

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report No: 50-382/91-09

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: February 20 through March 25, 1991

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

S. D. Butler, Resident Inspector
Project Section A, Division of Reactor Projects

Approved:


T. F. Westerman, Chief, Project Section A

4-9-91
Date

Inspection Summary

Inspection Conducted February 20 through March 25, 1991 (Report 50-382/91-09)

Areas Inspected: Routine, unannounced inspection of plant status, onsite followup of events, monthly maintenance observation, bimonthly surveillance observation, operational safety verification, followup of previously identified items, complex surveillance observation, and engineered safety feature system walkdown.

Results:

- o A noncited violation of Technical Specification (TS) 3.7.1.1 was identified in paragraph 3.1. The licensee identified an error in the dimension used for the calculation of the lift setpoints of the Main Steam Safety Valves (MSSV). This was found as a direct result of the questioning and self-checking attitude of one of the licensee's maintenance engineers. Such performance is considered a strength.
- o The performance of MSSV testing showed considerable improvement since its performance in September 1989.
- o The radioactive gas release (Unusual Event) discussed in paragraph 3.2 was handled well by operations personnel, but the release resulted from a lack

of coordination between personnel ventilating the No. 1 steam generator primary side and the control room operators, and weaknesses in engineering controls applied to the ventilation process.

- Good planning and preparation was apparent during the plant shutdown on March 15 and during the draindown of the reactor coolant system (RCS) to reduced inventory on March 20. The licensee's efforts to minimize the risks involved with reduced RCS inventory operation were noteworthy and met or improved on precautionary measures identified by the NRC and as a result of industry experience.

DETAILS1. PERSONS CONTACTED1.1 Principal Licensee Employees

*J. R. McGaha, General Manager, Plant Operations
 *P. V. Prasankumar, Technical Services Manager
 *D. F. Packer, Operations and Maintenance Manager
 *A. S. Lockhart, Quality Assurance Manager
 *D. E. Baker, Director, Operations Support and Assessments
 *R. G. Azzarello, Director, Engineering
 W. T. Labonte, Radiation Protection Superintendent
 *G. M. Davis, Events Analysis Reporting & Response Manager
 R. F. Burski, Director, Nuclear Safety
 *L. W. Laughlin, Licensing Manager
 *J. G. Hoffpauir, Maintenance Superintendent
 R. S. Starkey, Operations Superintendent
 A. G. Larsen, Assistant Maintenance Superintendent, Electrical
 D. T. Dormady, Assistant Maintenance Superintendent, Mechanical
 D. C. Matheny, Assistant Maintenance Superintendent, Instrumentation and Controls

*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 operated at full power during the reporting period until March 10, 1991, when a slight power reduction was required to maintain RCS temperature due to the core being at end of life. By March 14, reactor power had been reduced to approximately 95 percent. On March 15, beginning at approximately 10 p.m., the plant was shut down to commence the licensee's fourth refueling outage. At the end of the reporting period the plant was in cold shutdown, with the RCS drained to midloop and shutdown cooling in service to support steam generator and reactor coolant pump work in progress.

3. ONSITE FOLLOWUP OF EVENTS (93702)3.1 Incorrect Seat Diameter Used for Determination of MSSV Setpoints

On March 14, 1991, the inspector was informed that the licensee had entered their NOP-19, "Nonconformance/Indeterminate Qualification Process," procedure. At 8:58 a.m., during preparation for MSSV testing in accordance with MM-07-015, "Trevitest of Main Steam Safety Valves," the licensee discovered that an incorrect dimension had been previously used for valve seat diameter. When previous calculations were repeated using the correct valve seat diameter,

which was obtained from the valve manufacturer and verified by measurement of spare parts, 8 of the 12 valve lift setpoints were determined to be outside of the tolerance allowed by TS. The valves were declared inoperable at 1:40 p.m. which required the plant to be shut down unless the valves could be tested and reset within the allowed time. The licensee requested a TS Waiver of Compliance from Region IV. Calculations showed that the valves were out of tolerance low, which would be conservative for overpressure protection, with the worst case being approximately 2 percent low. The TS Waiver of Compliance was granted by Region IV to allow sufficient time to test and reset the valves prior to plant shutdown. MSSV testing was completed on March 15 at approximately 12 noon. Only two valves were found out of tolerance and required adjustment. The licensee was investigating the problem to determine why the wrong valve seat dimension had been used during previous performances of the surveillance. The results of this investigation will be included in Licensee Event Report 50-382/91-003.

TS 3.7.1.1 states that all main steam code safety valves shall be operable with lift settings within ± 1 percent of that specified by TS Table 3.7-1. The use of the wrong valve seat dimension resulted in 8 of the 12 valve calculations being out of TS tolerance at the time they were set prior to the commencement of the last refueling. The error caused setpoints to be up to (-)2 percent low. Actual testing found 2 of the 12 valves out of the acceptable setpoint lift range after approximately 18 months of operation. The licensee's maintenance engineer brought about the identification of the error, and the licensee's response was timely and technically appropriate. This licensee-identified violation is not being cited because the criteria specified in Section V.G of the NRC's Enforcement Policy was satisfied.

3.2 Inadvertent Release of Radioactive Gas Via Plant Stack

On March 22, 1991, at 5:44 a.m., with the unit in cold shutdown with both trains of shutdown cooling in service and the RCS drained to midloop, the licensee declared an Unusual Event (UE) in accordance with their emergency plan (EP) when plant stack activity exceeded the emergency action level limit of 1.1 E-3 microcuries per milliliter ($\mu\text{Ci/ml}$).

Operators noted an upward trend on the plant stack monitor shortly after 5 a.m. and secured the containment purge system. After trending down when the purge system was restarted, plant stack activity quickly exceeded the radiation monitor high alarm setpoint which automatically terminated containment purge, and stopped the release. The highest indicated plant stack activity was 1.4 E-3 $\mu\text{Ci/ml}$ and the principle isotope was determined to be Xenon (Xe-133) by analysis. The operators entered their off-normal procedure, OP-901-020, "High Airborne Activity in Containment." The containment was cleared of unnecessary personnel and the equipment hatch installed. It was subsequently determined that the high activity resulted from from temporary exhaust fans connected to ventilate the A steam generator primary side after the manways were removed. Containment was reentered and the fans which were being operated by health physics personnel were secured once they were identified as the source.

During previous refueling outages, the licensee typically ventilated the steam generator primary side in order to obtain access for eddy current testing of the tubes. They used an arrangement consisting of temporary ducts, charcoal

and high-efficiency particulate air (HEPA) filters, and a 2000 CFM fan. The discharge was directed into the containment atmosphere near a purge exhaust inlet. In view of the higher fission product levels observed in the RCS as the shutdown for refueling approached, and to reduce the impact on personnel in the containment, the licensee connected the duct directly to the purge exhaust to reduce releases to the containment atmosphere and directed the higher than previously experienced concentrations of xenon gas to the plant stack (less dilution by the containment atmosphere). Procedures were followed; however, the licensee underestimated the concentration of radioactivity that was to be released to the plant stack.

When containment purge was restarted with the temporary steam generator exhaust fans secured, plant stack activity remained below the high alarm setpoint. The licensee secured from the UE at 9:39 a.m. Later in the day, ventilation of the No. 1 steam generator was resumed in a more controlled manner to prevent plant stack activity from exceeding allowable levels. The ventilation process was performed with a smaller fan and with close coordination between the containment and the control room operators. Similar precautions were taken when No. 2 steam generator was ventilated. The process was accomplished safely and without incident.

The inspector monitored the licensee's actions during the event after being notified at approximately 5:50 a.m. Calculations performed by the licensee indicated that the release limits of TS 3.11.2.1 for gaseous radioactive effluents were not exceeded. There were no reports of excessive exposure or personnel contamination during the event. It was determined that the licensee's response actions were appropriate for the circumstances and that proper notification of the NRC and other outside agencies was made as required by their EP and 10 CFR 50.72. The inspectors noted that a lack of direct coordination for ventilating the No. 1 steam generator primary side contributed to the event, as well as a failure to take a more conservative approach to the initial ventilation operation in light of known elevated fission product activity trends in the RCS. This was not indicative of the conservative operational approach typically demonstrated by this licensee. The licensee recognized the lessons learned from the event, responded appropriately, and was performing a root cause investigation as of the end of this inspection period. Long-term corrective actions will be reviewed during a future inspection and tracked as Inspector Followup Item (IFI) 382/9109-001.

3.3 Conclusions

The use of the incorrect valve seat diameter to calculate MSSV setpoints was not identified during prior performances of MM-07-015. The questioning attitude of the engineer who identified the problem was a strength. The response of the plant staff in preparation of a TS Waiver of Compliance request and timely resolution of the issue was good.

The control room response to the declaration of an unusual event on March 22, 1991, and implementation of the licensee's EP demonstrated a strong emergency response capability. Weaknesses were identified in the apparent lack of coordination and work control of a major outage activity.

4. 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, and TS.

4.1 WAs 01071020, 01074418, 01074649

From March 19, 1991, through the end of the reporting period, the inspector observed maintenance in progress on the No. 1 emergency diesel generator (EDG). The engine was being inspected in accordance with MM-03-015, Revision 7, "18 Month Emergency Diesel Engine Inspection" (WA 01071020). Additional work packages were prepared (WA 01074418) to disassemble 1L, 5L, 8L, 1R, and 5R cylinders and pistons due to an apparent crankcase explosion, that occurred on March 18 during the analysis run of the EDG, and to replace the turbocharger (WA 01074649) after the thrust bearing clearance was found out of specification. The inspector reviewed the work packages and determined that the packages were properly prepared and approved for work and were adequate for the work being performed. Qualified mechanical maintenance personnel were working on the EDG as well as vendor representatives from Cooper Bessemer. The piston and liner from the 5L cylinder displayed significant scoring and signs of overheating and was thought to be a contributor to the cause of the crankcase explosion. The damaged components were sent to Cooper Bessemer for failure analysis to determine what additional disassembly and repair needed to be made, if any. This maintenance activity will continue to be monitored during the next reporting period, and conclusions will be documented in NRC Inspection Report 50-382/91-13.

No violations or deviations were identified.

5. BIMONTHLY SURVEILLANCE OBSERVATION (61726)

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

5.1 Procedure OP-903-005, Revision 6, "Control Element Assembly Operability Check"

On February 22, 1991, the inspector observed performance of the monthly movement of control element assemblies (CEAs) as required by TS 4.1.3.1.2. This TS required each full-length CEA not fully inserted, and each part-length CEA which is inserted in the core below 145 inches, to be determined operable by movement of at least 5 inches in any one direction. The plant was operating at full power during the test. The operators followed the procedure and conducted the test in an orderly manner. All of the CEAs functioned normally and within the acceptance criterion until CEA 68 (Regulating Group 2) was

inserted 5 inches to 144.75 inches on the lowest reading CEA control (CEAC) display. When the reactor operator attempted to withdraw the CEA back to its fully withdrawn position, it would not move. The CEA was declared inoperable per TS 3.1.3.1, Action e, which allowed continued operation with one CEA inoperable pursuant to TS 3.1.3.6. TS 3.1.3.6, however, required Group 2 to be above 145 inches or, within 2 hours, commence a plant shutdown. With the other CEAC display indicating 145.50 inches, a question arose as to whether or not the CEA was considered to be above or below 145 inches. The basis for TS 3.1.3.6, appeared to indicate that sufficient shutdown margin existed since the eight other CEAs in the group were fully withdrawn well above 145 inches. Utilizing an immediate work permit, the maintenance technicians determined that the CEA 68 reed switches for the upper electrical limit had failed, making the control element drive motor control system (CEDMCS) believe the CEA was already at the upper electrical limit. A switch lead was lifted, permitting the operator to withdraw the CEA back to its fully withdrawn position, thus satisfying TS 3.1.3.6. The switch lead was restored to normal and a condition identification report (CI 273840) was initiated to document the work done and to identify the need for a permanent repair. The CEA was trippable, and insertable, but could no longer be withdrawn until the reed switch was repaired, which could not be done until the refueling outage, which was scheduled to occur before the next monthly exercise was due. TS 3.1.3.1.f allowed continued reactor operation with one CEA inoperable as long as it was trippable and within TS 3.1.3.6 alignment (above 145 inches). No other problems were encountered. The inspector will follow up on the proper interpretation of TS 3.1.3.6 to determine for future reference if all CEAs in a group must be above 145 inches by all indications (IFI 382/9109-002).

5.2 Procedure OP-903-067, Revision 5, "Unit Power Supply Transfer Check"

On March 15, 1991, during unit shutdown for refueling, the inspector observed the performance of OP-903-067. The test involved verifying that the Class 1E unit switchboards could be manually and automatically transferred to the offsite power source as required by TS 4.8.1.1.1.b. The test was properly authorized and was performed by qualified individuals in accordance with an approved procedure. No problems were identified.

5.3 Procedure OP-903-096, Revision 3, "Boron Flow Rate Verification"

On March 15, 1991, during unit shutdown for refueling, the inspector observed the performance of OP-903-096. The test involved verifying that the boron addition flow rate to the RCS met the requirements of TS 4.1.2.2.d. The test was properly authorized and was performed by a qualified individual in accordance with an approved procedure. The volume control tank outlet valve, CVC-183, would not reopen from the main control room at the completion of the test. It was later determined that a relay associated with the low level interlock on the volume control tank had failed and was giving the valve a shut signal. The relay was replaced and the valve reopened. No other problems were identified.

5.4 Conclusions

No violations or deviations were identified during observations of surveillance testing. The licensee's response to equipment problems experienced during testing was prompt and appropriate and their interpretation of TS during CEA testing was conservative.

6. OPERATIONAL SAFETY VERIFICATION (71707, 71715)

The objectives of this inspection were to ensure that this facility was being operated safely and in conformance with regulatory requirements, to ensure that the licensee's management controls were effectively discharging the licensee's responsibilities for continued safe operation, to assure that selected activities of the licensee's radiological protection programs were implemented in conformance with plant policies and procedures and in compliance with regulatory requirements, and to inspect the licensee's compliance with the approved physical security plan.

The inspectors conducted control room observations and plant inspection tours and reviewed logs and licensee documentation of equipment problems. Through in-plant observations and attendance of the licensee's plan-of-the-day meetings, the inspectors maintained cognizance over plant status and TS action statements in effect.

The licensee commenced a plant shutdown at 10 p.m. on March 15, 1991, in preparation for their fourth refueling outage. The inspector observed the shutdown, which was performed in accordance with OP-10-001, Revision 12, "General Plant Operations," Section 8.6. Planning and preparation for the shutdown was discussed with the shift supervisor. The shutdown was very well controlled by the operators and went smoothly. Some minor secondary equipment problems were encountered but were handled properly by the operators and had no significant impact on the shutdown.

The licensee drained the RCS to midloop on March 20, 1991, to support scheduled outage work. The inspector reviewed preparations for reduced inventory operations, including Procedure OP-001-003, Revision 12, "Reactor Coolant System Drain Down," to ensure that the licensee's administrative controls were consistent with the requirements of Generic Letter 88-17, "Loss of Decay Heat Removal." It was determined that the licensee had requirements in place to ensure containment closure capability for mitigation of radioactive releases, continuous indication of core exit temperature, redundant RCS level indication, controls to minimize activities that could affect RCS level or shutdown cooling, redundant means for providing RCS makeup, controls for activities that could prevent refilling the RCS (e.g., nozzle dams), and controls to minimize the possibility of losing offsite power while in reduced inventory. Other precautions noted included a management walkdown of temporary reactor vessel level indications after installation, onshift operation management oversight during the draindown, and a continuous shutdown cooling system watch posted before beginning reduced inventory operations. The inspector witnessed the drain down evolution which was well controlled and deliberate. The licensee planned on being in reduced inventory for approximately 10 days. No problems were noted.

Based on observations of the implementation of the licensee's radiological protection plan and physical security plan, no problems were identified.

6.1 Conclusions

No violations or deviations were identified in this area. The licensee continued to display professionalism and attention to detail during day-to-day plant operation, including implementation of the health physics program and security plan. Plant management has placed a very high priority on ensuring that the current refueling outage is conducted in such a manner to minimize the risk of losing shutdown cooling, particularly while in a reduced RCS inventory condition.

7. FOLLOWUP OF PREVIOUSLY IDENTIFIED ITEMS (92701, 92702)

7.1 (Open) Violation 382/9022-03

On September 24, 1990, the inspector found a scaffold brace attached to the cylinder access platform on the No. 1 EDG. This placed the operability of the EDG in question with respect to seismic qualification, because an engineering evaluation required by the licensee's procedure was not performed to determine the potentially adverse consequences of the added weight during a design basis earthquake. The EDG was rated as Seismic Category I. This was in violation of the licensee's recently revised Procedure NOCP-207, "Erecting Scaffold." In response, the licensee promptly removed the scaffold, revised Procedure NOCP-207, and reviewed the violation with scaffolding crews. They further added lessons learned by this violation in the scaffolding training program. On February 26, 1991, the inspector followed up on the corrective actions by reviewing Revision 3.1 of Procedure NOCP-207 and selecting a scaffold that was attached to safety-related equipment as a test case. Scaffold No. 9406 was attached to a seismic support on the No. 2 EDG air starting line containing Valve EGA-153B. Upon reviewing Procedure NOCP-207, Attachments 7.1 and 7.4, which contained records of the scaffold request and the engineering evaluation checklist, the inspector found the following deficiencies: (1) the system engineer did not demonstrate good attention to detail in that he answered question No. 4 as "yes," requiring a nonseismic overseismic I review, but he did not perform the review. After the scaffold crew reconfigured the scaffold, negating the need for such a review, the engineer should have changed "yes" to "no"; (2) The system engineer signed off the form under the statement "Engineering Evaluation Performed by:," but no engineering evaluation was performed. The engineer explained to the inspector that he was not responsible for the engineering evaluation, and the signoff was only for completing the checklist. The checklist did identify the need for an engineering evaluation, and system engineering was responsible for evaluating the scaffold request. Design engineering was responsible for providing assistance in evaluating those scaffold requests as required, but it was unclear as to who was responsible to determine it necessary. The inspector also questioned whether or not Section 6.0 of Procedure NOCP-207, which specified record retention requirements, was in compliance with 10 CFR Part 50, Appendix B, Criterion XVII, "Quality Assurance Records." Section 6.0 only required retention of scaffold request forms, completed engineering evaluations, and engineering evaluation checklists

to be retained until the scaffold was removed. Furthermore, Procedure NOCP-207 affected safety-related equipment and involved cross-discipline personnel. Although Regulatory Guide 1.33 did not specifically call out a scaffold procedure, the licensee was asked by the inspector to determine whether Procedure NOCP-207 should be reviewed by the plant operations review committee and approved by the general manager. The licensee initiated a potentially reportable event (PRE) report to document corrective actions and a reportability determination. The licensee subsequently performed an engineering evaluation to determine if the configuration created by the installation of Scaffold No. 9406 had rendered the No. 2 EDG inoperable. The results indicated that the seismic support could withstand the additional weight during a design basis earthquake. Therefore, there was no TS violation, nor did the incident require reporting under 10 CFR 50.72 or -50.73. The inspector expressed concern over the licensee's continued failure to adequately control scaffold erection. The inspectors have expressed concern prior to this violation in NRC Inspection Reports 50-382/89-09 and -23. The licensee committed to get the right management personnel involved to ensure that complete and effective permanent corrective action will be taken. In view of the inadequacy of corrective actions taken in response to Violation 382/9022-03, this violation shall remain open.

7.2 (Closed) Violation 382/8931-02 (EA-192)

This violation addressed procedural inadequacies that led to the failure to comply with TS 3.7.1.1.a during the MSSV testing in September 1989. As part of the complex surveillance observation (see paragraph 8), Revision 3 of MM-07-015, "Trevitest of Main Steam Safety Valves," was reviewed and testing was observed. The licensee's revision of MM-07-015 to correct identified procedural inadequacies was considered satisfactory. This violation is closed.

8. COMPLEX SURVEILLANCE OBSERVATION (61701)

On March 14 and 15, 1991, the inspector observed the performance of TS Surveillance Test 4.7.1.1, which required the lift setpoint verification of the MSSV. The test was performed in accordance with MM-07-015, Revision 3, "Trevitest of Main Steam Safety Valves." The test procedure was reviewed to ensure that it was properly reviewed and approved, conformed to regulatory requirements, and was appropriate for the work to be performed. The testing was witnessed to ensure that test prerequisites were met, special test equipment was properly calibrated and in service, the required data was being recorded and verification signatures were obtained during testing, the appropriate revision of the test procedure was in use, and qualified personnel were supervising and performing the test. The inspector also verified that when valve setpoints were determined to be out of tolerance, the proper steps were taken to notify the control room so that the action required by TS could be taken. Even though a TS Waiver of Compliance was granted for the MSSVs (see paragraph 3.1), the two valves that were found out of specification were reset and tested within the time allowed by TS 3.7.1.1. The data collected during the test as well as a copy of the test procedure was sent to the NRC Region IV office for review by the Test Programs Section. The results will be documented in NRC Inspection Report 50-382/91-13. No problems were identified.

8.1 Conclusions

The licensee expended considerable effort to ensure that this surveillance was conducted properly in light of the problems previously experienced (NRC Inspection Report 50-382/89-31) with the test. The test was performed efficiently with excellent coordination between the test director and the control room.

9. ENGINEERED SAFETY FEATURE (ESF) SYSTEM WALKDOWN (71710)

During this inspection period, the inspectors commenced an indepth review and walkdown of accessible portions of the containment spray (CS) system.

On February 26, 1991, the inspector conducted a partial walkdown of accessible portions of the CS System while the plant was operating to verify that the system was in the state of readiness required by TS 3.6.2.1. No problems were identified; however, this inspection was not completed and will continue into the next inspection period. The results of the ESF walkdown will be documented in NRC Inspection Report 50-382/91-13.

10. EXIT INTERVIEW

The inspection scope and findings were summarized on March 27, 1991, with those persons indicated in paragraph 1. 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.