

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
DIVISION OF REACTOR INSPECTION AND LICENSEE PERFORMANCE  
VENDOR INSPECTION BRANCH

ORGANIZATION: WESTRONICS  
KINGWOOD, TEXAS

DOCKET/REPORT NO.: 99901273/94-01

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NUCLEAR INDUSTRY ACTIVITY: Supplier of chart recorders and associated spare parts for safety-related applications in most commercial nuclear power plants

INSPECTION CONDUCTED: May 2-6, 1994

TEAM LEADER: *Ronald K. Frahm, Jr.* Date  
Ronald K. Frahm, Jr., Engineer  
Reactive Inspection Section 2 (RIS2)  
Vendor Inspection Branch (VIB)

OTHER INSPECTORS: Richard C. Wilson, RIS2, VIB

APPROVED: *Gregory C. Cwalina* Date  
Gregory C. Cwalina, Chief  
Reactive Inspection Section 2  
Vendor Inspection Branch

INSPECTION BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B

INSPECTION SCOPE: To review the implementation of selected portions of the 10 CFR 50 Appendix B quality assurance program, and the 10 CFR Part 21 notification program

PLANT SITE APPLICABILITY: Nine Mile Point 2, Maine Yankee, and numerous others

## 1 INSPECTION SUMMARY

### 1.1 Nonconformance 99901273/94-01-01

Contrary to Criterion XVIII of Appendix B to 10 CFR Part 50, Westronics had not established and maintained a systematic schedule of audits to verify compliance with its quality assurance program and to determine the effectiveness of the program (see Section 3.5 of this report).

### 1.2 Nonconformance 99901273/94-01-02

Contrary to Criterion XVI of Appendix B to 10 CFR Part 50, Westronics had identified several conditions adverse to quality during an internal audit in July 1993, but eight of these conditions remained unresolved at the time of this inspection which was over nine months later (see Section 3.5 of this report).

### 1.3 Nonconformance 99901273/94-01-03

Contrary to Criterion III of Appendix B to 10 CFR Part 50, Westronics did not invoke the requirements of Appendix B on seismic qualification testing performed by the Southwest Research Institute (see Section 3.8 of this report).

## 2 STATUS OF PREVIOUS INSPECTION FINDINGS

This was the first NRC inspection at Westronics.

## 3 INSPECTION FINDINGS AND OTHER COMMENTS

### 3.1 Entrance and Exit Meetings

In the entrance meeting on May 2, 1994, the NRC inspectors discussed the scope of the inspection, outlined the areas to be inspected, and established interfaces with Westronics management and staff. In the exit meeting on May 6, 1994, the inspectors discussed their findings and concerns with Westronics management and staff.

### 3.2 Background and Inspection Scope

Westronics and its predecessors have supplied safety-related chart recorders and associated spare parts to the nuclear industry for many years. Westronics recorders have been marketed in the past primarily under the name "Tracor Westronics." In late 1992, the Westronics product line was relocated to its present location in Kingwood, Texas, and merged with Houston Atlas and Baker CAC to form Envirotech Controls, Inc. In early 1994, Thermo Instrument Systems, a subsidiary of Thermo Electron, acquired the Westronics product line and plans to reorganize and incorporate Westronics as a separate company in the near future.

The NRC inspectors reviewed Westronics's 10 CFR Part 21 program and its implementation for three recent 10 CFR Part 21 notifications. The inspectors also reviewed selected areas of Westronics's quality assurance (QA) program and its implementation to assure compliance with Appendix B to 10 CFR Part 50. The areas reviewed included calibration, testing, design control, procurement, audits, corrective action, organization, and personnel qualifications. The inspectors reviewed QA program implementation primarily by inspecting files for approximately five recorder procurement packages and three spares orders.

### 3.3 10 CFR Part 21 Review

#### 3.3.1 Review of Procedures and Postings

The inspectors reviewed procedures QP 0701, "10CFR21 Responsibility Procedure," Revision 0, dated December 15, 1990, and QP 0702, "Defect Review and Reporting Procedure - 10CFR21," Revision 1, dated April 15, 1993, adopted by Westronics pursuant to 10 CFR 21.21. The inspectors also verified that Westronics had maintained the proper posting pursuant to 10 CFR 21.6. The inspectors expressed concern that the current procedures and posting may not be sufficient to ensure that employees would report deviations from technical procurement specifications to Westronics management. The procedures and posting, as written, required employees to report information which they believe may constitute a potential safety hazard, a determination employees may not be able to make. Therefore, employees should be encouraged to report any deviations from technical requirements to Westronics management.

Westronics acknowledged the inspectors' concerns, and agreed to update its procedure and posting with appropriate wording to encourage employees to report all deviations. The inspectors also gave Westronics a copy of the recent Administrative Letter AL 94-04, "Change of the NRC Operations Center Commercial Telephone and Facsimile Numbers," dated April 11, 1994, for Westronics to incorporate into its revised posting and procedures. The inspectors concluded that Westronics's procedures and posting, with the aforementioned clarifications, met the intent of the applicable sections of 10 CFR Part 21.

#### 3.3.2 Program Implementation

Westronics submitted a 10 CFR Part 21 notification in October 1993 reporting two anomalies noted during a seismic qualification test. It was observed that the recorders would occasionally reset during peak acceleration and the door was being forced open from its lower attachment point during the full safe shutdown earthquake (SSE) qualification test. These anomalies only occurred during the full SSE (10g) level testing and were not noted during any previous tests of this design. Westronics conservatively determined the scope of the problem to potentially include any model 2100C recorders manufactured prior to 1993. Westronics appropriately notified all affected customers and offered replacement kits, though no customers had responded to date. Westronics purged existing stock of potentially affected units and verified that there were no units currently in the manufacturing process. To prevent recurrence, Westronics redesigned the 2100C recorder to replace the existing connectors with higher tension connectors to alleviate the reset anomaly and added small

retaining clips to the door to correct the door problem. The redesigned recorder was subsequently retested and seismically qualified.

Westronics submitted a second 10 CFR Part 21 notification in November 1993 after an electromagnetic interference test indicated that the recorder was susceptible to interference caused by a radiated field strength of 10 V/m. During this inspection, the inspectors verified that Westronics had notified all affected customers, had redesigned the suspect printed circuit board assembly to improve the immunity to electromagnetic interference, and had retested the new design to verify conformance to the applicable standards.

Westronics submitted a third 10 CFR Part 21 notification in December 1993 after it was notified by Niagara Mohawk Power Corporation that a pen drive servo motor in a Westronics recorder failed in service due to damaged shunt leads. The failed motor was manufactured by Globe Motors and supplied to Westronics as a commercial grade item. An investigation determined that the probable cause of the damaged leads was an assembly problem which was traced to Globe's Mexico facility between September 1987 and May 1993. The inspectors verified that Westronics notified all affected customers and purged existing stock. The inspectors noted that Westronics had not performed an audit or commercial grade survey at Globe, relying instead on receipt inspection and testing for the dedication process. Westronics agreed that a survey at Globe would better assure the suitability of the motors to perform their safety-related function, and had tentatively planned an audit/survey in the near future. The inspectors expressed a concern regarding the lack of an audit plan and schedule for Globe and other suppliers as described in Section 3.5 of this report.

The inspectors noted that Westronics had not documented the above referenced evaluations on form QF0702 as prescribed by QP 0702, but Westronics was able to retrieve sufficient documentation to support the evaluations. The inspectors concluded that Westronics's implementation of 10 CFR Part 21 was effective and met the intent of the reporting and evaluation requirements of 10 CFR Part 21. The notifications to both the NRC and the affected customers were timely and Westronics's corrective actions were adequate to preclude repetition in each of the above referenced instances.

#### 3.4 Quality Assurance Program Review

Westronics's QA program which governed the supply of safety-related chart recorders was documented in the Controlled Quality Assurance Program Manual, Revision 5, dated September 1, 1993, with implementation guidelines detailed in the quality procedures (QP) manual. The Controlled QA program was structured to parallel Appendix B to 10 CFR Part 50 and appeared to adequately address the 18 quality criteria. The quality assurance function appeared to have sufficient authority and organizational freedom to identify and assess quality problems. The team noted that the QA personnel had substantial knowledge and expertise of the design, manufacturing, QA, and test programs.

The inspectors also reviewed the training and qualification process and procedures and their implementation. QP 2002, "Inspector Qualifications Procedure," Revision 2, dated April 7, 1994, delineated the requirements for

qualifying Westronics personnel who performed inspection and related activities. The inspectors noted that the QP followed the general criteria contained in ANSI/ASME Standard N45.2.6-1978, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants." The inspectors reviewed six qualification files and found the employees had the proper QA indoctrination, on-the-job training, education, and experience, and had been qualified to perform their functions in accordance with QP 2002. The inspectors did note, however, that these and other employees were due to be recertified as required by QP 2002. Westronics indicated that it plans to recertify all employees once the changes related to the recent acquisition and reorganization have settled. The inspectors commended Westronics on its indoctrination training which included a session on the reporting requirements of 10 CFR Part 21 and the quality requirements of 10 CFR Part 50 Appendix B.

The inspectors concluded that Westronics had a knowledgeable and qualified QA staff which had the proper authority and management support to effectively implement their Appendix B QA program.

### 3.5 Audit and Corrective Action Program

Westronics's procedure for the control and implementation of internal and external audits was described in QP No. 0801, "Audit Procedure," Revision 0, dated December 15, 1990. This procedure stated that a systematic schedule of audits, both internal and external will be established, and further stated that the audit schedule will be developed and retained by QA. The NRC inspectors requested a copy of the audit schedule to assess the effectiveness and implementation of Westronics's internal and external audit program. Westronics indicated that it did not publish or maintain a schedule of internal or external audits. The failure to establish and maintain a systematic schedule of audits to verify compliance with its quality assurance program and to determine the effectiveness of the program constitutes Nonconformance 99901273/94-01-01.

The team did note, however, that Westronics had performed an in-depth internal audit to assess the implementation of its Controlled QA Program in July of 1993. The audit team consisted of the lead auditor, from Yankee Atomic Electric, and two certified auditors from Westronics's staff. The audit identified 24 deficiencies, distributed across all areas of the controlled QA program, which led the auditors to conclude that a programmatic breakdown had occurred following the transfer of the Westronics product line to Kingwood in 1992. These deficiencies were properly documented on corrective action request (CAR) forms per QP No. 0802, "Corrective Action Request Procedure," Revision 0, dated December 15, 1990.

The NRC inspectors reviewed several of the CARs and determined that causes had been adequately determined, corrective actions were sufficient to preclude repetition, and the implementation of the proposed solutions had been verified. The inspectors noted, however, that although each of the 24 CARs had been addressed, 8 still remained unresolved at the time of the inspection which was over nine months later. Section 16.0, "Corrective Action," of Westronics's Controlled Quality Assurance Program Manual, Revision 5, dated September 1, 1993, requires that measures be established to assure the

adequacy and effectiveness of corrective action and that serious or repetitive conditions adverse to quality be corrected promptly, including steps to preclude repetition. The inspectors viewed these uncorrected CARs as potentially significant conditions adverse to quality; examples being the uncontrolled use of redlined drawings for final testing activities and the lack of a software verification and validation program. This discrepancy constitutes Nonconformance 99901273/94-01-02.

### 3.6 Procurement Package Review

The NRC inspectors reviewed Purchase Order (PO) files for several recorders that had been supplied as nuclear safety-grade. No complete recorders had been shipped since relocation to Kingwood, so the NRC inspectors selected POs for review with 1992-93 shipment dates. Documentation for the two recorders discussed in Section 3.7 of this inspection report was reviewed in detail. The inspectors also reviewed a PO file covering repair of a damaged recorder.

The recorder files reviewed implemented production and acceptance test procedures no longer in effect. Although no safety-grade recorders were being manufactured during the inspection, the inspectors observed the implementation of current procedures in the production and testing of commercial recorders.

The NRC inspectors also reviewed files for all three shipped replacement parts listed on the controlled spare parts log sheet, covering two chart drive motors and one alarm contact module. These parts were dedicated at Kingwood and shipped as safety-grade parts.

With the exception of the seismic qualification nonconformance identified in Section 3.8 of this inspection report, the inspectors found no concerns in these reviews.

### 3.7 Recorder Calibration and Final Acceptance Testing

The NRC inspectors reviewed the calibration records for two recorders that were shipped from the Fort Worth, Texas, location. Type T4N analog recorder serial number 1117 was shipped on April 29, 1993, to the Millstone Station under Northeast Nuclear Energy Company PO No. 938255 dated February 21, 1992. The PO was issued to an Westronics sales representative in Nashua, New Hampshire; it stated that the procurement was nuclear safety-related, and invoked 10 CFR Part 21 and Appendix B to 10 CFR Part 50.

Type 2100C digital recorder serial number 1682 was shipped on June 26, 1992, to the Nine Mile Point Unit 2 plant on June 26, 1992, under Niagara Mohawk Power Corporation PO No. 96433 dated April 7, 1992. The PO was issued directly to Westronics. The PO specified model 2100C-111-100-001-111-0B0 [where the B designates Appendix B to 10 CFR Part 50 and 10 CFR Part 21]. The PO invoked 10 CFR Part 21, but did not specifically name Appendix B to 10 CFR Part 50; instead, it stated that the vendor should implement a QA program meeting NQA-1-1983 and specified supplements, that the supplier should implement the QA program found acceptable by Niagara Mohawk as the basis for placement on its qualified contractors list, and that changes to this program should be submitted to Niagara Mohawk. Westronics did not have a record of an

audit by Niagara Mohawk, but Niagara Mohawk is on the distribution list for a controlled copy of the Westronics controlled QA program manual.

Westronics performs extensive production testing on recorders, including calibrations before and after a minimum 12-hour exposure in a 45°C hot room. Final acceptance testing is subsequently performed by QA using different test equipment. A data package is assembled containing production and acceptance test data and a certificate of compliance with PO requirements. The data sheets identify test equipment by manufacturer, model number, serial number, and calibration due date.

The NRC inspectors reviewed the calibration records for the four standard instruments used to calibrate the two recorders. In three of the four cases, the Westronics standard was calibrated by Tektronix, Inc. of Irving, Texas. In each case the Tektronix Certificate of Traceable Calibration identified the specific Tektronix standards used. Westronics Vendor Audit Report No. V92287001 covered an audit of Tektronix on October 13, 1992. It contained the necessary elements of a dedication survey of a commercial grade supplier of calibration services.

The fourth Westronics standard instrument reviewed by the NRC inspectors had been returned to the manufacturer, Ectron Corporation, for repair and calibration to factory specifications. Ectron provided an appropriate certification with test data sheets. Since this instrument would normally be calibrated by Tektronix, and in fact has since been calibrated by them, the inspectors did not pursue the matter further.

Based on this review, the NRC inspectors had no concerns regarding the calibration and final acceptance testing of the recorders.

### 3.8 Seismic Qualification

The NRC inspectors reviewed the seismic qualification basis for type 2100C digital recorder serial number 1682, which was shipped to the Nine Mile Point Unit 2 plant on June 26, 1992. This procurement was governed by Niagara Mohawk Power Corporation PO No. 96433 dated April 7, 1992 (this is one of the recorders whose calibration was reviewed). The PO specified that seismic qualification report SwRI 04-3789-116-RPT1 should be provided for engineering review, along with the seismic response curves "for information purposes ... to be used as a reference to your qualification reports."

Southwest Research Institute (SwRI) Document No. 04-3789-116-RPT1, "Seismic Qualification Test Report for the Generic Qualification of Westronics Series 2000 and 2100 Recorders," dated July 23, 1991, covered testing of a Series 2100 recorder, serial number 1996, with signal conditioner module option KT100167. When asked to show similarity between the delivered and tested recorders, Westronics personnel began with the "2100C Unit Trace Form" and "2100 Data Sheet" (as-built parts lists) included in the data package for the delivered recorder. These sheets showed that the part numbers for only two circuit boards and the case had changed from the numbers applicable to the seismic test specimen. The inspector reviewed five engineering change orders (two for each board) and accompanying engineering change order evaluation

reports covering changes to these parts. Although the evaluations were brief, the changes were minor with respect to seismic performance and the inspectors concluded that design similarity was adequately documented.

Page ii of the SwRI "Nuclear Quality Assurance Manual" states that the manual will be used when the requirements of Appendix B to 10 CFR Part 50 "have been imposed contractually by the Client." When questioned about the purchase order covering the SwRI testing, Westronics personnel provided the inspectors a copy of the "Proposal and Fixed-Price Contract for Services" for SwRI Proposal 04-4518-(08) dated January 15, 1992, and stated that this document was a typical contract document with SwRI. This document did not impose Appendix B to 10 CFR Part 50 on the testing. Westronics personnel stated that seismic testing of several recorder types had been performed for commercial applications, and was not initially intended to support the POs from licensees for nuclear safety-grade recorders that followed later.

The NRC inspectors noted that an industry group audit performed in October 1993 identified a finding that the contract for another seismic test performed for Westronics by SwRI did not impose adequate quality requirements. In the course of resolving that finding, Westronics placed a PO with SwRI dated April 18, 1994, covering QA review of previously performed projects.

The NRC inspectors also reviewed Westronics Vendor Audit Report V92026001 dated February 14, 1992, which covered the latest survey of SwRI in January 1992. This commercial grade survey covered testing, personnel training and qualifications, calibration control, document control and storage, and QA independence. The report noted that "Specific QA interaction in a test only occurs if the customer directs that the work occur under 10CFR50 Appendix B." Earlier audits of SwRI were not reviewed. The NRC inspector further noted that the test plan included in the test report referenced SwRI procedures for testing, personnel, and calibration, but did not reference either Appendix B or the SwRI QA manual.

Criterion III of Appendix B to 10 CFR Part 50, "Design Control," requires that test programs performed to verify design adequacy shall include provisions to assure that appropriate quality standards are specified. Westronics has not established that the seismic qualification testing of recorders by SwRI was performed in accordance with Appendix B to 10 CFR Part 50. This discrepancy constitutes Nonconformance 99901273/94-01-03.

#### 4 PERSONS CONTACTED

- + \* S.A. McNelis, General Manager
- + \* H. Hadi, Manager, Quality Assurance
- + \* T.R. Poli, Director, Sales and Marketing
- + \* R.E. Driscoll, Jr., QA Engineer
- + \* J. Bittikoffer, Manager, Research and Design
- + \* W. Howes, Vice President, Operations
- + \* C. Kelly, Senior Test Engineer

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+ Attended the entrance meeting on May 2, 1994

\* Attended the exit meeting on May 6, 1994