

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF INSPECTION AND SUPPORT PROGRAMS

REPORT NO.: 99901295/96-01

ORGANIZATION: AMP Products, Inc.
250 Main Street
Jacobus, PA 17407-4560

ORGANIZATIONAL CONTACT: Mr. William Zelner, Manager
Quality Assurance

INSPECTION DATES: April 29 through May 2, 1996

INSPECTOR: Anil S. Gautam

APPROVED BY: Robert M. Gallo, Chief
Special Inspection Branch
Division of Inspection and Support Programs

Enclosure

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1 SUMMARY OF INSPECTION FINDINGS

NRC conducted a special inspection to assess whether licensees effectively monitored how well AMP Products, Inc. (AMP) controlled the quality of safety-related electrical terminals and splices purchased by licensees for use in nuclear power plants. The inspection was conducted by an NRC inspector from the Special Inspection Branch of the Office of Nuclear Reactor Regulation at the AMP General Products Business Unit, Jacobus, Pennsylvania. The inspector assessed attributes of AMP's quality control program and its monitoring by licensees for the period of January 1994 through April 1996.

In general, the AMP quality control program and its implementation were in compliance with the requirements of Appendix B to 10 CFR Part 50. Licensees effectively monitored AMP's quality control program through Nuclear Procurement Issues Committee (NUPIC) audit teams, questionnaires, and telephone surveys for safety-related electrical terminals and splices. The inspector had no concerns about AMP's control of quality and licensees' monitoring of AMP.

Status of previous inspection findings are in Section 2. Findings and other comments are in Section 3. The AMP personnel contacted, including those attending the entrance and exit meetings are listed in Section 4.

2 STATUS OF PREVIOUS INSPECTION FINDINGS

This was the first NRC inspection of AMP Products, Inc.

3 FINDINGS AND OTHER COMMENTS

Licensees are required to monitor how well vendors control quality consistent with the importance, complexity, and quantity of products or services purchased from the vendors. NRC's evaluation of the licensee monitoring process falls, in part, under 10 CFR Part 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," which requires licensees to establish specific measures to ensure that purchased material, equipment and services conform to the procurement documents, and comply with NRC guidance in Regulatory Guide 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants," for auditing quality assurance programs.

The inspection was performed to ascertain whether licensees effectively monitored AMP's control of quality for the manufacture of safety-related pre-insulated electrical terminals and splices purchased by licensees for use in Class 1E applications inside containments of nuclear power plants. The inspector assessed specific attributes of AMP's quality control program and the scope and the licensees' monitoring of these areas.

The inspector examined AMP's quality program, including AMP's quality control organization, conformance to procurement documents, evaluation and corrective actions in response to audit findings, validation of testing and certificates of conformance, commercial-grade item dedication, Part 21, "Reporting Defects and Noncompliances," of Title 10 of the Code of Federal Regulations (10 CFR Part 21) evaluations, monitoring of sub-vendors, and self-assessment of performance.

Licensees monitored AMP through audits conducted by NUPIC audit teams comprised of licensee staff. For example, AMP was monitored by Rochester Gas & Electric based on audits performed by NUPIC on July 24, 1995 (AMP supplied electrical terminals and splices for safety-related applications at the Ginna station). Licensee monitoring was also accomplished through licensee questionnaires and telephone surveys, and through audits conducted by other nuclear organizations.

The inspector evaluated NUPIC audit reports, licensee questionnaires and telephone surveys, audits conducted by Nuclear Logistics, Inc. and ABB Power T&D Company (vendors for nuclear power plants), nonconformance reports for safety-related terminals and splices, licensee purchase orders, AMP purchase orders for sub-vendor, certification of conformance, commercial-grade process, responses to licensees' audits, AMP internal audit report, and AMP followup of NRC information notices.

3.1 AMP's Quality Control Program

In general, the AMP quality control program and its implementation were in compliance with the requirements of Appendix B to 10 CFR Part 50.

The inspector assessed AMP's quality policy, program, and standards described in AMP's corporate quality specification 102-1 Revision K, "AMP Total Quality Management Process," and supplemental specification GPBU 1-1002 Revision B, "Addendum-Total Quality Management Process." Both documents described attributes of AMP's quality program and how it conformed to 10 CFR Part 50 Appendix B and NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities." In catalog No. 82038, AMP described the safety-related preinsulated terminal and splices. (Note: As of April 1, 1996, AMP no longer accepts purchase orders imposing 10 CFR Part 50 Appendix B responsibilities but plans to maintain the existing quality program).

AMP's senior management supported its quality program, assigned responsibilities, and remained involved in the implementation of the process. The program was run by the quality manager and 6 quality auditors. The quality manager reported to the business unit director, who reported to the vice president and general manager of the Automotive/Consumer Business Group, who reported to the president/chief executive officer. The quality manager and auditors had the authority to stop production until nonconforming conditions were corrected.

The inspector asked AMP for documents addressing any design errors and failures during manufacture requiring issuance of 10 CFR Part 21 reports during the past 3 years. AMP stated that it had found no design errors or deviations that required issuing a report in accordance with 10 CFR Part 21.

The inspector requested information on any restrictions imposed by licensees on AMP for the manufacture of electrical splices purchased by licensees during the past 3 years. AMP stated that no restrictions had been imposed on it and no stop-work orders had been issued by licensees.

The inspector assessed AMP's commercial-grade dedication process. AMP purchased commercial-grade items from sub-vendors and qualified them to Appendix B requirements. The commercial-grade process comprised appropriate dedication activities, such as inspections, examinations, and witnessing of tests. Inspection findings were documented on data sheets and kept on file. Testing activities were identified in control plans and performed to test procedures. AMP evaluated test results for compliance to test requirements.

The inspector examined AMP's certificate of conformance for items purchased under licensee Purchase Order (PO) 6J515004. The certificate attested that Kynar insulated ring tongue terminals and environmentally sealed splices were qualified for use in nuclear power plants. The basis of the certificate was AMP Test Report 110-11004, Revision A; and Institute of Electrical and Electronic Engineers standards 323-1974, 344-1975, 383-1974, and Quality Specification 102-1. The inspector determined that Test Report 110-11004 qualified the test specimens mounted on terminal barrier blocks in specific configurations and for specific environmental conditions inside the containment.

The AMP quality program procedures required evaluation of sub-vendors. AMP PO 31606201 for Kynar Grade 460 identified "Ausimont USA" as an AMP sub-vendor. The inspector questioned why AMP had not monitored Ausimont. The inspector also questioned why AMP had not monitored Grant Manufacturing, a sub-vendor for tin and lead anodes, and Hewlett Packard and Quality Technical Laboratories, sub-vendors for calibration services. The 1995 NUPIC audit team also noted that AMP had not audited these sub-vendors and issued audit finding SA-95-029-03 which identified, "Lack of audits/surveys for several sub-tier suppliers, and several performed surveys lacked objective evidence." The AMP quality manager stated that AMP planned to correct the situation by auditing Ausimont, Grant Manufacturing, and the providers of the necessary calibration services in late 1996 (eventhough AMP no longer accepts purchase orders imposing 10 CFR Part 50 Appendix B responsibilities). Since this finding was identified by NUPIC, AMP corrective action is in process, it was not a willful nonconformance, and it was not a repetitive problem, this nonconformance is being treated as a non-cited nonconformance, consistent with Section VII.B.1 of the NRC Enforcement Policy.

The inspector reviewed licensee PO 31606201 for AMP preinsulated splice part No. 53550-1. The PO required AMP to identify and correct/resolve nonconforming conditions in accordance with the vendor's quality requirements and to submit any changes to the licensee for approval. The inspector verified that the safety-related terminals and splices conformed to procurement requirements. Original PO requirements were maintained to prevent inadvertent removal of requirements it was committed to meet. Certifications compared appropriately against the technical and quality requirements contained in the licensees' POs.

AMP stated that it incorporated information on pertinent programmatic and hardware changes into service letters for distribution to appropriate customers. NRC Information Notice 88-81, "Failure of AMP Window Indent Kynar Splices and Thomas and Betts Nylon Wire Caps During Environmental Qualification Testing," alerted licensees to the failure of AMP splices during licensee tests in which the splices touched each other or had a ground path. (Note: Test Report 110-11004 did not test the terminals and splices for

configurations where they touched each other or had a ground path.) The inspector questioned if AMP issued any guidance to its customers addressing the failures noted in NRC Information Notice 88-81. The AMP quality manager could not identify any guidance issued to AMP's customers to address these failures.

The inspector reviewed selected AMP nonconformance reports to determine if adequate actions were taken to correct defects or weaknesses identified by AMP quality inspections or NUPIC audits. The inspector reviewed nonconformance reports for AMP terminals and splices (part Nos. 53956-1, 53409-1, and 53550-1) and determined that AMP tracked, handled, and took corrective action in response to the nonconformance reports.

The inspector assessed AMP's internal audit Report No. 032096, dated March 20, 1996. The audit identified 10 nonconformances, involving documentation deficiencies for design reviews, corrective actions, and maintenance procedures. Three corrective actions pertinent to the findings remain to be completed. Eight observations were forwarded to management, among them an observation on effectiveness of corrective actions.

3.2 Licensee Monitoring of AMP

In general, licensees effectively monitored AMP's quality control program for safety-related electrical terminals and splices.

AMP identified two NUPIC audits conducted in October 1993 and July 1995 on licensee monitoring of how well AMP controlled the quality of safety-related electrical terminals and splices purchased by licensees for use in nuclear power plants, and a 1994 NUPIC survey of AMP's process for manufacture of commercial-grade non-nuclear items. AMP also identified licensee questionnaires and telephone surveys conducted to monitor AMP.

AMP identified the following licensees to have purchased nuclear grade AMP terminals and splices qualified to 10 CFR Part 50 Appendix B during 1993 - 1996:

<u>Licensee</u>	<u>Remarks</u>
Arizona Public Service	Participated in 1993 NUPIC audit; conducted 1993 annual questionnaire.
Boston Edison	Participated in 1993 NUPIC audit.
Carolina Power & Light	-
Duquesne Light	-
Houston Lighting & Power	Conducted 1995 telephone survey.
Illinois Power	-

IES Utilities	Conducted 1993, 1994, & 1995 annual questionnaire; conducted 1996 telephone survey.
Northeast Utilities	-
Philadelphia Electric	Participated in 1993 & 1995 NUPIC audits; conducted 1996 telephone survey.
Rochester Gas & Electric	Conducted 1993, 1994, & 1995 telephone survey.
Southern Nuclear Operating	Conducted 1995 telephone survey.
Tennessee Valley Authority	Participated in 1993 NUPIC audit; conducted 1993, 1994 & 1995 annual questionnaire; conducted 1993 telephone survey.
Texas Utilities Electric	-
Washington Public Power Supply	Conducted 1993, 1994, & 1995 annual questionnaire.

(Note: NUPIC sends questionnaires to licensees to plan areas for inspection of the vendor, and makes audit results available to all licensees. Licensee use of NUPIC for auditing vendors is based on 10 CFR Part 50, Appendix B, and Regulatory Guide 1.144, which allow use of outside organizations to reduce the number of external audits as an alternative method for qualifying and monitoring vendors as long as all pertinent information is adequately evaluated.)

The inspector determined that the NUPIC audit reports were, in general, performed in accordance with written procedures and checklists. Audits comprised monitoring, witnessing, and observing activities, such as inspections, examinations, and performance tests.

Arizona Public Service led the 1993 NUPIC audit regarding the control of quality by AMP at its facility in Mechanicsburg, Pennsylvania. The audit was conducted according to the standards of ANSI N45.2-1977, "Quality Assurance Program Requirements for Nuclear Facilities." The audit team uncovered no deficiencies or weaknesses, and the quality assurance program was found to be effectively implemented. However, the audit report gave insufficient detail of activities conducted by the audit team.

IES Utilities led the 1995 NUPIC audit that was performed at five AMP facilities to review the AMP's QA program "from a performance-based aspect." The team identified 12 deficiencies and made three observations. AMP responded to the findings and the licensee accepted AMP's responses. The report contained sufficient details of the review but did not state whether the audit criteria included verifying that AMP quality activities were in conformance with 10 CFR Part 50 Appendix B.

ABB Power T&D Company Inc. (ABB Power) audited its sub-vendor AMP in November 1994 to assure that AMP's quality program complied with their quality

assurance programs. The audit focused on commercial-grade (non-nuclear grade) AMP products. The report gave sufficient detail of activities conducted by the audit team. No audit findings were identified.

Nuclear Logistics Inc. (NLI) audited five facilities of its sub-vendor AMP in December 1995. The audit plan addressed 10 CFR Part 50 Appendix B criteria and critical characteristics. NLI monitored compliance to 10 CFR 50 Appendix B activities. The report did not state whether AMP was in compliance with 10 CFR 50 Appendix B; however, when the inspector contacted the NLI lead auditor by phone the auditor verified that AMP was in compliance with Appendix B. No audit findings were identified.

The inspector assessed the questionnaires and telephone surveys conducted by licensees during the period assessed. In general, licensee evaluations were appropriate. Areas evaluated by licensees included potential problems or changes to AMP's product line, quality program, or procedures; purchase orders or procurement specifications; and sub-vendors, facilities, personnel, or quality involvement which could have an effect on product qualifications.

To assess the staff's conclusions on the adequacy of licensees' monitoring AMP's control of quality over the past 3 years, the inspector interviewed the following AMP staff: the quality manager, two quality control auditors, and the manufacturing team leader. In general, the AMP staff considered NUPIC audits a "plus." The quality manager stated that the 1995 NUPIC team was very detailed and did not take credit for areas reviewed during previous NUPIC audits.

4 PERSONS CONTACTED

The NRC inspector and AMP staff contacted during the inspection are listed below.

AMP Products, Inc.

* William Zelner	Quality Manager
Ruth Hershey	Quality Auditor, Team Leader
Carol Presnell	Auditor
Bill Marshall	Manufacturing Team Leader

Nuclear Regulatory Commission

* Anil S. Gautam	Team Leader, NRR
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* Attended the entrance and exit meeting