APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report No: 50-382/92-17
Docket No: 50-382 License No: NPF-38

Licensee: Entergy Operations, Incorporated
P.O. Box B
Killona, Louisiana 70066

Facility Name: Waterford Steam Electric Station, Unit 3 (Waterford 3)

Inspection At: Taft, Louisiana

Inspection Conducted: June 21 through August 1, 1992

Inspectors: W. F. Smith, Senior Resident Inspector
Project Section A, Division of Reactor Projects

L. J. Smith, Senior Resident Inspector (Arkansas Nuclear One),
Project Section A, Division of Reactor Projects

Approved: W D Johnson 8/12/92
William D. Johnson, Chief, Project Section A Date

Inspection Summary

Inspection Conducted June 21 through August 1, 1992 (Report 50-382/92-17)

Areas Inspected: Routine, unannounced inspection of plant status, followup, onsite response to events, monthly maintenance observation, bimonthly surveillance observation, operational safety verification, and verification of plant records.

Results: Within the areas inspected, no violations or deviations were identified. Listed below are weaknesses and strengths noted during the inspection period:

Weaknesses

- When a large plastic bag was dropped into the Wet Cooling Tower A basin, communications in describing the size of the bag appeared to be poor. As a result, the operators' response to secure the pump to prevent the system from becoming disabled from clogged suction piping or pump damage, appeared to be untimely (paragraph 4.3).

- Minor weaknesses were identified in the station battery cell replacement procedure during the July 2 replacement of Battery Bank 3B-S, Cell No. 59. The procedure did not provide direction on optimizing intercell tightness, and the retesting sequence did not minimize time losses, which was critical during a 2-hour Technical Specification action statement (paragraph 5.1).

- Radiological practices for activities conducted above 8 feet from the reactor auxiliary building floors did not appear to be consistently understood (paragraph 6.3).

Strengths

- The licensee's performance in identifying and dealing with the improperly positioned control air valves on Emergency Diesel Generator A was a strength. Therefore, a violation was not cited (paragraph 3.1.3).

- The licensee's actions in addressing the Potter and Brumfield motor-driven rotary relay issues were proactive and thorough. The responsible licensee personnel kept an excellent focus on priorities as they applied them to the more safety-significant applications (paragraph 3.2.1).

- During the Valve RC-104 packing leakage event, the operators followed procedures and acted in a professional manner in detecting the anomaly, executing a timely plant shutdown, and recovering from the event (paragraph 4.1).

- The licensee's actions in response to a 10 CFR Part 21 report on spare station batteries purchased from Nuclear Logistics Incorporated were proactive (paragraph 4.2).

- The licensee's actions to resolve the engineered safety feature (ESF) actuation problem that had been occurring during the monthly channel functional test of the actuation logic were well executed. Troubleshooting, utilization of engineering support, and development of a design change for implementation during the refueling outage was appropriate to the circumstances with the plant operating at full power. Processing of the Temporary Waiver of Compliance to forego the test until the design change was completed was executed smoothly with minimal comments from the NRC staff (paragraph 4.4).

- The performance of the electrical technicians during a station battery cell replacement was superior in terms of planning, staging, and executing this maintenance activity, with two minor procedure weaknesses mentioned above (paragraph 5.1).

- The performance of mechanical maintenance technicians in the repair of High Pressure Safety Injection Pump (HPSI) A, was noteworthy, with the exception of attempting to break torque in the wrong direction on a pump

head nut. This minor error was well compensated for by the performance of a conservative engineering evaluation to confirm the stud was not damaged (paragraph 5.2).

- During inservice testing of HPSI Pump A, operator response to a failed temporary discharge pressure gage fitting was rapid and effective. Lessons learned from a previous spill during pump venting were discussed during crew briefs and well implemented in the field (paragraph 6.3).

- Temporary Instruction 2515/115, "Verification of Plant Records," was completed with no adverse findings. The inspector identified some cases where nonlicensed auxiliary operators were signing their logs before they were completed, thus assuming responsibility for data that had not yet been obtained. The licensee committed to conduct training and revise procedures as necessary to cease this questionable practice (paragraph 8).

DETAILS

1. PERSONS CONTACTED

1.1 Principal Licensee Employees

*D. F. Packer, General Manager, Plant Operations
*T. R. Leonard, Technical Services Manager
R. S. Starkey, Operations and Maintenance Manager
*R. E. Allen, Security and General Support Manager
*A. S. Lockhart, Quality Assurance Manager
J. B. Houghtaling, Acting Director, Design Engineering
J. A. Ridgel, Radiation Protection Superintendent
R. F. Burski, Director, Nuclear Safety
*L. W. Laughlin, Licensing Manager
T. J. Gaudet, Operational Licensing Supervisor
*J. G. Hoffpauir, Maintenance Superintendent
D. W. Vinci, Operations Superintendent
R. D. Peters, Electrical Maintenance Superintendent
D. E. Marpe, Mechanical Maintenance Superintendent
D. C. Matheny, Instrumentation & Controls Maintenance Superintendent
*B. E. Meyers, Quality Assurance Support Supervisor (Acting)

*Present at exit interview.

In addition to the above personnel, the inspectors held discussions with various operations, engineering, technical support, maintenance, and administrative members of the licensee's staff.

2. PLANT STATUS (71707)

The plant was operating at full power from the beginning of this inspection period, until July 11, 1992, when it was shut down to hot standby to repair a failed packing gland on Primary Sampling Valve RC-104 (see paragraph 4.1 for details). The plant was restarted on July 12 and restored to full power operation on July 13, where it remained through the end of this inspection period.

3. FOLLOWUP

3.1 Followup of Previous Inspection Findings (92701, 92702)

3.1.1 (Closed) Violation VIO 90022-3

This violation involved inadequate controls over scaffold erection in the vicinity of safety related systems and components. The specific issue was the inappropriate attachment of a scaffold to an emergency diesel generator (EDG).

On February 26, 1991, the inspector followed up on the licensee's corrective actions. This was documented in NRC Inspection Report 50-382/91-09, paragraph 7.1, where the violation was left open due to deficiencies in the licensee's corrective actions. One concern was the effectiveness of the revised procedure to provide good controls although, in most instances, there were no problems with scaffolds inspected by the resident inspectors in recent months. Also of concern was that Procedure NOCP-207, Revision 3, "Erecting Scaffold," was not reviewed by the Plant Operations Review Committee, nor approved by the General Manager, Plant Operations even though the procedure had a direct impact on the operability of safety-related equipment.

On July 21, 1992, to improve scaffolding controls and administration, the licensee issued a major revision to Procedure NOCP-207 (Revision 4). The inspector reviewed the procedure and found that it was well structured to provide the scaffold erection controls needed. In addition, the procedure was reviewed by the Plant Operations Review Committee and approved by the General Manager, Plant Operations. This violation is closed.

3.1.2 (Closed) Inspection Followup Item IFI 91025-4

This item was opened to track the disposition of discrepancies found during the ESF walkdown inspection of the emergency feedwater system and to conduct a review of the licensee's improved component labeling program. The discrepancies were of minor safety significance.

Document Revision Notice M8800750 was issued on May 7, 1992, to correct a disparity between the drawing and the emergency feedwater procedures. The drawing was changed to remove the requirement that Valves MS-403A and MS-403B be locked open. The inspector verified that the latest revision of the drawing reflected the change. On February 21, 1992, Operating Procedure OP-006-003, "Emergency Feedwater System," was revised to include four main feedwater valves that were missing. The valves were nonsafety-related and were found in the correct position. The inspector reviewed the above revisions and found no problems. On November 27, 1991, the licensee implemented the "Operations Department Valve, Breaker and Switchgear Label Enhancement Action Plan," which was intended to correct discrepancies between labels and procedural component descriptions. The inspector reviewed the plan and noted that, by the end of 1993, the first 20 percent of valve labels, and all nuclear island switchgear, were to have upgraded labels. The entire project was scheduled to be completed by the end of 1997. This item is closed.

3.1.3 (Closed) Unresolved Item URI 92003-6

This item was opened pending further review as to whether or not a violation or deviation existed as a result of two EDG A control air valves found closed when they should have been open. The operability of the EDG was in question, and the cause of the valves being out of position had not been identified at the end of the inspection.

The licensee determined by engineering analysis that the EDG was capable of starting and performing its intended safety function during the period of time the valves were closed. Although one of the two air receivers was completely disabled, and the second air receiver had its compressor taken out of service for preventive maintenance, there was sufficient air to start the diesel. The engineering evaluation contained a calculated air pressure decay rate, based on known values, and then extrapolated, based conservatively on a linear decay rate, to the time the control air valves were reopened. The result was 109 psig, which was sufficient for starting based on completed records of Preoperational Test SPO-39-001, "Emergency Diesel Generator." The data showed that the EDG was capable of starting with 95 to 100 psig air available in one air receiver. The inspector reviewed the documentation and found the basis of the operability determination to be valid.

The licensee's security organization conducted an investigation to determine who might have closed the valves and found no evidence of malicious tampering, vandalism, or sabotage. The investigation could not ascertain how the valves became misaligned. The licensee's operations organization also could not identify a probable cause for valve misalignment and, therefore, the licensee declared this to be an isolated event with an indeterminate cause. Failure to maintain the correct position of the two control air valves on Emergency Diesel Generator A in accordance with the emergency diesel generator operating procedure was in violation of NRC regulations. However, as no safety system was disabled, this violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII of the Enforcement Policy. This unresolved item is closed.

3.2 Other Followup (92701)

3.2.1 Potter & Brumfield Model MDR Relay Failures

In NRC Inspection Report 50-382/90-15, the inspectors described a licensee-identified problem where certain model Potter & Brumfield motor-driven rotary (MDR) relays had been misapplied, causing a failure rate that warranted a root cause analysis. The issue was resolved, and the misapplied relays were replaced with properly designed relays. NRC Information Notice 92-19 was issued on March 2, 1992, to alert plants that may have had similar problems.

While in the process of dispositioning the misapplication problem, the licensee received a 10 CFR Part 21 report identifying a number of other potential failure mechanisms associated with MDR relays which were manufactured prior to May 1990. This included all of the 752 MDR relays at Waterford 3. The primary failure mechanism was a mechanical binding of the rotor caused by organic outgassing and deposition of contaminants and corrosion particles on the relay rotor shafts. NRC Information Notice 92-04 had been issued on January 6, 1992, to alert applicable plants of the other potential failure mechanisms. In response to these concerns, the licensee

removed four typical MDR relays that had been in service and sent them out for analysis. The results confirmed some of the concerns listed in Information Notice 92-04 The inspectors monitored the licensee's actions through periodic discussions with engineering and by attendance of the licensee's plant issues status meeting held weekly. The licensee's actions in addressing the MDR relay issues were proactive and thorough. The inspector noted that the responsible licensee personnel applied higher priority to the more safety-significant applications.

On June 26, 1992, the licensee announced completion of a plan to resolve all identified MDR relay problems. In short, the plan was to replace 90 of the 752 relays during the next refueling outage, scheduled to commence on September 19, 1992. The 90 relays being replaced included all the MDR relays in ESF actuation system (ESFAS) and plant protection system circuits. The licensee determined that the service life of the remaining non-ESFAS MDR relays was reduced to the extent that replacement will be required by December 18, 2002. These would be replaced on a staggered basis, scheduled as preventive maintenance concurrent with the affected component outages, thus minimizing safety-related equipment outage times.

On June 15, 1992, the licensee became aware that another failure mechanism, in addition to those identified in IN 92-04, was identified at San Onofre Nuclear Generating Station in July 1991. On some alternating current (ac) relays, the shading coils became detached and fell between the rotor and stator, thus interfering with relay operation. The copper shading coil was extremely susceptible to temperature-induced expansion. The epoxy beads that secured the coil became brittle due to the heat and cracked under the excess shading coil expansion. Of the 752 relays, 13 were ac relays which could fail in this manner. Four of these were already scheduled for replacement during the refueling outage with newer copper-beryllium shading poles, not susceptible to this kind of failure. The remaining nine were to be inspected for the characteristic buzzing sound caused by the failure, and replaced if appropriate. Actions taken by the licensee on those issues have been proactive, and future planned actions appeared appropriate. This issue is closed at Waterford 3.

3.3 In-Office Review of Licensee Event Reports (LERs) (90712)

The following LER was reviewed. The inspectors verified that reporting requirements had been met and that the LER forms were complete. The inspectors confirmed that unreviewed safety questions and violations of Technical Specifications, license conditions, or other regulatory requirements had been adequately described. The NRC tracking status is indicated below.

3.3.1 (Closed) LER 92-003, "Inadvertent Control Room Emergency Filtration Unit Start."

Revision 01 to this LER was issued on July 8, 1992, to correct minor editorial errors identified by the inspector when Revision 00 was reviewed. The licensee was unable to detect any causes for the actuation and considered it

an isolated incident until June 9, when a similar actuation occurred again, as described in LER 92-005. Since there is no need to track the same problem on two LERs, this LER is closed.

4. ONSITE RESPONSE TO EVENTS (93702)

4.1 Plant Shutdown due to Excessive Reactor Coolant System (RCS) Leakage

At 7:03 a.m., on July 11, 1992, with the plant operating at full power, the licensee declared an Unusual Event in accordance with the emergency plan due to unidentified RCS leakage being greater than the Technical Specification 3.4.5.2 limit of 1 gallons per minute (gpm). The senior resident inspector responded to the event and observed the licensee's actions to correct the leakage and restore the plant to power operation.

At 6:34 a.m., the operators noticed a decreasing volume control tank level and a mismatch of roughly 10 gpm between letdown and charging flow. They entered Off-Normal Procedure OP-903-023, Revision 5, "Reactor Coolant System Leak." At 6:58 a.m., the RCS leak rate was calculated to be 7.6 gpm, and the operators commenced boration for a reactor shutdown. By 7:34 a.m., a containment entry was made to look for leaks and to specifically look at the 3/4-inch air-operated RCS hot leg sampling valve, RC-104. This valve had been leak-repaired on March 27, 1992, due to a packing gland failure. See NRC Inspection Report 50-382/92-08, paragraph 4.1.

The Valve RC-104 packing gland was identified as the source of leakage. Attempts to remotely close the valve were unsuccessful, and with the valve handwheel engulfed in steam, the operators could not close the valve manually. The plant was shut down by 10:27 a.m., and subsequently pressure was reduced to 1500 psia to minimize the leak rate. The only device in the piping between the RCS hot leg and Valve RC-104 was a flow-limiting orifice plate. The licensee attempted to leak-repair the valve in the open position so that it could be used for sampling, but efforts were unsuccessful until the steam was blown aside with air and the valve manually closed. By 5:07 a.m. on July 12, Valve RC-104 was closed and leak-repaired. At 5:08 a.m., the licensee terminated the Unusual Event and exited from the applicable Technical Specification action statements.

With Valve RC-104 disabled and closed, the licensee implemented Temporary Alteration Request 92-020 on the non-nuclear safety primary sampling tubing outside the containment building to utilize the pressurizer surge line sample point for routine RCS samples and to restore the post-accident sampling system flow path. The inspector reviewed the documentation supporting the temporary alteration request and noted that a complete and appropriate evaluation was performed as required by 10 CFR Part 50.59. Drawing routine primary samples from the pressurizer surge line appeared to be an acceptable alternative. Also, with Valve RC-104 closed and the down stream containment isolation valves closed, repetition of this event was not likely, because there was an

additional barrier provided between the leak repair and the RCS. Valve RC-104 was already scheduled for permanent repair or replacement during the next refueling outage.

At 11:30 a.m. on July 12, the reactor was taken critical, and by 12:30 p.m. on July 13, the plant was restored to full power operation. Throughout the event, the inspector noted that the operators utilized and followed the appropriate procedures. The startup on July 12 and 13 was performed without any problems, which was noteworthy in view of the careful controls needed on axial shaping and the xenon transient so late in the fuel cycle.

4.2 10 CFR Part 21 Notification on Station Batteries

On July 9, 1992, the licensee informed the inspector that a report was received from Nuclear Logistics, Inc. (NLI), pursuant to 10 CFR Part 21, that may have affected the safety-related station batteries. NLI stated that the NCX-17 (formerly designated NCX-1200) battery and cells manufactured by GNB Industrial Battery Company (formerly Gould) did not meet the GNB published 1-minute rating of 1306 amperes to 1.75 Volts per cell, based on testing performed by NLI. NLI certifies safety-related battery cells obtained from GNB and performs the necessary tests and certifications to meet 10 CFR Part 50, Appendix B, quality requirements. NLI supplied 5 spare replacement cells to Waterford 3.

The licensee promptly recognized the implication that, since the 5 spare cells were like-for-like replacements for the station batteries, the qualification of the station batteries was questionable. In addition, due to the narrow margins that existed with the station battery ratings compared with station loads, the licensee has purchased new, like-for-like batteries from NLI to be delivered in time for replacement of the existing Train A, AB, and B batteries during the next refueling outage. Therefore, the licensee implemented a short-term plan to compensate for the lesser 1-minute rating established by NLI. By July 10, the licensee performed preliminary calculations in support of a prompt operability call for the Train A, AB, and B batteries and found them to be operable. The licensee also canceled a standing Temporary Alteration Request which allowed bypassing one cell from each bank by installing an electrical jumper cable. There would be a 2-hour shutdown Technical Specification action statement in the event a cell failed to meet surveillance requirements. The jumper cable was made available to provide time to obtain a replacement cell from the warehouse and place it on a 32-hour charge before installing it. In lieu of having a jumper cable available, the licensee staged a replacement cell in the shop with a floating charge similar to the station batteries. The cell could be installed on short notice so that the 2-hour action statement would not be exceeded. During the week of July 14, the licensee sent a system engineer to NLI to obtain more information on the issue, and to witness testing. The resident inspectors will continue to monitor the licensee's actions on this issue during future inspection periods.

4.3 Plastic Bag Inadvertently Dropped Into Basin of Wet Cooling Tower A During Chemical Addition

On July 14, 1992, at about 11:20 a.m., during routine addition of anhydrous sodium metasilicate, a large plastic bag was dropped into the basin of Wet Cooling Tower A for the auxiliary component cooling water (ACCW) system. This was the first time the chemical had been supplied in a plastic bag. The chemist was accustomed to pouring the chemical from a drum. The control room was notified that a plastic bag was in the basin. In the absence of a complete description of the bag, the operators stated that they assumed it was a small bag that probably would not affect the operation of the system. The control room operators stated that ACCW Pump A operating parameters, such as motor vibration, motor temperature, and pump suction pressure were within the normal range. However, the pump was turned off about 10 minutes from the time the incident was reported, as a precautionary measure.

An operator was dispatched to the basin to evaluate the condition. He reported that the bag had been dropped in the vicinity of the pump suction. After further evaluation, the control room operators declared ACCW Train A inoperable due to the plastic bag being in the vicinity of the pump suction. About 1 hour later, the licensee entered Technical Specification 3.7.3 which addressed operability of ACCW and also entered cascading Technical Specifications for equipment which would be affected by the loss of ACCW in accordance with Procedure OP-100-014, Revision 1, "Technical Specification Compliance." The licensee completed the immediate actions associated with Technical Specification 3.8.1.1 (offsite power verification) at 12:50 p.m.

Initial efforts to retrieve the plastic bag using a makeshift hook and rope were unsuccessful. Work Authorization 01097492 and Condition Identification CI-281438 were initiated. A commercial diver was utilized to locate and retrieve the plastic bag. He also gathered other items which had previously dropped in the basin including: a glass sample bottle, a flashlight, a carpenter's level, miscellaneous scaffold bracket parts, an equipment identification tag, safety glasses, a portable two-way radio, a wire brush, a pencil, a pen, ear plugs, and warning tape. The diver stated that there was no grate covering the suction line to the pump. The inspector was concerned that, given the amount and type of debris found in the basin, adequate protection may not be afforded the ACCW pumps. The inspector was also concerned that the large size of the bag was not well communicated to the control room such that the pump could be secured immediately to reduce the probability of the bag entering and fouling the system. As a result, there was a 10-minute delay in stopping the pump.

The control room was notified when cleanup efforts were completed, and the licensee exited the appropriate Technical Specification at 5:47 p.m. The licensee issued a Significant Occurrence Report in accordance with Procedure UNT-006-014, Revision 4, "Significant Occurrence Report," to ensure appropriate actions to prevent recurrence would be developed. It remains unresolved whether or not the present ACCW basin and suction piping configuration affords sufficient protection from foreign material fouling of

the ACCW pumps. During the exit interview of August 3, 1992, the licensee agreed to review this issue further. This shall be tracked as an unresolved item (URI 92017-1).

4.4 Inadvertent Recirculation Actuation During Surveillance Testing

On July 26, 1992, at 2:14 a.m., while performing Surveillance Procedure OP-903-107, "Plant Protection System Channel C Functional Test," a Recirculation Actuation Signal (RAS) occurred when Test Position 3 of Logic Matrix AC was tested. Test Positions 1 and 2 had been successfully tested, as well as all positions for several other ESFs. The plant was operating at 100 percent power. All RAS components functioned properly. The operators reset the RAS and restored the affected components to their normal configuration. Channel C was restored to normal, and the surveillance test was terminated at that point.

By 12 noon on July 26, the first attempt at troubleshooting was completed (see paragraph 5.3 of this report) and no anomalies were found. Then Test Positions 1, 2, 3, and 4 of Logic Matrix AC were retested in an attempt to recreate the problem, and the problem repeated. On July 27, the technicians conducted more troubleshooting by checking test coil and hold coil voltages and loading. After instrumenting at several points, the test was repeated and the problems disappeared. The instrumentation was removed and the technicians and system engineer withdrew to determine the next course of action.

Similar problems have occurred with other ESF actuations on August 19 and November 17, 1991 (see NRC Inspection Reports 50-382/91-22 and -30 and LERs 382/91-019 and -022, respectively). As a result of the August 19 event, the licensee set up a test circuit mockup and found that a "contact race" existed in the matrix hold pushbutton. Variations in the speed at which the button was pushed caused dramatic changes in the hold and test coil energization sequence. The pushbutton could be depressed quickly enough to cause the bistable relay test coils to energize before the matrix trip relay hold coils were fully energized. Under this circumstance the ESF under test could actuate.

As an interim action from the August 19 event, the licensee implemented precautions to push the matrix hold pushbutton slowly. This may have been helpful based on the many successful tests accomplished to date. Permanent corrective action intended by the licensee included Design Change (DC) -3371 which will provide some circuit reliability enhancements, as well as replace the matrix hold pushbutton on all six matrices with a rotary switch that will eliminate the "contact race." The licensee has committed to complete DC-3371 prior to the end of the next refueling outage, which is scheduled to start on September 19, 1992.

The licensee appropriately reported the RAS event at 3:35 a.m., as required by 10 CFR Part 50.72(b)(2)(ii) and, in addition, informed the senior resident inspector.

By July 29, the licensee had concluded that the root cause(s) of the problem were not fully identified but were in the test circuits only. They further concluded that the ESF actuation circuits were operable but could not be tested with confidence that another actuation might not occur. Although the RAS did not cause a plant transient, other ESF actuations could and have in the past, as discussed above. To preclude this possibility, and to allow the ESF circuits to remain operable until DC-3371 is installed, the licensee requested a Technical Specification temporary waiver of compliance to forego the monthly channel functional test of the actuation logic specified by Technical Specification Table 3.4.2 until DC-3371 was installed during the refueling outage. This amounted to less than one calendar quarter delay in the surveillance requirement, which was consistent with Technical Specification Change Request NPF-38-118 dated October 11, 1991, and revised on December 18, 1991, currently under review by the NRC staff. Although the Technical Specification change request had not yet been approved, the staff granted a one-time waiver of compliance as requested on July 30, 1992.

The inspectors will follow up on the completion of DC-3371 as part of the completion review to be performed on the applicable LER.

Conclusions:

During the Valve RC-104 leakage event, the operators conducted themselves in an professional manner in detecting the anomaly, executing a timely plant shutdown, and recovering from the event.

The licensee's actions in response to the 10 CFR Part 21 report on station batteries by NLI were proactive. There was excellent engineering support of the prompt operability determination.

The licensee's actions in response to the chemical bag falling into the wet cooling tower basin were appropriate; however, communications to the operators in describing the size of the foreign material appeared poor and, as a result, securing the pump and entering the Technical Specification action statements appeared untimely.

The licensee's actions to resolve the ESF actuation problem that had been occurring during the monthly channel functional test of the actuation logic were well executed. Troubleshooting, utilization of engineering support, and development of a DC for implementation during the refueling outage was appropriate to the circumstances with the plant operating at full power. Processing of the temporary waiver of compliance to forego the test until the DC was completed was executed appropriately.

5. MONTHLY MAINTENANCE OBSERVATION (62703)

The station maintenance activities affecting safety-related systems and components listed below were observed and documentation reviewed to ascertain

that the activities were conducted in accordance with approved work authorizations (WAs), procedures, Technical Specifications, and appropriate industry codes or standards.

5.1 WA 01096725: Replacement of Cell No. 59 on Battery Bank 3B-S

On June 29, 1992 (prior to receiving the 10 CFR part 21 report from NLI discused in paragraph 4.2), while conducting weekly battery cell voltage surveillance checks on Battery Bank 3B-S (Safety Train B), the electricians reported Cell No. 59 was measuring 2.058 Volts DC. The Technical Specification 4.8.2.1 allowable value for an operable battery was greater than 2.07 Volts. At 11:24 a.m. the battery was declared inoperable. The Technical Specification 3.8.2.1 action statement required the licensee to restore the battery to an operable status in 2 hours or commence a plant shutdown. All of the other cells were within voltage limits. This particular day was a compressed work week day off for licensee personnel, so limited support was available on site. However, in anticipation of such a problem, the licensee had prepared and approved a Temporary Alteration Request (TAR) in late 1991 to install a jumper in place of an inoperable cell. The inspector reviewed TAR 91-054 and noted that an evaluation pursuant to 10 CFR Part 50.59 had been completed. The TAR was promptly implemented, and by 12:44 p.m. the jumper was installed and tested, and the battery was declared operable.

On July 2, the inspector observed the removal of the TAR and replacement of the deficient cell with a new battery cell. The licensee had three spares in the warehouse. Prior to taking the battery bank out of service, the tools, equipment, and new cell were staged in the battery room. The electricians were briefed and were the appropriate protective clothing. The battery bank was tagged out of service at 10:04 a.m., at which time the 2-hour Technical Specification 3.8.2.1 shutdown action statement commenced. The TAR was removed, the old battery cell removed, and the new cell installed in accordance with Maintenance Procedure ME-004-807, Revision 5, "Battery Cell Jumping and Replacement." A peer inspector was utilized to witness the torque on the fasteners used on the intercell connectors. The NRC inspector questioned the technique used to apply the torque pursuant to a note in the procedure, which stated that both the bolt head and the nut should be torqued to the prescribed torque value to provide desired tightness. The inspector's question was whether to torque the nut first or last because, based on the inspector's experience, when a nut was torqued first, applying torque to the bolt was moot due to friction. The peer inspector said the procedure was not specific, so either way would be procedurally correct. The intercell connector, which had the nuts torqued first and the bolt heads torqued last (and thus no movement), failed the retest. The cell-to-cell resistance exceeded 150 micro-ohms. After recleaning the connectors and retorquing the nuts last, the retest was satisfactory. Several minutes were lost in clearing the tagout, restoring the battery to service, retesting, and then reinstating the tagout to correct the retest deficiency. This sequence was established in the procedure. The inspector questioned why at least a preliminary retest could not have been done before spending the time it took to restore the battery to service and back out of service. The electrical maintenance

superintendent told the inspector that both the fastener torque sequence and the retest sequence would be evaluated and changed accordingly. No other problems were identified.

5.2 WA 01096775: Correcting Excessive Vibration on HPSI Pump A

On June 30, 1992, the licensee declared HPSI Pump A inoperable due to unacceptable inservice test results. During inservice testing, the pump outboard bearing horizontal vibration was 2.79 mils. This was in excess of the 2.4 mils maximum acceptance criterion for the alert range; therefore, action was required by Surveillance Procedure OP-903-030, Revision 8, "Safety Injection Pump Operability Verification." The operators lined up and placed HPSI Pump AB into service in place of HPSI Pump A. The Train AB vital bus was currently being supplied power from the Train A vital bus. Therefore, no Technical Specification action statements were required, except during the pump transfer.

On July 9, after the vibration data was analyzed and work instructions were generated, the mechanical technicians removed the outboard bearing and found some rough spots that appeared to be the cause of vibration. The inspector noted the same. Clearances were checked and the bearing was replaced. When the pump was operated again on July 10, the vibration was worse at 4.98 mils, there was an oil flinger rubbing on the inboard bearing, and noise came from inside the outboard seal in the area of the balancing drum.

On July 11, the mechanics removed the outboard seal and found that the hydrostatic bearing in the pump was badly scored, and the sleeve and segment keys holding the balance wheel were loose. A set screw holding the sleeve in place had apparently released, even though it was staked in place. The mechanics proceeded to remove the pump casing head in order to replace the hydrostatic bearing. The casing head nuts had been preloaded to a torque of 2900 lb-ft, so to break torque, an air-driven impact wrench was staged. Since there were no service air outlets in the pump room, the mechanics attempted to obtain an impairment of the air lock/fire door entrance doors. The shift supervisor did not grant the impairment, because disabling the doors might render both of the auxiliary building emergency filtration heating, ventilation, and air conditioning units inoperable, resulting in a Technical Specification 3.0.3 shutdown requirement. The mechanics then obtained a torque multiplier with a 4 to 1 mechanical advantage and a handle extension. On the first nut, they applied force to break torque in the wrong direction. The inspector questioned whether or not the stud might have been overstressed. There did not appear to be any nut movement. The mechanical maintenance supervisor initiated an engineering evaluation. It was based on 1/8 inch movement of a nut corner, which was conservative, and found that the maximum possible stress was 86 percent of the minimum yield strength. The inspector considered the action to be responsive and conservative.

By July 15, the pump was reassembled with a new hydrostatic bearing and was properly aligned. All of the inservice testing acceptance criteria were met. Specifically, the pump outboard bearing horizontal vibration was reduced to

1.09 mils. The acceptable range was 0 to 1.60 mils. The pump was declared operable shortly after 9 a.m. on July 15. No other problems were identified.

The inspector questioned the licensee on what actions were being taken to ensure that the set screws in question would not come loose in the other two HPSI pumps. In addition to properly staking the set screws in HPSI Pump A, the licensee used Loctite 22 thread locking compound. As of the end of this inspection, the licensee had not yet responded on what actions, if any, were necessary for the other HPSI pumps. However, the licensee had performed maintenance on the other two pumps and expressed confidence that the set screws were probably tight. This was the first time HPSI Pump A was disassembled at Waterford 3. The inspector will follow up on the licensee's actions to address this issue.

5.3 WA 01098265: Troubleshooting for Anomalies in the Plant Protection System

Following the inadvertent RAS actuation on July 26, 1992, the inspector observed troubleshooting activities performed by instrumentation and control maintenance technicians. The RAS event is discussed in paragraph 4.4 of this inspection report. The inspector reviewed the WA to verify that it covered the intended work and noted that it provided flexibility for the technicians to pursue the problem, but there were controls in place to ensure the shift supervisor was kept advised of the steps taken. The WA was flagged as a "high risk" evolution in view of the plant being operated at full power. The technicians checked test power supply voltages and documented the results in the WA. As part of the troubleshooting, the technicians requested the operators to repeat the test on the AB matrix that caused the RAS. The test was repeated in accordance with Procedure OP-903-107, and the matrix hold pushbutton was very slowly pushed. The inspector noted that the matrix hold status lights came on before the matrix dropout light extinguished, indicating a successful test. The operator completed all four test positions, and the system responded normally and as expected. Subsequent troubleshooting, not observed by the inspector, revealed a repeat of the RAS, but the cause could not be determined beyond what was already identified subsequent to previous actuations of this type. The permanent corrective actions are discussed above in paragraph 4.4. No administrative problems were identified with this maintenance activity.

Conclusions:

The performance of the electrical technicians during the station battery cell replacement was excellent in terms of planning, staging, and executing this maintenance activity. However, the procedure had some weaknesses in that it lacked specific direction to optimize intercell connector fastener tightening, and the sequence did not minimize time consumption during retesting.

The mechanical maintenance technicians performed well in the repair of HPSI Pump A, with the exception of attempting to break torque in the wrong

direction on a pump head nut. This minor error was well compensated for by the performance of an engineering evaluation to confirm the stud was not damaged.

6. BIMONTHLY SURVEILLANCE OBSERVATION (61726)

The inspectors observed the surveillance testing of safety-related systems and components listed below to verify that the activities were being performed in accordance with the Technical Specifications. The applicable procedures were reviewed for adequacy, test instrumentation was verified to be in calibration, and test data was reviewed for accuracy and completeness. The inspectors ascertained that any deficiencies identified were properly reviewed and resolved.

6.1 Surveillance Procedure OP-903-068, Revision 8, "Emergency Diesel Generator (EDG) and Subgroup Relay Operability Verification"

On June 22, 1992, the inspector monitored control room operations during the performance of the EDG and subgroup relay operability verification for Train A. The Train B surveillance test was observed on May 11, 1992; however, emphasis was focused on activities at and around EDG B (see NRC Inspection Report 50-382/92-12).

The procedure was recently revised to combine the EDG operability verification with ESFAS subgroup relay testing in the interest of minimizing EDG starts. The inspector reviewed Procedure OP-903-068 and found it to be well written and human factored. The operators conducted the test in a deliberate, step-by-step manner and obtained satisfactory results. They appeared to be knowledgeable of the effects each step was having on the applicable systems. The inspector reviewed the test data and found no discrepancies.

6.2 Surveillance Procedure OP-903-030, Revision 8, "Safety Injection Pump Operability Verification"

On June 30, 1992, the licensee performed the operability verification test on HPSI Pump A in accordance with Procedure OP-903-030. The test involved running the pump with test gauges and IRD Mechanalysis, Model 818 vibration analyzer. All of the parameters were within the acceptance criteria except the pump outboard bearing vibration in the horizontal plane. It measured 2.79 mils displacement, when the maximum allowed by the ASME Code tolerances was 2.4 mils. A second set of readings was taken, but the horizontal vibration, though lower, was still in the "alert" range with a value of 1.69. The alert range was between 1.6 and 2.4 mils. At 12:30 a.m., the operators declared the pump inoperable and entered Technical Specification 3.5.2. HPSI Pump AB was valved into service, and by 1:27 a.m. Technical Specification 3.5.2 was exited.

On July 1, the inspector observed a repeat run on HPSI Pump A, and again the pump outboard bearing vibration was high in the horizontal plane at 2.09 mils displacement. Even though this was in the alert range, and the pump could

have been declared operable, the operators conservatively left the pump inoperable pending an engineering evaluation of the data. The procedures appeared to be followed, and the inspector observed that the test equipment was in current calibration. The nuclear auxiliary operators used good radiological work practices while installing and removing the test gauges. Upon evaluating the data, engineering recommended pump repairs. This resulted in the generation of WA 01096776 (see paragraph 5.2 of this inspection report).

6.3 Surveillance Procedure OP-903-030, Revision 8, "Safety Injection Pump Operability Verification"

On July 15, 1992, the inspector observed activities performed to place HPSI Pump A back in service following maintenance under WA 01096776. Surveillance Procedure OP-903-011, Revision 7, "High Pressure Safety Injection Pump Preservice Operability Check," was used to establish the correct mechanical and electrical alignments and to verify HPSI Pump A would start both manually and upon receipt of a safety injection actuation signal. HPSI Pump A was vented in accordance with Surveillance Procedure OP-903-026, Revision 5, "Emergency Core Cooling System Valve Lineup Verification." Inservice test pump performance data was collected and evaluated in accordance with Surveillance Procedure OP-903-030, Revision 8, "Safety Injection Pump Operability Verification."

During previous venting of HPSI Pump A, radioactive liquid was inadvertently spilled on the floor. Lessons learned from that event were discussed during a crew brief held prior to placing HPSI Pump A back in service. The operators very carefully installed the tygon hose which was used to transport vented liquid to a floor drain. No water was spilled during the venting process. The small amount of water spilled during the removal of the tygon hose on the high point suction vent was captured in a paper towel and properly placed in a radioactive trash bag.

Following the venting evolution, the inspector noted that the operator and the health physics technician had a different understanding of the controls placed on areas above 8 feet from the floor. The health physics technician stated that the area above the pump did not need decontamination following disconnecting the tygon vent hose because it was a radiologically restricted area. Later, an operator entered the room to verify valve position. He stated that he believed the handwheel was clean and it was not necessary for him to get rubber gloves to manipulate the valve. Other personnel informed him that, in this case, someone with gloves should manipulate the handwheel because of the previous activities.

The reinstallation of the protective cap over the HPSI Pump A suction header event did result in a small amount of water spilling. The area was surveyed by health physics personnel and found not to be contaminated.

During the performance of the inservice testing, a fitting attached to a temporary test pressure gage on the discharge header leaked at a rate of

several drops per minute. The operator attempted to tighten the fitting and stop the leak. The fitting broke and fluid sprayed onto the floor. The operator responded very rapidly, closing the permanent valve installed at the test point and stopping the leak.

6.4 Surveillance Procedure OP-903-056, Revision 8, "Fire Protection Functional Test"

On July 15, 1992, the inspector observed two nonlicensed auxiliary operators (NAOs) performing the auto start functional test of the electric driven fire pump and the two diesel-driven fire pumps. The test procedure was started during the previous shift, at which time the pump flow tests and other controller tests were completed up to the point of installing the test gauge required for the test the NAOs were about to perform. The test was resumed at Step 36 of Section 7.4 of Procedure OP-903-056. The inspector noted that the NAOs reviewed the precautions, limitations, and initial conditions delineated in the procedure. The pump prechecks were repeated. The NAO that actually performed the procedure steps was under instruction and was being supervised by a NAO qualified for this test. The NAOs performed the test in a very deliberate, step-by-step manner, and self-checking was evident. The test results met the acceptance criteria, and the NAOs performed in an exemplary manner.

Conclusions:

Performance of the operators during conduct of EDG surveillance testing was good.

Operator response to a failed temporary discharge pressure gage fitting was rapid and effective during inservice testing. Lessons learned from a previous spill during HPSI Pump A venting were discussed during crew brief and were well implemented in the field.

Radiological practices for activities conducted above 8 feet from the floor did not appear to be consistently understood.

7. OPERATIONAL SAFETY VERIFICATION (71707)

The objectives of this inspection were to ensure that this facility was being operated safely and in conformance with regulatory requirements and to ensure that the licensee's management controls were effectively discharging the licensee's responsibilities for continued safe operation.

On a daily basis, when on site during this inspection period, the inspectors observed control room operations and walked down the control panels. Proper operator manning levels were maintained as required by Technical Specifications. When annunciators came in, or were already in, and were not self-explanatory, the operators were questioned by the inspectors. The responses reflected good operator knowledge over what was going on in the plant. The inspector noted a few instances where the control room operators'

logs were overly cryptic. In most of these instances a safety related component was logged out of service, or actuated, without an explanatory entry. The inspector discussed the matter with the Operations Superintendent as an area that could be improved. The Operations Superintendent said he would take action to refresh the operators. The inspector considered this action to be appropriate.

The inspectors toured the reactor auxiliary building, turbine building, refueling building, and outside areas throughout this inspection period and had only a few minor comments, which were given to the shift supervisor for action. Examples were ladders adrift, a nitrogen bottle chained to a seismically supported component cooling water large bore pipe, a ratio relay on EDG B leaking oil on the floor, and Valve CHW-113B packing leak dripping on the inboard bearing of Chilled Water Pump B. Appropriate action was initiated promptly by the licensee.

The inspectors attended daily plan-of-the-day meetings to ensure that plant problems were being given the appropriate priorities and were getting the proper levels of management attention. In general, plant management demonstrated a good working knowledge of plant problems the inspectors were concerned about.

Radiological work practices were observed when available and were found to be very good.

The inspectors observed security officers as they controlled access through the primary access point to the protected area and found no deficiencies The officers appeared to be alert and attentive.

Conclusions:

The licensee demonstrated exemplary performance in the day-to-day safe operation of the plant. There continued to be good management involvement in solving problems, and teamwork was evident at all levels. Plant housekeeping was good, with minor exceptions promptly attended to when identified by the inspectors.

8. VERIFICATION OF PLANT RECORDS (TI 2525/115)

The objectives of this inspection were to evaluate the licensee's ability to obtain accurate and complete log readings from either licensed or nonlicensed operators.

The inspector questioned the licensee on what, if any, self-monitoring programs were in place which would detect plant mechanics, technicians, or operators whose practices might have falsified logs. The licensee's response was that there were no such programs but, in view of NRC Information Notice 92-30, "Falsification of Plant Records," having been issued on April 23, 1992, the licensee was considering such a program. The licensee

pointed out, however, that there have been routine walkdowns where management personnel accompanied NAOs and technicians during their rounds to observe and evaluate performance.

There has been one recent case of falsification of plant records at Waterford 3. During a records review, the licensee detected a falsified radiological survey report of February 11, 1990. The licensee had checked security access records, performed time and motion studies of the activities documented as having been performed, and concluded that the individual was not in the area at the times indicated on the survey records. The licensee's prompt and appropriate actions to identify and correct the problem were exemplary and, as such, a violation was not cited. See NRC Inspection Report 50-382/90-13 (EA 90-117) for details.

Since the licensee did not have a formal program to detect problems as described in this Temporary Instruction, the inspector reviewed a representative sample of 100 required room entries against security access records for 20 different NAOs. The dates of the entries covered a period beginning March 6 and ending June 5, 1992. Thirty percent of the samples were taken for rounds before Information Notice 92-30 was issued. Since the licensee devitalized many rooms within the nuclear island, only six rooms could be sampled; however, they were representative of three major watch areas. The rooms included for this inspection were as follows:

- security diesel generator room
- EDG A room
- EDG B room
- dry/wet Cooling Tower A area
- dry/wet Cooling Tower B area
- relay room at +35 elevation

The inspector found no cases where the logs indicating required entry was made did not agree with the security access records. In addition, the times spent in the rooms were consistent with the tasks (log readings and inspections) to be performed.

The inspector found several instances where the logs were signed off prior to the time the required entry was made. It was apparent that the individuals were signing the logs to identify who was responsible for the logs that shift, rather than signifying that the logs were complete and correct. This was discussed with the operations superintendent. As a result of the discussion, the licensee committed to initiate training to ensure that the logs are not signed off unless and until they are complete, and to make necessary changes to the controlling procedures on log keeping. Completion of this action will be tracked under Inspection Followup Item IFI 92017-2.

The inspector noted six examples in which the task was apparently performed by an operator who was not the operator who signed (initialled) the log sheets. The inspector questioned the operations superintendent about this practice.

The response was that the licensee has always held the individuals who sign logs responsible for the contents and accuracy of the logs they signed and that this was understood by the individuals. In the six examples, other qualified operators performed the entries and obtained the log data. This was similar to the acceptable practice of one person obtaining data through official communications from another and having the one person sign off the data as being correct. The inspector considered the licensee's response to be acceptable.

Conclusions:

Temporary Instruction 2515/115, "Verification of Plant Records," was completed with no adverse findings. The inspector identified some cases where NAOs were signing their logs before they were completed, thus assuming responsibility for data that had not yet been obtained. The licensee committed to conduct training and change procedures as necessary to cease this questionable practice.

9. SUMMARY OF [illegible]XING ITEMS OPENED IN THIS REPORT

The following is a synopsis of the status of all open items generated, closed, or left open in this inspection report:

VIO 90022-3 was closed.

IFI 91025-4 was closed.

LER 92003 was closed.

URI 92017-1, "Potential vulnerability of ACCW System to foreign material in wet cooling tower basins."

IFI 92017-2, "Followup on training and procedure changes on NAO log keeping."

10. EXIT INTERVIEW

The inspection scope and findings were summarized on August 3, 1992, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspectors' findings. The licensee did not identify as proprietary any of the material provided to, or reviewed by, the inspectors during this inspection.