for the specific conditions. In each case, the hangers were either determined to be acceptable as is, or acceptable for short term operability based on loading considerations and/or the small degree to which as-found conditions were outside of procedural or manufacturer's requirements.

For example, regarding out-of-alignment struts vs. pipe clamps, licensee procedure MMP-004, Installation of Pipe Supports, required that sway struts and snubbers must be within +/-3 degrees of the design requirements. However, the hanger manufacturer's tolerance sometimes allowed up to six degrees angular deviation from vertical or horizontal alignment between struts and pipe clamps. Depending on the specific components, sometimes both of these tolerance limits were exceeded. In one case, for a run of CCW piping inside containment, a clamp and its associated strut were misaligned by approximately 13 degrees. All of the cases for piping inside containment, which involved the CCW, SW, FP, and RHR systems, exceeded both licensee and manufacturer's requirements and were analyzed for

operability in ESR 9400345.

As a result of the inspectors findings, licensee personnel conducted independent walkdowns which identified an additional design deficiency. A hanger for a 1-1/2 inch diameter fuel oil system pipe was found with a bolt installed at the pipe clamp end in lieu of the load pin supplied by the vendor. This condition was documented in ACFR 94-3177 and an operability determination was conducted in ESR 9400331.

According to the ESR, operability would not have been affected with the support in the as-found condition. The condition was subsequently corrected in the field via a work request.

Although the licensee determined that the specific deficiencies noted above did not present operability problems for those affected hangers, the inspectors were concerned that the as-found conditions, some of which were outside of design specifications, were not previously identified and corrected by the licensee. The inspectors concluded that hangers for small-bore piping not included in the licensee's ISI program were in worse shape than those that were included; and that the licensee lacks an adequate program for identifying and correcting these type deficiencies.

10 CFR 50, Appendix B, Criterion III requires that measures be established to assure that regulatory requirements and design bases are correctly translated into design documents. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. These requirements are further delineated in the licensee's Corporate Quality Assurance Manual, Sections 3 and 12.

The licensee's failure to identify the above-noted examples of deficiencies and/or deviations from design standards for several small-bore piping supports on both safety and nonsafety-related systems is contrary to the above requirements and is considered to be a violation.

Violation (400/94-22-03): Failure to identify/correct several design deviations for small-bore pipe supports.

The inspector noted that the licensee has corrected some of the as-found conditions in the field and is completing a final engineering evaluation for those conditions documented in ACFR 94-3199. This evaluation is due by the end of November 1994.

(2) During a plant tour of the EDG rooms, the inspector observed that the Target Rock brand solenoid valve cover in the 1A EDG fuel transfer line had a distorted gasket flange surface because of overtightening of the eight cover attachment screws. Though this specific valve was not in the harsh environment qualification program, others like it were located inside the containment and were in the program. Subsequent inspector tours of the containment penetration areas, both inside and outside the containment building, found a large number of these valve covers with the screws obviously unevenly tightened such that the cover flanges were unevenly deflected. Two containment isolation valves, 1SP-42 and 1SP-62 visually appeared more distorted than the others. The licensee disassembled these, found permanent cover deformation in the gasket area, installed new covers, and evaluated from impressions in the gaskets that, in this case, the gaskets had indeed been sealed. ACFR 94-3210 on this subject contained an evaluation of operability. The ACFR also contained an action item to upgrade maintenance procedure MPT-I0019, Target Rock Valve Inspection and Refurbishment. As of the end of this inspection, procedure upgrade had not occurred.

The inspector reviewed MPT-I0019 and vendor technical manual "NEX" to understand why the covers were unevenly installed. The vendor technical manual was last reviewed and approved on July 18, 1994. Section 1 contained vendor technical manual TR 1571, dated 1978 and updated in 1986. It did not mention installation of the covers. Section 3 contained vendor technical manual TM 100-43, dated July 1984, with change 1 dated March 1985. It merely stated to fasten the cover in place with eight screws and self-locking nuts. Licensee procedure MPT-I0019, Revision 4, Change 4/7, Step 7.7.6, stated to install the cover and fasteners and tighten the fasteners [locknuts] snug tight. Snug tight is defined in procedure MMM-010, Threaded Fastener Tightening Procedure, revision 3, change 3/2 as ". . . when the fastener or nut cannot be further turned under the full effort of a single person using an ordinary wrench". While this effort would wring these small (#10) screws in two, lack of specific direction led technicians to overtighten the screws and permanently distort the cover flanges to a configuration outside the valve design envelope. Since the covers were thin stainless steel, and mildly deflected by

proper screw installation, the inspector judged that there was only a small difference between "tight enough" and "causing permanent cover deformation".

Technical Specification 6.8.1.a required written procedures to be established, implemented, and maintained covering the procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Appendix A, paragraph 9.a recommended that maintenance that can affect the performance of safety-related equipment should be properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. In this case, procedure MPT-I0019 was inappropriate to the circumstances in that it resulted in permanent distortion of Target Rock valve cover flanges to a configuration outside the tested valve design envelope, placing equipment qualified for a harsh environment in an indeterminate condition.

Violation (400/94-22-02, example 2): Inadequate procedure for assembly of Target Rock solenoid valves.

A vendor-to-licensee memorandum of October 25, 1994, stated that "good mechanical practice" was desired, however a specific seven-step procedure was also presented. The vendor's memorandum stated that this seven-step procedure is currently included in technical manuals and service bulletins where cover installation is involved. It is not clear why the information was missing from manual "NEX", which was recently reviewed by the licensee.

The inspector will track as an inspector followup item the vendor manual update program as applied to this manual. The licensee has also scheduled a revision to procedure MPT-I0019 for December 1994.

Inspector Followup Item (400/94-22-04): Follow the licensee's Target Rock vendor manual update activities.

The inspectors concluded for the engineering area that, except for the case with the feedwater isolation valves, ESRs were done effectively. Several issues involving vendor manual content and/or implementation of vendor manual recommendations have surfaced in recent months. The lack of a program for identifying small-bore pipe support design deviations also identified.

6. PLANT SUPPORT

a. Plant Housekeeping Conditions (71707) - Storage of material and components, and cleanliness conditions of various areas throughout the facility were observed to determine whether safety and/or fire

hazards existed. One potential fire hazard was identified which is discussed in paragraph 6.d below.

b. Radiological Protection Program (71750) - Radiation protection control activities were observed to verify that these activities were in conformance with the facility policies and procedures, and in compliance with regulatory requirements. The inspectors also verified that selected doors which controlled access to very high radiation areas were appropriately locked. Radiological postings were likewise spot checked for adequacy.

During the outage this month, the health physics preparations were excellent, including ALARA reviews and pre-job briefings from both the radiological and technical perspective. The newly acquired "Surrogate Tour" computer graphics package was an excellent aid in visualizing work areas and approach routes within containment.

c. Security Control (71750) - The performance of various shifts of the security force was observed in the conduct of daily activities which included: protected and vital area access controls; searching of personnel, packages, and vehicles; badge issuance and retrieval; escorting of visitors; patrols; and compensatory posts. In addition, the inspector observed the operational status of closed circuit television monitors, the intrusion detection system in the central and secondary alarm stations, protected area lighting, protected and vital area barrier integrity, and the security organization interface with operations and maintenance.

Two incidents involving inadequate control of designated vehicles within the protected area have occurred over the past four months. The latest incidents happened on June 13 and September 13, 1994, and followed several examples that have occurred over the past twelve months. On June 13, the Site Vice President found a key in the ignition switch of an unattended vehicle parked inside the protected area. Upon discovery, the keys were removed and given to the security unit manager. The vehicle was later removed from site. In a separate event on September 13, a man-lift vehicle was parked unattended inside the protected area when a security guard discovered a key in its ignition. The guard removed the key which was ultimately returned to the manager responsible for the designated vehicle.

A non-cited violation (400/93-20-03) was issued in October 1993 and a Severity Level V violation (400/94-06-01) was cited in April 1994 for previous vehicle control incidents. Corrective actions have included verbal and written communications to employees concerning the requirement to properly secure vehicles inside the protected area. Placards have been placed on key chains, and at key consoles or vehicle dashboards reminding drivers of this requirement. Plant personnel involved in each violation have been disciplined.

Following the June 13 incident, an event review team was commissioned to do a root cause investigation and recommend further corrective actions. The listing of designated vehicles was revised such that several vehicles were "undesignated" and removed from the protected area. Discussions with security personnel indicated that forklifts have been administratively removed from the list and compensatory measures were taken to ensure protection of vital area boundaries from these vehicles.

On June 22, 1994, licensee management issued a written statement to all site employees regarding the requirement to properly secure vehicles. Since previous incidents had indicated that licensee management's communication efforts on this subject had not been successful, the memorandum was required to be signed by each recipient acknowledging his or her awareness of the requirement. The individual responsible for the September 13 incident had signed this acknowledgement letter and returned it to his supervision in June. In his discussions with plant management about the violation, the individual stated that he simply forgot about the requirement.

The licensee's Physical Security Plan, paragraph 1.6.4.1.a., and Procedure SP-007, Access Control and Personnel Identification, require positive control over designated vehicles. The two latest incidents discussed above indicate that the licensee continues to have problems properly implementing the security plan and that corrective actions have not been adequate to prevent recurrence.

The failure to establish adequate corrective actions to prevent the security plan violation is contrary to the requirements of 10 CFR 50, Appendix B, Criterion XVI and is considered to be a violation.

Violation (400/94-22-05): Failure to establish adequate corrective actions to prevent inadequate control of designated vehicles.

d. Fire Protection (71750) - Fire protection activities, staffing and equipment were observed to verify that fire brigade staffing was appropriate and that fire alarms, extinguishing equipment, actuating controls, fire fighting equipment, emergency equipment, and fire barriers were operable. During plant tours, areas were inspected to ensure fire hazards did not exist.

During a tour of the main steam tunnel on September 28, 1994, the inspectors observed an unattended 1-liter glass bottle of 99% Isopropyl Alcohol inside of a plastic bucket on the elevated mezzanine level grating about four feet from the "A" steam generator PORV. According to the label on the bottle, the highly flammable contents had a flashpoint of 53 degrees Fahrenheit with a NFPA flammability rating of 4 (the highest of four levels). This material was left in the power block overnight but was not

logged and approved per step 5.2.3 of AP-302, Revision 0, Fire Protection Housekeeping and Temporary Storage. In addition, the material was not in a safety can or approved closed container per FPP-007, Revision 4, Control of Flammable Liquids. When the licensee was informed, the incident was investigated under ACFR 94-2956.

Technical Specification 6.8.1.a requires written procedures to be established, implemented, and maintained covering the procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Appendix A, item 1.1 lists the plant fire protection program. The licensee's failure to follow the above procedures is considered a violation of these requirements.

Violation (400/94-22-02, example 3): Failure to follow procedures regarding proper control and storage of flammable material.

e. Emergency Preparedness (71750) - Emergency response facilities were toured to verify availability for emergency operation. Duty rosters were reviewed to verify appropriate staffing levels were maintained. As applicable, emergency preparedness exercises and drills were observed to verify response personnel were adequately trained.

The inspectors found plant housekeeping and material condition of components to be satisfactory. Except as noted above, the licensee's adherence to radiological controls, security controls, fire protection requirements, emergency preparedness requirements and TS requirements in these areas was satisfactory. Two violations were identified.

7. REVIEW OF LERs (92700)

The following LERs were reviewed for potential generic impact, to detect trends, and to determine whether corrective actions appeared appropriate. Events that were reported immediately were reviewed as they occurred to determine if the TSs were satisfied. LERs were reviewed in accordance with the current NRC Enforcement Policy.

a. (Closed) LER 94-03: This LER, which was discussed in NRC Inspection Report 50-400/94-17, reported a potential unanalyzed condition in which a single failure vulnerability in the ESW system could result in the loss of high head safety injection during a combined LOCA/LOSP event. The LER was left open pending the results of the licensee's engineering analysis. The licensee completed its analysis as discussed in NRC Inspection Report 50-400/94-21 and issued LER 94-003 Supplement 01 on November 10, 1994. An apparent violation was issued in Inspection Report 50-400/94-21 and an enforcement conference was held on October 21, 1994 in Region II to discuss issues associated with the single

failure vulnerability. On November 17, a Severity Level III Notice of Violation was issued for the long-standing design deficiency. LER 94-03 is closed and any corrective actions will be tracked with the licensee's pending response to the violation.

b. (Open) LER 94-05: This LER reported that a TS violation occurred on September 1, 1994 when the contents of the Treated Laundry & Hot Shower (TL&HS) Tank "A" were released prior to a sample analysis being performed. The event was caused by personnel error when the grab sample for TL&HS Tank "A" was placed into one detector of a multiple channel analyzer, and another detector (which was empty at the time) was erroneously entered into the data acquisition system. The results of the sample analysis for the empty detector were then used to complete the release permit which authorized releasing TL&HS Tank "A". The licensee determined that the safety significance of the event was minimal since the results of a subsequent analysis on the actual grab sample yielded no abnormal radioactivity levels and that the TL&HS radiation monitor functioned as required during the release with a conservative alarm setpoint installed.

The licensee determined the cause for the above incident to be lack of proper self-checking techniques to ensure that the data acquisition system was aligned to the correct detector. Corrective actions included counseling cognizant personnel. An outstanding corrective action was identified to evaluate possible human factors enhancements to the sample analysis process to prevent recurrence of this type of event. This LER will remain open pending completion of the latter action.

8. EXIT INTERVIEW (30703)

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on November 11, 1994. During this meeting, the inspectors summarized the scope and findings of the inspection as they are detailed in this report, with particular emphasis on the Violations and Inspector Follow-up Items addressed below. The licensee representatives acknowledged the inspector's comments and did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection. No dissenting comments from the licensee were received.

Item Number	Description and Reference
400/94-22-01	Inspector Followup Item: Follow the licensee's activities to determine the root cause of the TDAFW pump overspeed events, paragraph 3.b.
400/94-22-02	Violation: Failure to adequately establish and implement procedures, paragraphs 4.c, 5.c.(2), and 6.d.

400/94-22-03	Violation: Failure to identify/correct several design deviations for small-bore pipe supports, paragraph 5.c.(1).
400/94-22-04	Inspector Followup Item: Follow the licensee's Target Rock vendor manual update activities, paragraph 5.c.(2).
400/94-22-05	Violation: Failure to establish adequate corrective actions to prevent recurrent designated vehicle control violations, paragraph 6.c.

9. ACRONYMS AND INITIALISMS

ACFR	-	Adverse Condition Feedback Report
AFW	-	Auxiliary Feedwater
ALARA	-	As Low as Reasonably Achievable
ASME	-	American Society of Mechanical Engineers
CCW	-	Component Cooling Water
CFR	-	Code of Federal Regulations
CSIP	-	Charging Safety Injection Pump
EDG	-	Emergency Diesel Generator
ESR	-	Engineering Service Request
ESW	-	Emergency Service Water
F	-	Fahrenheit
FP	-	Fire Protection
FSAR	-	Final Safety Analysis Report
FWIV	-	Feedwater Isolation Valve
GPM	-	Gallons Per Minute
HESS	-	Harris Engineering Support Services
HVAC	-	Heating, Ventilation and Air Conditioning
IR	-	Inspection Report
ISI	-	Inservice Inspection
LER	-	Licensee Event Report
LOCA	-	Loss of Coolant Accident
LOSP	-	Loss of Offsite Power
MSIV	-	Main Steam Isolation Valve
NCV	-	Non-cited Violation
NFPA	-	National Fire Protection Association
NRC	-	Nuclear Regulatory Commission
NRR	-	Nuclear Reactor Regulation
PCR	-	Plant Change Request
PORV	-	Power Operated Relief Valve
RAB	-	Reactor Auxiliary Building
RCS	-	Reactor Coolant System
RGSC	-	Ramp Generator Signal Convertor
RHR	-	Residual Heat Removal
SG	-	Steam Generator
TDAFW	-	Turbine Driven Auxiliary Feedwater
TL&HS	-	Treated Laundry and Hot Shower
TS	-	Technical Specification

URI	-	Unresolved Item
VIO	-	Violation
WR	-	Work Request
WR/JO	-	Work Request/Job Order