

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Report No: 99901308/96-01

Organization: Ellis & Watts
Division of Dynamics Corporation of America

Contact: Craig Hunt, QA Manager
513/752-9000

Nuclear Industry Activity: Heating, ventilation, and air conditioning (HVAC)
systems and associated spare and replacement parts

Dates: December 2-6, 1996

Inspector: Anil S. Gautam, Senior Engineer

Approved by: Gregory C. Cwalina, Chief
Vendor Inspection Section
Special Inspection Branch
Division of Inspection and Support Programs

Enclosure 3

1 INSPECTION SUMMARY

During this inspection, the NRC inspector reviewed activities associated with implementation of selected portions of Ellis & Watts' (E&W's) quality assurance (QA) program and licensee monitoring of E&W's control of quality.

The inspection bases were as follows:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50).
- 10 CFR Part 21, "Reporting of Defects and Noncompliance."
- NRC Regulatory Guide 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants."
- E&W's Quality Assurance Manual QC-4000N, Revision 7, dated September 7, 1995, and associated implementing procedures.

During this inspection, a violation of NRC requirements was identified. The violation is discussed in Section 3.1 of this report. In addition, the inspector noted three instances in which E&W failed to conform to NRC requirements imposed upon it by NRC licensees. This nonconformance is discussed in Section 3.1 of this report.

2 STATUS OF PREVIOUS INSPECTION FINDINGS

This was the first NRC inspection of E&W.

3 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 Quality Assurance Program

a. Inspection Scope

The inspector examined E&W's QA program, policy, implementing procedures, conformance to procurement documents, corrective actions in response to licensee audit findings, commercial-grade item dedication, Part 21 evaluations, and monitoring of subvendors.

b. Observations and Findings

E&W's QA staff comprised the QA manager, two quality engineers, three QA shop inspectors, and six test technicians. The QA manager reported directly to the president of E&W.

The inspector observed that E&W's procedure QA-112, "Compliance to Regulation 10 CFR Part 21 Procedure," Revision 3, failed to address the identification or evaluation of "deviations" from procurement document requirements. As a result, personnel were not alerted to the need to identify deviations from safety-related purchase order requirements, and

to evaluate the deviations to determine if they could become defects. Part 21 requires adopting appropriate procedures to evaluate deviations to identify defects and failures to comply associated with substantial safety hazards. Failure to adopt appropriate procedures, as required by 10 CFR Part 21.21, constitutes Violation 99901308/96-01-01. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised procedure QA-112 to address evaluation of deviations and require pertinent training for appropriate employees. No further response is required.

The inspector observed that E&W's Nonconformance/Deviation Control Procedure Form QC-12, "Request for Material Disposition," for documenting "major nonconformances," did not address screening of issues for Part 21 applicability. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised Form QC-12 to address Part 21 applicability. No further response is required.

The inspector observed that QA-112, Revision 3, page 5, stated, in part, that Part 21 regulations were on file for employee "off-shift review in the QA department during work breaks, and after working hours." The inspector was concerned that the procedure would discourage or prevent employees from adequately reviewing or implementing Part 21. Based on E&W's December 30, 1996, letter to the NRC, the QA manager revised QA-112 to remove restrictive instructions so that employees would review Part 21 regulations and procedures during work hours. No further response is required.

E&W issued Part 21 report No. 101, dated August 20, 1994, to address deficiencies in the design pressure ratings of four air conditioner units (ACUs) supplied by E&W to the Tennessee Valley Authority (TVA) for the Browns Ferry Nuclear Plant. The shell side pressure rating of the installed ACU condensers was less than the minimum pressure necessary. The deficiencies resulted in coolant leaking from the ACU condensers. In February 1995, TVA audited E&W's QA program and identified deficiencies in the design and configuration control of the ACUs. On the basis of E&W's April 28, 1995, letter in response to TVA's findings, the inspector observed that E&W believed the defects in the ACUs to be a result of errors in TVA's design documents. QC-4000N, Section 3, "Design Control," Revision 7, paragraph 3.1.6, requires product design to be verified by E&W for adequacy of the design and the verification or checking process to be performed by individuals or groups other than those who performed the original design. E&W's failure to verify the adequacy of design, as required by Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, constitutes Nonconformance 99901308/96-01-02.

The inspector assessed E&W's design control and commercial-grade dedication activities by evaluating purchase orders (POs) from Texas Utilities Electric Company (TUEC), TVA, and Duquesne Light Company (DLC) to E&W for the following items:

<u>Item</u>	<u>Licensee</u>	<u>Licensee PO No.</u>	<u>P.O. Date</u>
Coil fan assembly	TUEC	S013040056D1	July 25, 1994
Oil pump	TVA	P-94N2S-105874-000	March 25, 1994
Thermal expansion valve	TVA	P-94N2S-115662-000	September 19, 1994
Gasket	TVA	P-94N2S-105639-000	March 18, 1994
Pressure switch	DLC	D134982	November 3, 1994

The inspector assessed E&W's commercial-grade dedication documents for the above items, including review and analysis of intended safety functions, identification and verification of critical characteristics (equipment performance features identified in licensee procurement specifications and E&W's dedication documents), tests conducted to verify characteristics, and any failures during testing. The inspector observed that dedication plans did not address verification of the following critical characteristics:

- that cooling coil fans would operate during tornado conditions at a reduced pressure of 11.7 psia at the Comanche Peak Steam Electric Station.
- that an oil pump would develop a minimum oil pressure of 11 psi at the Browns Ferry Nuclear Plant.
- that a thermostatic expansion valve would provide the required flow of liquid refrigerant to the evaporator coil at the specified accident temperature at the Browns Ferry Nuclear Plant.
- that a gasket for oil pump and bearing assembly would perform its safety function without degradation during the specified accident temperature at the Browns Ferry Nuclear Plant.

E&W stated that the items were qualified based on certificates of conformance (COCs) from subvendors but could not provide test documentation for the above characteristics. The inspector contacted TUEC and TVA to determine whether the above items were qualified to perform their intended safety functions. On the basis of a preliminary analysis, the licensees reported no operability concerns associated with the installed items. E&W's failure to implement measures to assure review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of systems and components, as required by Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, constitutes Nonconformance 99901308/96-01-03.

The inspector observed that there were continuing deficiencies in E&W's dedication program. The Nuclear Utilities Procurement Issues Committee (NUPIC) audited E&W in August 1995, to determine, in part, whether E&W had established and effectively implemented a QA program in compliance with 10 CFR 50 Appendix B. NUPIC identified deficiencies in the areas of design control, configuration control, and commercial-grade dedication. Deficiencies included E&W's failure to reference materials as a critical attribute during dedication, and to verify the validity of certified material test reports (CMTRs) and COCs supplied by E&W's commercial-grade

subvendors. In April 1996, NUPIC audited E&W's corrective actions and again identified deficiencies in E&W's dedication program, including E&W not identifying materials as a critical attribute and not verifying the validity of CMTRs. E&W failed to establish effective corrective action for deficiencies in its commercial-grade dedication activities that were identified by NUPIC. Similarly, documents reviewed by the inspector regarding E&W's dedication activities did not address verification of certain critical characteristics. The inspector concluded that E&W's continuing failure to assure that conditions adverse to quality are promptly corrected and that corrective actions are taken to preclude repetition, as required by Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50, constitutes Nonconformance 99901308/96-01-04.

E&W implemented measures to identify nonconforming items by applying appropriate tags. However, the inspector observed a lack of physical segregation between safety-related items and non-safety-related items in storage and staging areas. Criterion XV, "Nonconforming materials, parts or components," of Appendix B to 10 CFR Part 50, requires segregation of nonconforming materials, parts or components to prevent their inadvertent use or installation. QC-4000N, Section 15, "Nonconforming Materials, Parts or Components," Revision 7, paragraph 15.2.2, states, in part, that storage areas for nonconforming items shall be segregated. Based on E&W's December 30, 1996, letter to the NRC, E&W fabricated and installed a bonded locked cage to segregate nuclear non-conforming materials during "receiving inspection." E&W also reported that it was in the process of establishing a locked segregated and controlled area for storage of nuclear material. No further response is required.

The inspector observed that TUEC's PO S013040056D1 to E&W, dated July 7, 1994, included an agreement between E&W and TUEC to inform the licensee immediately of any allegations of discrimination (Section 211 of the Energy Reorganization Act of 1974) filed by an E&W employee or former employee with a Federal, State, or local administrative agency, in connection with E&W's activity related to the Comanche Peak Steam Electric Station. The inspector determined that TUEC included such agreements in its POs to increase TUEC's efforts in responding to allegations of discrimination filed by vendor employees. These efforts included monitoring the adequacy of the vendor's investigation and actions to achieve a remedy (as indicated by the Commission in its Statement of Policy [61 FR 24336], "Freedom of Employees in the Nuclear Industry to Raise Safety Concerns Without Fear of Retaliation," dated May 14, 1996). At the exit meeting, the inspector expressed concern that the agreement, as delineated in the PO, could inadvertently discourage an E&W employee from engaging in protected activity (as described in 10 CFR Part 50.7 (a)(1)(i)), for fear of retaliation from TUEC. However, after further review of the above policy statement, the NRC determined that the PO agreement was appropriate, and was consistent with the Commission Policy Statement referenced above. The inspector subsequently informed the vendor that the PO agreement was appropriate, and was not in violation of NRC requirements. E&W stated that it would take measures to inform employees that the PO agreement was meant to protect, rather than intimidate, employees who raised safety concerns. No further concerns were identified.

c. Conclusions

The QA manual and procedures were adequate, except for the violation and nonconformances described herein. Problems with dedication plans reviewed indicated a weakness in the areas of design control and commercial-grade dedication.

3.2 Review of Monitoring of E&W by Licensees

a. Inspection Scope

The inspector evaluated licensee monitoring of E&W's control of quality for safety-related items purchased by licensees, including audits and surveillances of E&W's commercial-grade dedication, Part 21 reports, and monitoring of subvendors.

b. Observations and Findings

The inspector contacted TVA, TUEC, DLC, and Carolina Power & Light (CP&L) to discuss the scope and findings of their audits and surveillance of E&W.

TVA audited E&W in February 1995, to evaluate, in part, the defects TVA identified in the ACUs supplied by E&W for the Browns Ferry Nuclear Station, Units 1 and 3. TVA determined that E&W had deficiencies in the areas of design control and configuration control. TVA made two findings: a lack of formalized design analysis review affecting equipment installed in Units 1 and 3, and inadequate control of changes to design documents. In February 1996, TVA accepted E&W's corrective actions but imposed procurement restrictions, one of which was that TVA review E&W's design for any new purchases.

NUPIC audited E&W in August 1995. The utilities represented on the NUPIC audit team included CP&L (team leader), TVA, and Niagara Mohawk Power Corporation. The scope of the audit, in part, was to verify whether E&W had established and effectively implemented a QA program in compliance with the requirements of 10 CFR Part 50 Appendix B and other industry standards. NUPIC concluded that E&W's QA program was "weak and partially ineffective" and made eight findings concerning E&W's QA program: (1) weak design control measures not assuring documented independent evaluations of materials and engineering changes, (2) computer software not controlled in accordance with E&W procedures, (3) various deficiencies in the monitoring of subvendors, (4) unqualified welder, (5) inadequate 1994 and 1995 internal audits and related corrective actions, (6) inadequate measures for traceability of weld filler material, (7) inadequate storage facilities for quality documents, and (8) lack of implementation of procurement requirements of one PO. NUPIC recommended that utilities explicitly communicate to E&W their expectations in the area of commercial-grade dedication through their purchase orders, and require E&W to provide objective evidence of dedication for review by the utility at receipt.

In March 1996, NUPIC (represented by CP&L) examined E&W's corrective actions in response to NUPIC's August 1995 findings. NUPIC found continuing deficiencies in E&W's dedication documents for commercial-

grade items. For example, certain dedication plans did not identify materials as critical attributes and did not verify the validity of the certified material test reports. NUPIC concluded that E&W had not developed a comprehensive program to control purchased material and equipment, and ensure that all critical attributes were adequately verified during commercial grade surveys. NUPIC recommended that licensees perform detailed verification of E&W's design reviews and surveillance before and during performance of work for future orders.

CP&L retained E&W on its list of approved suppliers with these procurement restrictions: that CP&L verify the design of any new purchases, that CP&L approve E&W's dedication plan for commercial-grade spare parts prior to E&W's performance of work, and that E&W verify the validity of COCs or CMTRs for material purchased through subvendors who did not have provisions for material verification.

TUEC and DLC's monitoring of E&W was based on the results of the NUPIC audits. DLC provided the inspector a copy of their evaluation of how NUPIC's audit applied to DLC's purchases. No concerns were identified.

c. Conclusions

In general, licensees effectively audited E&W in accordance with proper criteria, procedures, and checklists. Licensees continue to have concerns regarding E&W's design control and commercial-grade dedication activities despite E&W's corrective actions.

3.3 Entrance and Exit Meetings

In the entrance meeting on December 2, 1996, the NRC inspector discussed the scope of the inspection, outlined the areas to be inspected, and established interactions with E&W management. In the exit meeting on December 6, 1996, the inspector discussed his findings and observations.

4 PERSONNEL CONTACTED

E&W

Craig Hunt, QA Manager
Roger Schertler, QA Engineer
Jim York, Manager, Special Projects
Richard Porco, Manager, Engineering

Licensees (contacted by telephone)

Danny Leigh, Plant Overview Supervisor, TUEC
John Taylor, Procurement Engineer, TUEC
Hrach Minassian, Procurement Engineer, TUEC
William Sidberry, Senior Analyst, CP&L
R.G. Newsome, NUPIC Team Leader, CP&L
James Johns, Supervisor Quality Services, DLC
Larry Spiers, Procurement Engineer, TVA

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

99901308/96-01-01	NOV	inadequate Part 21 procedure
99901308/96-01-02	NON	inadequate design control
99901308/96-01-03	NON	inadequate design control
99901308/96-01-04	NON	inadequate corrective action

Closed

99901308/96-01-01	NOV	inadequate Part 21 procedure
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