

**ENCLOSURE**

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No.: 50-382  
License No.: NPF-38  
Report No.: 50-382/99-24  
Licensee: Entergy Operations, Inc.  
Facility: Waterford Steam Electric Station, Unit 3  
Location: Hwy. 18  
Killona, Louisiana  
Dates: November 7 through December 25, 1999  
Inspectors: T. R. Farnholtz, Senior Resident Inspector  
J. M. Keeton, Resident Inspector  
Approved By: P. H. Harrell, Chief, Project Branch D  
  
ATTACHMENT: Supplemental Information

## EXECUTIVE SUMMARY

### Waterford Steam Electric Station, Unit 3 NRC Inspection Report 50-382/99-24

This routine, announced inspection included aspects of operations, maintenance, engineering, and plant support activities. The report covers a 7-week period of resident inspection.

#### Operations

- Operator performance during the plant shutdown to repair a steam leak and during the subsequent plant restart was good. Control room access was closely controlled to minimize operator distractions (Section O1.2).
- A failure to appropriately implement the inspection of temporary freeze protection shelters constituted a procedural violation contrary to the requirements of Technical Specification 6.8.1. This Severity Level IV violation is being treated as a noncited violation consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Condition Report 99-1254 (Section O1.3).

#### Maintenance

- Investigation and actions taken to correct a loose nut, found on one cold leg manway and two hot leg manways on the steam generators, were thorough. Conclusions of the root cause determination were appropriate. No evidence of reactor coolant system leakage either before or after the manway nuts were retorqued was noted (Section M2.1).
- Weld repair of a chemical and volume control system check valve seal weld was appropriately performed, inspected, and documented (Section M2.2).

#### Engineering

- The system engineers were aggressive in resolving the failure of the main generator breaker to trip when required. An appropriate conservative decision was made to replace the relay prior to restart (Section E2.1).
- In response to Generic Letter 98-02, the licensee had concluded that Waterford 3 was not susceptible to a drain down such as had occurred at the Wolf Creek Nuclear Station. The inspectors reviewed the appropriate system drawings and concurred with the licensee's conclusions (Section E3.1).

#### Plant Support

- The quality assurance audit conducted on the emergency preparedness program and the Offsite Dose Calculation Manual was effective (Section P7.1).

## Report Details

### Summary of Plant Status

At the beginning of this inspection period, the plant was operating at 100 percent power. On November 26, 1999, the plant was shut down and cooled down to Mode 5 to perform repairs to a steam line upstream of a main steam isolation valve. Repairs were completed and the plant was restarted on December 1, 1999. The main generator was connected to the electrical grid on December 2 and power was increased to approximately 100 percent and remained at that level for the remainder of this inspection period.

### I. Operations

#### **O1 Conduct of Operations (71707)**

##### **01.1 General Comments (71707)**

The inspectors performed frequent observations of on-going plant operations, control panel walkdowns, and plant tours. Observed activities were performed in a manner consistent with safe operation of the facility. The inspectors observed control room operators utilize good self-checking and peer-checking techniques when manipulating plant equipment. Operators generally used good communication techniques.

##### **01.2 Plant Shutdown to Repair Unisolatable Main Steam Leak and Plant Restart**

###### **a. Inspection Scope (71707, 93702)**

The inspectors evaluated the circumstances and facts related to the plant shutdown to repair the steam leak. The inspectors reviewed the documentation related to repair of the steam leak and subsequent plant startup.

###### **b. Observations and Findings**

On November 26, 1999, a steam leak was identified on a main steam header drain pipe on the upstream side of Main Steam Isolation Valve MSIV-124B. A plant shutdown was commenced to cool down and replace the leaking section of steam pipe. During the reactor coolant system (RCS) cool down, while placing the RCS on shutdown cooling, a rapid drop in pressurizer level was observed and an Alert was declared. This event was the focus of a special inspection documented in NRC Inspection Report 50-382/9925.

The section of steam drain pipe that had been leaking was found to be severely degraded due to external rust. Another steam drain pipe that had been in similar environmental conditions was inspected. No additional damage was found. The section of pipe that was damaged was replaced with the same type that had been removed.

After repairs had been completed, the RCS was heated up and Mode 2 was entered on December 1. Criticality was achieved at 11:19 p.m. The main generator breaker was closed at 3:03 a.m. and power escalation commenced. The plant achieved full power on December 3. The inspectors reviewed the estimated critical concentration and other required startup documentation and observed portions of the heat up, startup, and

power escalation. Operator performance was satisfactory with good three-way communication. Control room access was closely controlled to minimize operator distractions.

c. Conclusions

Operator performance during the plant shutdown to repair a steam leak and during the subsequent plant restart was good. Control room access was closely controlled to minimize operator distractions.

O1.3 Failure to Inspect Temporary Freeze Protection Shelters in Accordance with Procedures

a. Inspection Scope (71707)

The inspectors performed a review of the freeze protection requirements, walked down the installed temporary freeze protection shelters, and interviewed operations personnel regarding the status of freeze protection preparation.

b. Observations and Findings

The inspectors were performing periodic inspections of the licensee's freeze protection in preparation for winter. The inspectors found that scaffolds had been erected as temporary framework for freeze protection shelters around freeze-susceptible components on safety-related systems.

Procedure OP-002-007, "Freeze Protection and Temperature Maintenance," Revision 10, Section 6.16, stated, in part, perform inspections of all temporary shelters and heaters at least once each day, preferably on the night shift, or more frequently as determined appropriate by the shift supervisor/control room supervisor. The purpose of these inspections was to ensure the shelters were intact and not interfering with plant equipment.

Records indicated that the scaffold erection had been started on November 30, 1999. The first notation that the required inspection had been performed was a log entry on December 4. This constituted a procedural violation contrary to the requirements of Technical Specification (TS) 6.8.1, which states, in part, that written procedures shall be implemented. Condition Report (CR) 99-1254 was written to place the issue into the corrective action program. This Severity Level IV violation is being treated as a noncited violation consistent with Section VII.B.1.a of the NRC Enforcement Policy (50-382/9924-01).

c. Conclusions

A failure to appropriately implement the inspection of temporary freeze protection shelters constituted a procedural violation contrary to the requirements of TS 6.8.1. This Severity Level IV violation is being treated as a noncited violation consistent with

Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CR 99-1254.

O8.1 (Closed) Licensee Event Report (LER) 50-382/98-001: TS 3.0.3 Condition/No Charging Pumps Operable

On February 14, 1998, a relay failure in the control system for the chemical volume and control system caused a loss of letdown flow and charging pump valve repositioning. The operators took prompt action to stop the charging pumps, which required entry into TS 3.0.3. The problem was diagnosed and isolated allowing TS 3.0.3 to be exited in 39 minutes. The cause of the relay failure was determined to be internal shorting. The relay was replaced and the system was returned to normal operation.

O8.2 (Closed) LER 50-382/98-002: Brief Loss of Command Function in the Control Room

Details of this LER and corrective actions taken were discussed in NRC Inspection Report 50-382/9806. A noncited violation was issued.

O8.3 (Closed) Inspection Followup Item 50-382/9806-01: Station log keeping procedures.

The inspectors have continually inspected the station log and have identified only minor discrepancies. No violations of the logging procedures have been identified. All discrepancies identified have been discussed with the operations superintendent and corrective actions were immediately taken. The inspectors consider this issue closed.

## **II. Maintenance**

### **M1 Conduct of Maintenance (61726,62707)**

The inspectors observed all or portions of the following maintenance and surveillance activities, as specified by the referenced maintenance action items and surveillance procedures:

- 410331 Charging Pump B Filter, Oil Replacement, and Crosshead Assembly Adjustment
- OP-903-121 Safety Systems Quarterly IST Valve Tests
- 410392 Emergency Feed Water Pump Operability Check

In general, the inspectors considered the observed work activities to have been performed in an acceptable and effective manner. The technicians were knowledgeable and conducted the work as required by applicable procedures. Appropriate support personnel, including health physics, quality control, supervisory, and system engineering personnel were at the work site when required.

## **M2 Maintenance and Material Condition of Facilities and Equipment**

### **M2.1 Steam Generator Manway Nuts Found Loose**

#### **a. Inspection Scope (92902)**

The inspectors followed the licensee's maintenance activities to correct several loose nuts on steam generator manways and efforts to determine the root cause of the condition.

#### **b. Observations and Findings**

On November 28, 1999, maintenance technicians were performing a boric acid inspection of the RCS following entry into Mode 5. A nut on a cold leg manway cover bolt on Steam Generator 1 was observed backed off approximately 2 inches. More detailed inspection identified the bolt as Number 19 in the torque sequence. Additional inspections found the nuts on the corresponding torque positions (Number 19) were hand tight on Steam Generator 1 hot leg manway and Steam Generator 2 hot leg manway. All manway nuts were retorqued to 1200 foot-pounds in accordance with Engineering Request W3-99-1114-00-00. An investigation to determine why the nuts were loose was initiated. The technicians found no evidence of RCS leakage either before or after the manway nuts were retorqued.

The manways were found to have been replaced during the last scheduled refueling outage in early 1999 using the same multi-stud tensioning device. The device was installed on a test stand and closely examined. The hydraulic piston for Position 19 was found to stick consistently. Disassembly of the device revealed corrosion on the mating surfaces of the cylinder. This was postulated to have contributed to the erratic operation of the cylinder. Other potential contributors may have been a clogged inlet port at Position 19, or the seal cup at that location may have developed a minor internal leak that went undetected.

The inspectors interviewed the maintenance supervisor and discussed the investigation, conclusions, and corrective actions. Prior to the next refueling outage, the procedures will be revised to require manual torque verification. The inspectors considered the investigation thorough and identified no problems with the licensee's conclusions.

#### **c. Conclusions**

Investigation and actions taken to correct a loose nut, found on one cold leg manway and two hot leg manways on the steam generators, were thorough. Conclusions of the root cause determination were appropriate. No evidence of RCS leakage either before or after the manway nuts were retorqued was noted.

**M2.2 Repair of Seal Weld on a Chemical and Volume Control System Check Valve**

a. Inspection Scope (92902)

The inspectors reviewed the repair plans and repair package for Valve CVC-219B.

b. Observations and Findings

On November 28, 1999, a bonnet leak was noted on Check Valve CVC-219B. CRs 99-1216 and 99-1217 were written. Closer inspection found that the seal weld had cracked. The RCS pressure boundary on this valve was found to be the threads rather than the seal weld, therefore, the leak was not pressure boundary leakage. Repair Package MAI 411831 was prepared to grind out and replace the seal weld. The inspectors reviewed the package after the weld repair was completed. The weld preparation, repair, and postweld inspections were appropriately documented.

c. Conclusions

Weld repair of a chemical and volume control system check valve seal weld was appropriately performed, inspected, and documented.

**M8 Miscellaneous Maintenance Issues (92902)**

**M8.1 (Closed) Violation 50-382/9806-03: Postmaintenance testing of Valve CVC-103.**

The cause of this violation was determined to be inadequate procedures. Corrective actions included revising maintenance procedures for Valve CVC-103 and all other safety-related, air-operated valves that could be susceptible to this same problem. All corrective actions have been completed.

**M8.2 (Closed) VIO 50-382/9806-04: Corrective actions for diaphragm valves.**

This violation was a result of narrowly focusing the initial corrective actions on a small population of valves that were susceptible to the same failure mechanism. Additional walkdowns of diaphragm valves in other safety-related applications found a wide range of discrepancies. Repairs were made to all other valves that were found to have problems. The entire population has been inspected and repaired as necessary.

### **III. Engineering**

#### **E2 Engineering Support of Facilities and Equipment**

##### **E2.1 Main Generator Breaker Failed to Open Automatically on Turbine Trip**

###### **a. Inspection Scope (37551)**

The inspectors reviewed the sequence of events, engineering investigation, and final corrective actions.

###### **b. Observations and Findings**

On November 26, 1999, during the plant shutdown to repair a steam leak, the main generator output breaker failed to automatically trip following a turbine trip. The operators responded by manually opening the breaker. CR 99-1214 was written to investigate and correct the problem prior to plant restart.

The system engineer aggressively investigated the failure of the breaker to trip as required. No indication of damage to the generator was detected. All the relays in the trip sequence were inspected and tested. The reverse power relay was found to pickup at 0.051 amperes instead of 0.023 to 0.027 amperes as required by the calibration. The relay was recalibrated to 0.023 amperes and allowed to set overnight. No drift of the set point was detected the following day. However, since no immediate evidence could be found that indicated why the setpoint had changed, the engineer conservatively had the relay replaced and appropriately calibrated.

Subsequent investigation found that Maintenance Procedure ME-005-085, "Calibration Procedure G.E. Power Directional Relay Types 12GGP53B and 12GGP53C," Revision 8, had been used to calibrate the relays on March 20, 1999. The procedure was determined to require enhancements because it required manipulation of the voltage bias after determining the as-found setpoint, without going back and rechecking the setpoint. This resulted in the setpoint being left out of tolerance following the calibration. The procedure will be revised prior to the next scheduled calibration of those relays.

The inspectors noted that the engineers were aggressive in resolving the issue. The engineers made the appropriate conservative decision to replace the relay prior to restart. Additional evaluation will be performed by design engineers for possible relay setting enhancements.

###### **c. Conclusions**

The system engineers were aggressive in resolving the failure of the main generator breaker to trip when required. An appropriate conservative decision was made to replace the relay prior to restart.



**E3 Engineering Procedures and Documentation****E3.1 Response to Generic Letter 98-02****a. Inspection Scope (Temporary Instruction 2515/142)**

The inspectors reviewed the licensee's response to GL 98-02 and independently reviewed drawings of the emergency core cooling system piping.

**b. Observations and Findings**

On November 18, 1998, inter-office Memorandum W3F1-98-0161, "NRC Generic Letter (GL) 98-02, Loss of Reactor Coolant Inventory And Associated Potential for Loss of Emergency Mitigation Functions While in a Shutdown Condition," was written to file in response to the GL. The engineers had concluded that Waterford 3 was not susceptible to a drain down such as had occurred at the Wolf Creek Nuclear Station. Their attention was limited to activities at hot shutdown when it was feasible to divert RCS water to the refueling water storage pool in a lineup that could result in simultaneous RCS drain down and voiding in the suction headers of the safety injection pumps.

The engineers concluded that unlike the Wolf Creek design, the Waterford 3 design did not provide a drain path directly to the safety injection suction piping without having a passive component failure. The physical connections between the shutdown cooling system and the safety injection pump suction piping contain check valves that preclude flow back to the suction header. Also, recirculation flow piping from the safety injection pumps returns to the refueling water storage pool rather than to the pump suction headers.

The inspectors reviewed the system drawings and concurred with the conclusions of the licensee's limited scope review.

**c. Conclusions**

In response to Generic Letter 98-02, the licensee had concluded that Waterford 3 was not susceptible to a drain down such as had occurred at the Wolf Creek Nuclear Station. The inspectors reviewed the appropriate system drawings and concurred with the licensee's conclusions.

**E8 Miscellaneous Engineering Issues (92903)****E8.1 (Closed) Violation 50-382/9806-05: Operation of Emergency Feedwater Pump AB without control room concurrence.**

This violation was the result of lack of understanding by a system engineer as to what constitutes manipulation of plant equipment. The definition of manipulation was discussed with all system engineers. The plant engineers' desk guide was updated to

make clear that operations approval and oversight were required prior to equipment manipulation in the field.

#### **IV. Plant Support**

##### **P7 Quality Assurance (QA) in EP Activities**

###### **P7.1 QA Assessment of Emergency Preparedness (EP) and Offsite Dose Calculation Manual (ODCM)**

###### **a. Inspection Scope (71750)**

The inspectors discussed the QA assessment results with the QA inspector and his supervisor and reviewed the assessment summaries.

###### **b. Observations and Findings**

During this reporting period, the QA group performed assessments of the EP program and the ODCM. The EP review focused on the Alert event that occurred on November 27. The result indicated that the program was being effectively implemented with no identified weaknesses. The ODCM audit found that liquid and gaseous effluents were being appropriately monitored, controlled, and quantified. Minor problems were identified with procedures that required updating. The inspectors reviewed the findings and agreed with the assessments based on independent review.

###### **c. Conclusions**

The QA audit conducted on the EP program and the ODCM was effective.

##### **S2 Status of Security Facilities and Equipment**

During this inspection period, the inspectors noted several upgrades and improvements to security equipment. The areas of improvement included upgrades of the metal detectors and x-ray machines at the primary access point. The problems with the new computer system have been reduced by installation of new hardware and software modifications. Further improvements were scheduled to be added in the future.

##### **F2 Status of Fire Protection Facilities and Equipment**

Through detailed reviews of 10 CFR Part 50, Appendix R, requirements over the past several months, the fire protection engineers had identified several areas where the fire suppression systems or electrical separation were not in strict compliance with the Appendix R requirements. This had resulted in having continuous fire watches posted in several areas of the plant. During the forced outage this reporting period, corrections were made to bring these areas into compliance with Appendix R. This relieved the manpower burden by allowing the fire watches to be secured.

**V. Management Meetings**

**X1 Exit Meeting Summary**

The inspectors presented the inspection results to members of licensee management on January 4, 2000. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. F. Burski, Director Site Support  
J. R. Douet, Manager Plant Maintenance  
C. M. Dugger, Vice-President, Operations  
E. C. Ewing, Director, Nuclear Safety & Regulatory Affairs  
R. M. Fili, Manager, Quality Assurance  
C. Fugate, Operations Superintendent  
J. G. Hoffpauir, Manager, Operations  
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T. R. Leonard, General Manager, Plant Operations  
T. P. Lett, Superintendent, Radiation Protection  
J. M. O'Hern, Manager, Training and Emergency Planning  
E. Perkins, Jr., Manager, Licensing  
L. N. Rushing, Manager, Mechanical and Civil Engineering  
B. Thigpen, Director, Planning and Scheduling  
A. J. Wrape, Director, Design Engineering

INSPECTION PROCEDURES USED

37551	Onsite Engineering
61726	Surveillance Observations
62707	Maintenance Observations
71707	Plant Operations
71750	Plant Support Activities
92700	Onsite LER Review
92901	Followup-Plant Operations
92902	Followup-Maintenance
92903	Followup-Engineering
92904	Followup-Plant Support
93702	Prompt Onsite Response to Events

ITEMS OPENED AND CLOSED

Opened

50-382/9924-01	NCV	Failure to inspect temporary freeze protection shelters in accordance with procedures (Section O1.3)
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Closed

50-382/9924-01	NCV	Failure to inspect temporary freeze protection shelters in accordance with procedures (Section 03.1)
50-382/98-001	LER	TS 3.0.3 Condition/No Charging Pumps Operable (Section O8.1)
50-382/98-002	LER	Brief Loss of Command Function in the Control Room (Section O8.2)
50-382/9806-01	IFI	Station log keeping procedures (Section O8.3)
50-382/9806-03	VIO	Postmaintenance testing of Valve CVC-103 (Section M8.1)
50-382/9806-04	VIO	Corrective actions for diaphragm valves (Section M8.2)
50-382/9806-05	VIO	Operation of Emergency Feedwater Pump AB without control room concurrence (Section E8.1)

LIST OF ACRONYMS USED

CR	condition report
EP	emergency preparedness
LER	licensee event report
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
PDR	Public Document Room
QA	quality assurance
RCS	reactor coolant system
TS	Technical Specification