U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
REGION IV

Report No. 99900278/79-01

Company: Automation Industries Inc.
Vitro Division
1400 Georgia Avenue
Silver Spring, Maryland 20910

Inspection Conducted: April 9-12, 1979

Inspector: J. R. Agee 4/30/79
J. R. Agee, Contractor Inspector, Vendor Inspection Branch — Date

Approved by: D M Hunnicutt 4/30/79
D. M. Hunnicutt, Chief, Components Section II, Vendor Inspection Branch — Date

Summary

Inspection on April 9-12, 1979 (99900278/79-01)

Areas Inspected: Implementation of 10 CFR 50, Appendix B, including Quality Assurance Manual/Program concerning auditing, training, receiving, inspection and nonconformances; manufacturing inspection and test control; design control and tests; measurements and calibration. The inspection involved twenty-six (26) inspector-hours on site.

Results: In the four (4) areas inspected, no deviations or unresolved items were identified.

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Details Section

A. Persons Contacted

*W. C. Chambers, Quality Control Supervisor
*J. C. Doughterty, Quality Assurance Manager
*W. L. Frienmuth, Vice President, Engineering Services Branch
*E. C. Ingles, Quality Assurance Officer
J. C. Schuesseler, Project Manager

*Attended the exit interview.

B. Quality Assurance Manual/Program

1. Objectives

The objectives of this area of the inspection were to verify that the:

a. QA Manual had been maintained current as committed.

b. QA Program had been implemented in the areas of auditing, training, receiving inspection, manufacturing inspection, test control, nonconformances and measurements, and calibration.

c. Organizational structure and facility capabilities are sufficient to design and manufacture Class 1E products and systems.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of the QA Manual, HDM-A, and related quality manuals, including Design Control Manual, HDM-C; Quality Control Standards Manual, HDM-G; and Manufacturing Control Standards Manual, HDM-E; Determined that each had been maintained current according to the QA Manual, Section A1, Vitro Laboratories Division (Vitro), Product Quality Policy, and Section A2 Policy.

b. Discussions with QA and QC management personnel concerning the Engineering Services Branch (ESB) QA Program practices.

c. Review of the general procedures, HDM-A 4 and HDM-G 15.4, relating to audits, and determined that for the ESB eight (8) separate functional areas had been identified for annual internal audits, including:

Planning and Document Control
Manufacturing Control (Assembly Shop)
Design and Test Control
Control of Test and Measuring Equipment
Procurement Control
Packaging and Shipping Control
Non-Conforming Material Control
QA Management and Records

An inspection of the audit files revealed that audits to the applicable 1979, projected audit schedule had been completed, with no significant outstanding findings. A subsequent review of the 1978 and 1977 audit files revealed audits had been conducted during those years to established audit schedules. Audit findings generally concerned administrative procedures which required updating to comply with customer and regulatory change requirements.

d. Review of the HDM-A, Procedure A 2.5, Indoctrination and Proficiency Training and determined that manufacturing and assembly personnel receive on the job training for their specific tasks plus training for specific jobs and special processes required by contract and/or as defined in the specific Job Quality Assurance Plan. Subsequent inspection of manufacturing personnel practices revealed that each operator possessed personal training identification (I.D.) cards. A random selection of three (3) operators were requested to show their training identification cards for the specific assembly activities they were pursuing. Each operator displayed an appropriate I.D. card. The individual cards indicated that the operators were qualified for the tasks they were performing.

e. Review of receiving inspection practices and the procedure HDM-G 17, Receiving Inspection. As part of this review, several randomly selected purchase orders (PO) were compared with incoming material invoices for printed circuit boards, sensors, relays, terminal blocks, IC (integrated circuit) units, and power supplies. None of these components are normal stock items by ESB for use in Class 1E products, since all such components are ordered for a specific customer contract.

Incoming items are compared with an approved product list and an approved supplier's list and are inspected to required AQLs (acceptance quality levels). Electronic components are functionally tested, appropriately tagged, and moved to the Material Control Center for recall when the contract production or fabrication schedule requires it. Rejected or nonconforming materials or components are tagged and stored in the Rejected Material Storage Area for evaluation and classification as "Use As Is," "Rework," "Repair," or "Scrap" by the Material Review Board.

3. Finding

Within this area of the inspection, no deviations or unresolved items were identified.

C. Manufacturing Inspection and Test Control

1. Objectives

The objectives of this area were to verify that:

a. Manufacturing activities are inspected and controlled for each progressive stage of production.

b. Manufacturing activities are conducted in compliance with approved and established procedures.

c. Manufacturing inspection is conducted by quality control inspectors.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Discussions with QC management and manufacturing personnel and inspection of manufacturing and assembly practices.

b. Review of procedure, HDM-G 18, Manufacturing Inspection, dated May 2, 1977.

c. Verifying that materials requiring tests and/or test reports are not released from receiving inspection until the reports have been received or Material Review Board (MRB) approval for release has been obtained.

d. Verifying that in-process (assembly) inspection is performed according to the Process Sheet and Requisition instructions, and supplemented Inspection Instructions. In-process materials can not progress to succeeding assembly stations without inspection approval and appropriate tagging.

e. Verifying that upon final inspection, an Item Identification Record card is completed and stamped with the Final Acceptance stamp.

f. Reviewing the final documentation (QA data package) for a specific project in which all inspection activities and data sheets had been stamped and signed off by the cognizant QA inspector (examples: QA data for Engineering Safety Features Actuation System for Sensor Channel tag number 2C43, Vitro part numbers 2717-1048-5/6/7/8 and Actuation Channel tag number 2C44, Vitro part numbers 2717-1049-3/4). Documentation for this data package included:

(1) Engineering and Quality Verification Documents.

(2) Supplier Deviation Disposition Requests.

(3) Certificate of Conformance.

(4) Data Sheets for drawing 0423-271.

(5) Cleaning and Coating Procedures.

(6) Defects and Characteristics to be inspected (for all parts listed).

Note: The above documentation was supplied at the request of the customer. Vitro typically provides the following type documentation as part of its QA data package. Those typical QA documents including: Test Procedures, In-Process Inspection/Test Instructions, In-Process Inspection/Test Data, Acceptance Test Data, Packaging/Shipping Instructions, and Certificate of Conformance.

3. Findings

Within this area of the inspection, no deviations or unresolved items were identified.

D. Design Control and Tests

1. Objectives

The objectives of this area of the inspection were to verify that:

a. Criteria from customer specifications had been adequately addressed including quality assurance requirements and applicable electrical codes and standards.

b. Design concepts had been adequately reviewed and approved in compliance with approved and established procedures.

c. Components, modules, subsystems and systems designed for Class 1E applications had been adequately functionally tested and qualification tested to meet customer specifications and referenced codes and standards.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of contract documentation for selected projects including the following:

(1) Customer Purchase Order SN-10214-SR for Job No. 02544. This PO was effective August 27, 1976, and was accepted by Vitro on August 5, 1976. This PO is for the ESF Loading Sequence Control Panel (ESFLS) which is a solid state digital system that provides the logic to load nuclear safety related buses in a prescheduled time sequence in the event of certain specific emergency conditions. Additional documentation reviewed pertinent to this PO included the following:

'a) Specification for ESF Loading Sequence Control Panels, SP-569-044461-000. Safety Related Quality Program required January 14, 1976. This specification requires that this system and its equipment be designed, fabricated, assembled, tested, shipped in accordance with QA requirements in the Specification SP-701-4461-00 and to the following applicable codes and standards:

-ANSI N45.2.2-1972
Y14.15-1966
-IEEE 324-1974
338-1971
334-1975
352-1975
384-1974
420-1973
-ASTM D 635-1974
-NEMA CS-1970
-NRC Regulatory Guides
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(b) Reliability/Availability Analysis for ESFLS, Revision A, June 1977.

(c) Qualification Report ESFLS, August 10, 1977. This report was approved by a customer letter, dated August 3, 1977.

(d) ESFLS Seismic Qualification Test Plan No. 2544 (8173), February 4, 1977.

(e) Seismic Similation Test Program on a Two Bay AM Co. Cabinet containing a Sequence Pacer System.

(f) Seismic Simulation Test Report No. 43497-1.

(g) Instrument Measurements for ESFLS Control Panel, June 1977.

(h) Job Quality Assurance Plan, Job 02544, approved November 4, 1976.

(2) Job Quality Assurance Plan, Job No. 02717.

(3) Job Quality Assurance Plan, Job No. 02242. This document which is typical for items a.(1)h and a.(2) above, identifies the design data, documents, codes and standards, and additional engineering documentation pertinent to the respective projects.

(4) ESFAS Qualification Procedure, No. 2717, Revision A. This document is typical for qualification procedures provided for all Class 1E systems for commerical nuclear applications by Vitro.

(5) PO No. 7220-J-207-AC, May 25, 1977, which contains the same type documentation, codes and standards requirements as identified in items a.(1) thru a.(4) above.

b. Review of the Design Control Manual, HDM-C, Sections C.3.3, Job Quality Assurance; C.3.4, Engineering Design Assurance; and C.3.6.7, Test Procedures and Test Rate Forms.

c. Discussions with the design project manager concerning Class 1E projects that have been designed, manufactured, tested and shipped and projects that are currently in various stages of design and/or qualification testing. These discussions revealed that Vitro does not have a standard product line for the Class 1E systems it has provided for commercial nuclear applications. There have been no duplicate project (system) requirements. Therefore, each system has been a separately designed system, designed to each customer's specific criteria and design requirements. Each System has been functionally qualified to plant normal operating conditions and qualified life is based on real time testing. Therefore, the qualified age of the System will normally not be more than a few years greater than the operating age of the equipment installed in the plant. For the equipment installed in plants, ". . . a continuing commitment by Vitro, the plant Engineer, and the utility will be required to maintain system qualification throughout the life of the plant."

In respect to systems under contract, certification can not currently be provided for forty (40) year plant life. However, the systems are being developed under an alternate qualification program plan in which electrical type tests will be conducted in accordance with current procedures. Seismic tests will be conducted to demonstrate forty (40) year qualification. Wiring qualified to IEEE-383 will be used. Components and subassemblies critical to safety functions will be identified, based on results of System Reliability Analysis programs. Critical components will be selected from types that have been operated at nominal electrical levels and elevated temperatures equated to forty (40) year life. Some systems will not require qualification under Design Bases Accident (DBA) conditions, since their functions must be completed prior to DBA effects reaching the equipment; however, the equipment will be qualified for a given age.

If certain components or subassemblies fail the forty (40) year qualification requirements, selected parts of the tests will be repeated and the qualified life will be reduced according to engineering judgement.

d. Review of printed circuit boards (modules) and subassemblies that have been designed and fabricated for qualification testing for use in current contract projects. Products inspected during functional operational testing included the following:

(1) bistable assembly part No. 2242-1059

(2) trip module part No. 2242-1055

(3) protection module part No. 2242-1054

(4) FOGG module assembly part No. 2242-1058

(5) receiver transmitter assembly part No. 2242-1057

Other tests to be conducted will include the following type components:

(1) digital isolators

(2) solid state relays

(3) isolation amplifiers

(4) power supplies

(5) fiber optics

3. Findings

a. Within this area of the inspection, no deviations or unresolved items were identified.

b. Comments

Certain components and subassemblies designed and committed for use in Class 1E systems and applications are currently being qualification tested. Their compliance to the required codes and standards will be verified in a future inspection subsequent to completion of the qualification tests.

E. Measurements and Calibration

1. Objectives

The objectives of this area of the inspection were to verify that:

a. A system has been established and is maintained to assure that tools, gages, instruments and other measuring devices used in activities affecting quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within specified limits.

b. Calibration records are kept for each instrument and that these records include the following information:

(1) Purchase date and calibration history.

(2) Accuracy required and calibration results.

(3) Location for use.

(4) Present calibration interval and date due.

(5) All maintenance and repair details.

(6) Persons or agency performing all calibration.

(7) Serial number of identification of each standard used to perform the calibration.

(8) Number or name of the calibration procedure.

(9) Environmental conditions used during calibration.

(10) Equipment recall schedules.

(11) Disposition of obsolete, unrepairable and unuseable test equipment.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. Review of the Quality Control Standards Manual, HDM-G, Section G 13, Measuring Equipment, Control and Calibration.

b. Randomly selected approximately twenty (20) instruments in receiving inspection, manufacturing assembly, manufacturing test areas and verified that the calibration status and recorded data for the instruments were in compliance with the HDM-G 13 procedures.

c. Findings

Within this area of the inspection, no deviations or unresolved items were identified.

F Exit Interview

The inspector met with management representatives denoted in paragraph A above, at the conclusion of the inspection at the Silver Spring facility on April 12, 1979. The inspector summarized the scope of the inspection concerning the following areas:

1. Quality Assurance Manual/Program.

2. Manufacturing Inspection and Test Control.

3. Design Control and Tests.

4. Measurements and Calibration.

Management representatives had no comments relative to the items discussed by the inspector.