

APPENDIX C

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-382/90-16 Operating License: NPF-38


Docket: 50-382

Licensee: Entergy Operations, Inc. (Entergy)
P.O. Box B
Killona, Louisiana 70066

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

Inspection At: W-3, Taft, Louisiana

Inspection Conducted: August 20-24, 1990

Inspector:  9-12-90
C. Padik, Reactor Inspector, Plant Systems Date
Section, Division of Reactor Safety

Accompanying
Inspector: D. Kelley, Reactor Inspector, Test Programs Section
Division of Reactor Safety

Approved:  9/12/90
T. F. Stetka, Chief, Plant Systems Section Date
Division of Reactor Safety

Inspection Summary

Inspection Conducted August 20-24, 1990 (Report 50-382/90-16)

Areas Inspected: Routine, announced inspection of the implementation of commitments made relative to Regulatory Guide 1.97, "Postaccident Monitoring Instrumentation." The inspection included the review of design documents, physical inspection of instrumentation displays and an evaluation of instrument calibration procedure, and records. Licensee actions on previously identified items were also evaluated.

Results: The inspectors determined that the licensee had failed to meet fully their commitment to comply with Regulatory Guide 1.97. The inspectors identified six examples where deviations from the commitment had occurred. These are discussed in paragraphs 3.1 and 3.2 of this report.

The inspectors were concerned with the number of parameters that were identified as deficient considering the small sample population that the inspectors selected and the length of time that they had existed. These were indicative of a lack of attention to detail by the licensee's engineering staff over a long period of time and is considered to be a weakness in the engineering staff. The inspectors were also concerned with the lack of unique identification of the parameters especially considering the fact that the reactor operators were apparently not trained on which instruments were the accurate postaccident monitoring instruments.

The inspectors determined that tape splices utilized in instrument circuits subject to harsh environments were not qualified in accordance with 10 CFR 50.49(f) based on evaluation of test reports submitted by the licensee. As a result, Unresolved Item 382/8939-01 was closed and a violation issued. This violation does not require a response because of the licensee's planned corrective actions which are detailed in its Justification for Continued Operation (JCO) dated May 21, 1990.

DETAILS

1. PERSONS CONTACTED

Entergy Personnel

- *R. Azzarello, Director, Engineering and Construction
- *D. Baker, Director, Operations Support and Assessment
- *P. Barkhurst, Vice President, Operations
- *T. Brennan, Design Engineering Manager
- *R. Burski, Director, Nuclear Safety
- *V. Coy, Lead Senior Engineer
- *D. Gamble, Design Engineer
- *T. Golladay, Engineering Supervisor
- *L. Laughlin, Site Licensing Supervisor
- *A. Lockhart, Quality Assurance Manager
- *J. McGaha, General Manager, Plant Operations
- *B. Morrison, Licensing Engineer
- *T. Payne, Principal Engineer
- *P. Prasankumar, Manager, Technical Services
- *R. Starkey, Operations Superintendent
- *K. Walsh, Event Analysis Supervisor

NRC Personnel

- *S. Butler, Resident Inspector, W-3
- *T. Stetka, Chief, Plant Systems Section, Division of Reactor Safety, Region IV

*Denotes attendance at the exit interview conducted on August 24, 1990.

The inspectors also contacted other plant personnel during the course of the inspection.

2. BACKGROUND

By letter dated December 17, 1982 (Generic Letter 82-33), the NRC provided all reactor licensees and applicants with the "Requirements for Emergency Response Capability." Included in these requirements was the application of Regulatory Guide (RG) 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." The provisions for the instrumentation described in RG 1.97 were endorsed by the NRC to ensure that nuclear power plant operators would have sufficient and reliable information available for preventing and/or mitigating the consequences of a reactor accident. During this inspection, the inspectors evaluated the acceptability of the installed instrumentation at W-3. The inspection was conducted in accordance with Temporary Instruction 2515/87.

The inspectors reviewed the licensee submittals dated July 6, 1983; November 21 and 29, 1984; August 27, 1986; March 17, 1987; and July 7, 1987. The

inspectors also reviewed the "Safety Evaluation Related to Conformance to Regulatory Guide 1.97," dated October 18, 1985; the W-3 Updated Safety Analysis Report (USAR), Section 7.5, "Instrumentation Systems"; and the W-3 Technical Specifications (TS) related to instrumentation systems.

The inspectors compared the attributes of the instruments being utilized by the licensee to the provisions contained in Revision 2 of RG 1.97 to verify conformance with the recommendations for range, power supply, environmental qualification, seismic qualification, and redundancy and to note any questions requiring a more detailed review (e.g., verify proper instrument range when the readout is specified as only 0-100 percent span). The inspectors also verified that the operability and surveillance requirements for all of the Category 1 and some of the Category 2 instruments were included in the TS related to Postaccident Monitoring Instrumentation (TS 3/4.3.3.6). The calibration requirements for selected Category 2 instruments which were not included in the TS were verified to be consistent with the requirements of those which were included in the TS.

The inspectors selected for detailed review the instruments utilized for all five of the Type A variables; these were all designed as Category 1 instruments. An additional sample of six Category 1 and six Category 2 instruments were also selected. The sampled instruments are listed in Table 1. The design and qualification criteria for Categories 1, 2, and 3 instrumentation are provided in Regulatory Position 1.3 of RG 1.97, Revision 2, dated December 1980. A brief comparison of these criteria is included in Table 2. Category 3 instruments provide backup-type of information and were not included in this inspection effort. The instruments related to meteorological and radiological parameters that are included in RG 1.97 are inspected in accordance with separate guidance contained in Temporary Instructions 2500/18 and 2515/65, respectively, and were also not included in this inspection.

The inspectors reviewed selected piping and instrumentation diagrams to verify that all but two of the parameters were being detected by direct sensing. The indirect sensing of the reactor vessel level was accomplished through the use of a heated junction thermocouple system and the reactor coolant system subcooling was determined by calculations within the qualified safety parameter display system (QSPDS). These indirect sensing methods had been previously approved by the NRC.

The inspectors reviewed the listing of equipment required to be environmentally qualified to verify that the appropriate RG 1.97 instruments were included. The inspectors also verified that all of the selected instruments were included in the licensee's quality assurance program by reviewing the "Q" list.

The inspectors reviewed the various schematic, loop, and connection wiring diagrams to identify the power supply, electrical separation, and isolation devices utilized for each of the selected instruments and for the QSPDS. The diagrams were reviewed to ensure that redundant instruments were energized from separate sources, that system interconnections were properly isolated from each other, and that the systems contained the necessary components. The inspectors

also verified the proper range of level instruments by reviewing the related scaling documentation and comparing the process inputs to the installation schematics and the elevations shown on the instrumentation isometric drawings.

The inspectors also verified that the required indications and monitors were available in the control room and on the plant specific simulator. The inspectors checked the QSPDS in the control room and observed that the selected Category 1 and Category 2 parameters were being monitored. The inspectors also verified the installation of the required strip chart recorders in the control room for the Category 1 parameters.

3. INSPECTION FINDINGS

3.1 Review of Design Documentation

The inspectors were provided a printout listing the tag numbers associated with the instruments that were used to meet the commitments to RG 1.97. This list was necessary since the licensee's submittal provided only the parameters to be monitored, not the individual instruments the licensee intended to use to perform the sensing and monitoring functions. This submittal, dated July 6, 1983, was reviewed and accepted by the NRC and provides the basis for compliance with the commitments to the RG. During review of this list, the inspectors noted numerous errors in the printout (e.g., missing instruments, instruments with wrong ranges) and were informed that FSAR Table 7.5-1 was the official list of instruments (with tag numbers) that was used to meet the RG 1.97 commitments. The inspectors were also informed that the printout was only a working copy.

The inspectors attempted to use the FSAR table, but found that the table had additional instruments listed that were not necessary, had required instruments missing, and had instruments listed with ranges that were incorrect. Because of the conflicts among the information provided, the inspectors had a difficult time verifying that the licensee had instrumentation necessary to meet their commitments. The licensee had reached this same conclusion a few months prior to this inspection and had recently initiated a program to develop an accurate listing of the RG 1.97 instrumentation. The inspectors were informed that this effort would be completed by December 31, 1990, and that a final copy would be provided to the NRC to indicate any changes from the original commitment. The inspectors noted, however, that this list was required to be complete and accurate prior to initial fuel loading which occurred in December 1984.

The inspectors reviewed the FSAR, various design documents, and drawings for the selected instruments. A listing of the pertinent drawings that were reviewed is contained in Attachment 1. The inspectors made the following observations during the review of the design documents.

3.1.1 Reactor Coolant System (RCS) Hot and Coldleg Temperature

The inspectors identified an adequate number of RTDs with the proper ranges to meet the commitments with the exception of two coldleg RTDs with a range of

0-600°F. These two RTDs were required to be environmentally qualified, meet Safety Class 1E requirements, and were to supply a recorder channel each with a range of 0-600°F. The licensee identified a recorder with the proper range, but the RTDs were not properly qualified. This recorder was apparently identified during the recently initiated program to develop an accurate list of RG 1.97 instruments.

The failure to provide recording of qualified coldleg RTDs with a range of 0-600°F is considered to be in deviation of the commitments made to the NRC in the July 6, 1983, submittal.

Deviation (382/9016-01): Failure to have postaccident monitoring instrumentation to meet the RG 1.97 commitment.

The inspectors noted that, in addition to the deviation identified above, FSAR Table 7.5-1 did not include recorders for narrow range hotleg RTDs, but the submittal of July 6, 1983, did list these recorders. This is an example of a discrepancy between the two documents that were used to verify compliance to the commitments to RG 1.97. The recorders do, in fact, exist on the control board where the submittal states they were.

3.1.2 Safety Injection Tank Level and Pressure

The inspectors noted that these parameters were listed on the submittal of July 6, 1983, but were not included on FSAR Table 7.5-1. The requisite instruments were installed in the plant. This is another example of discrepancies between the two lists as noted above.

3.1.3 Wide Range Containment Sump Water Level

The July 6 submittal identified the range of the wide range containment sump instrument as 0 to 20 feet, whereas the instrument actually installed had a range of only 0 to 16 feet. The failure to provide an instrument with a range consistent with that stated in the submittal is a deviation to the commitments. This is considered to be another example of Deviation (382/9016-01).

3.1.4 Neutron Flux

The July 6 submittal specified that four qualified channels of wide range neutron flux detection would be provided with a range of 1E-8 to 2E2 percent full power. The inspector's review revealed that only two of the channel detectors were qualified and had ranges of 2E-8 to 2E2 percent full power.

The failure to provide four qualified channels of wide range neutron flux with the appropriate ranges is considered to be in deviation of the commitments. This is considered to be another example of Deviation (382/9016-01).

3.2 Instrument Displays

The inspectors performed a walkdown of the simulator and control room to verify that the Types A, B, and C, Categories 1 and 2 instrument displays were

properly installed and specifically identified. Regulatory Position 1.4 of RG 1.97, Revision 2, dated December 1980, states that Types A, B, and C instruments designated as Categories 1 or 2 should be specifically identified with a common designation on the control panels so that the operator can easily discern that they are the most accurate instruments and that they are intended for use under accident conditions. This guidance was included to provide assurance that operating personnel would have a basis for relying on the qualified instrumentation if a disagreement existed between the qualified and another instrument monitoring the same variable.

3.2.1 Instrument Designation

During the walkdown of the control room and simulator panels, the inspectors did not observe any distinguishing markings for the RG 1.97 instruments. The inspectors questioned a senior licensed operator and two licensed operators as to which indications would be used to determine a selected parameter, RCS temperature, in accordance with the emergency operating procedures (EOPs). All stated that they would look at all available indications and select the one that looked reasonable. The inspectors questioned simulator training personnel and found that no specific training was performed at the simulator as to what instruments could be relied upon in an accident condition. The failure to fulfill the commitment to comply with the RG 1.97 provision for specifically identifying the appropriate instruments is considered to be in deviation to the commitment. This is considered to be another example of Deviation (382/9016-01).

3.2.2 Wide Range Steam Generator Level

The July 6 submittal specified that four channels of wide range level instrumentation were available for each steam generator. However, the physical plant had only two wide range instrument channels installed for each steam generator. Additionally, the licensee personnel incorrectly identified four narrow range steam generator level instruments to be the correct instruments instead of the wide range instruments. This discrepancy was noted during the walkdown of the simulator and verified in the design documents.

The failure to provide four channels of wide range steam generator level instrumentation is considered to be in deviation of the commitments. This is considered to be another example of Deviation (382/9016-01).

3.2.3 RCS Pressure

The original submittal, dated July 6, 1983, identified the wide range reactor coolant pressure instrument range as 0 to 3000 psig. This was subsequently revised by licensee letters, dated August 27, 1986, and July 7, 1987, and approved by NRC letter dated August 20, 1987, to provide instruments with ranges of 0 to 4000 psig. These instruments were installed during the last refueling outage. However, the instruments were not provided with continuous display capability on the control board in the control room as provided for by the RG. The pressure can be selected for display on the screen of the Qualified Safety Parameter Display System (QSPDS) computer in addition to

trending information; however, the capability to periodically select the instantaneous pressure does not meet the requirements of a continuous display.

The failure to provide continuous indication for wide range reactor coolant pressure with a range of 0-4000 psig is considered to be in deviation of the commitments. This is considered to be an example of Deviation (382/9016-01).

3.3 Instrumentation Calibrations

The inspectors reviewed the calibration procedures and the records of completed calibrations to ensure that the performance of the selected instruments was being properly monitored. The licensee had difficulty in retrieving the historical data on the completion of calibration activities for the selected instruments but eventually provided the information during the inspection.

During the review of the documentation for the last performed calibration for the RCS RTDs, the inspectors noted that the licensee appeared to perform a channel check vice a calibration of the RTD. In essence, the licensee compared the computer indication of one RTD to that of the one being "calibrated." The inspectors did not consider this practice to be in accordance with the definition of calibration stated in TS 3/4.3.3.6.

The validity of this action is being reviewed by the NRC. Pending a final evaluation of this activity by the NRC, this is considered to be an unresolved item.

Unresolved Item (382/9016-02): Determine the validity of comparing computer readouts as a means of RTD calibrations.

3.4 Conclusion

The inspectors completed the requirements of Temporary Instruction 2515/87 with respect to the W-3 plant. The inspectors concluded that the licensee had not fully met the commitments made to comply with the specifications of RG 1.97, as demonstrated by the numerous examples of Deviation (382/9016-01). Additionally, the inspectors had difficulty in concluding that the instruments reviewed were the ones intended to meet the commitment due to discrepancies between the lists provided to the inspectors and the lack of familiarity with the instruments and the RG by the licensee's engineering staff.

4. FOLLOWUP ON PREVIOUS FINDINGS (92701 and 92702)

4.1 (Open) Open Item 382/8632-08: File Discrepancies for Conax Electrical Penetration Assemblies (EPAs)

In response to NRC Inspection Report 50-382/89-39 by letter dated January 19, 1990, the licensee stated that the information necessary to close this item was presented during a previous inspection. During this previous inspection, the licensee provided information but was unable to provide supporting documentation to validate their position.

During this inspection, the inspectors discussed the information with the licensee again. The licensee is to obtain the necessary supporting documentation and provide it to the NRC for review. This item will remain open pending receipt and satisfactory review of the additional information.

4.2 (Closed) Open Item 382/8632-09: Damaged Conax EPA

During previous inspections, cracking was noted in the polysulfone seal on the Conax EPAs. Previously, the licensee was not able to show that the cracking had no effect on the integrity of the EPA. The licensee has provided information from the vendor that indicates that the cracking was only cosmetic and did not affect the integrity of the EPA. This item is considered closed.

4.3 (Closed) Violation 382/8905-01: Inadequate Qualifications of Tape Splices

A previous inspection identified the licensee's failure to qualify tape splices for submergence. In response to the Notice of Violation, the licensee identified several instruments with associated tape splices that would be subject to submergence during a design basis accident (DBA).

In the licensee's response, dated August 30, 1989, the licensee committed to relocate the splices above the containment building flood level during refueling outage (RFO) 4. By letter dated December 5, 1989, the licensee committed to also relocate the corresponding instruments above the flood level during RFO 4. Modification package, DC3278, has been prepared and scheduled to assure that these activities are completed.

Based on the licensee's commitments and the preparation and scheduling of the modification package, this item is considered closed.

4.4 (Closed) Unresolved Item 382/8939-01: Determine the Environmental Qualification (EQ) of Okonite 195/35 Tape Splices Used In Instrument Circuits Subject to Harsh Environments

A previous report identified the use of tape splices on instrument circuits subject to harsh environments. The licensee provided five EQ test reports, on which the licensee based qualification of the splices, for NRC review. The NRC review concluded that the test reports, neither individually or collectively, demonstrated qualification of the tape splices in instrumentation circuits subject to harsh environments. This position was documented in a memorandum, dated May 16, 1990, and placed on the licensee's docket.

The licensee prepared and submitted a JCO, dated May 21, 1990, to allow continued plant operation until RFO 4. The licensee committed to replace the tape splices with fully qualified splices during RFO 4.

The failure to provide adequate documentation to demonstrate the qualification of the subject splices is considered to be in violation of 10 CFR 50.49(j). Unresolved Item (382/8939-01), therefore, will be closed and upgraded to a violation.

Violation (382/9016-02): Unqualified Tape Splices Utilized in Instrument Circuits Subject to Harsh Environments.

The NRC's review found the licensee's JCO and commitment to replace the subject splices with fully qualified splices to be acceptable, and, as such, no response will be required and the violation is considered closed.

5. UNRESOLVED ITEMS

Unresolved items are matters for which more information is necessary for the inspectors to ascertain if the matter is acceptable, a deviation, or a violation. An unresolved item related to the calibration of reactor coolant system RTDs is identified in paragraph 3.3.

6. EXIT INTERVIEW

The inspectors summarized the scope and findings of the inspection during the exit interview on August 24, 1990, with the personnel identified in paragraph 1. Although some proprietary documents were reviewed by the inspectors, no proprietary documents were removed from the facility, and no proprietary information is contained in this report.

TABLE 1

POSTACCIDENT MONITORING INSTRUMENTATION INSPECTED

CATEGORY 1 INSTRUMENTS

Neutron Flux
Reactor Coolant System Hotleg Water Temperature
Reactor Coolant System Coldleg Water Temperature
Reactor Vessel Level
Core Exit Temperature
Reactor Coolant System Pressure
Pressurizer Level
Steam Generator Level (Wide Range)
Containment Sump Water Level (Wide Range)
Containment Pressure
Containment Hydrogen Concentration

CATEGORY 2 INSTRUMENTS

Containment Sump Water Level (Narrow Range)
Status of Standby Power
Degrees of Subcooling
Accumulator Tank Level
Accumulator Tank Pressure
Refueling Water Storage Pond Level

TABLE 2

COMPARISON OF REQUIREMENTS

	<u>CATEGORY 1</u>	<u>CATEGORY 2</u>
Environmental Qualification	Yes	Yes
Seismic Qualification	Yes	As Appropriate
Single Failure	Yes	No
Power Supply	Emergency Standby	Reliable
Indication	Immediate	Demand
Recording	Yes	As Required
QA Requirements	10 CFR 50, Appendix B	As Appropriate
Testability	Yes	Yes

ATTACHMENT

LIST OF DRAWINGS REVIEWED

Drawing
LOU 1564
B-425

Revision

Subject

T112CA	1	RCS CL1A Temp. Ch. A
T112CA2	1	Saturation Margin Monitor Train A
T112CB	2	RCS CL1B Temp. Ch. B
T112CB2	2	Saturation Margin Monitor Train B
T112HA	1	RCS HL1 Temp. Ch. A
T112HA2	1	Saturation Margin Monitor Train A
T112HB	1	RCS HL1 Temp. Ch. B
T112HB2	1	Saturation Margin Monitor Train B
T122CA	1	RCS CL2A Temp. Ch. A
T122CA2	3	Saturation Margin Monitor Train A
T122CB	1	RCS CL2B Temp. Ch. B
T122CB2	1	Saturation Margin Monitor Train B
T122HA	1	RCS HL2 Temp. Ch. A
T122HA2	1	Saturation Margin Monitor Train A
T122HB	2	RCS HL2 Temp. Ch. B
T122HB2	1	Saturation Margin Monitor Train B
T2200A	3	Saturation Margin Monitor Train A
T2200B	3	Saturation Margin Monitor Train B
L311	1	SIT 1A LVL W/R
L321	1	SIT 1B LVL W/R
L331	1	SIT 2A LVL W/R
L341	1	SIT 2B LVL W/R
P311	1	SIT 1A Pressure
P321	1	SIT 1B Pressure
P331	1	SIT 2A Pressure
P341	1	SIT 2B Pressure
P9700	0	Instrument Air Dryer Outlet Air Pressure
P9800	0	Station Air Supply Pressure