

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

Report No. 99900100/79-01

Program No. 51400

Company: Limitorque Corporation
5114 Woodall Road
Lynchburg, Virginia 24502

Inspection Conducted: March 26-29, 1979

Inspectors *for* *D M Hunnicutt* 4/24/79
R. E. Oiler, Contractor Inspector, Vendor
Inspection Branch Date

for *D M Hunnicutt* 4/24/79
J. R. Agee, Contractor Inspector, Vendor
Inspection Branch Date

Approved by: *D M Hunnicutt* 4/24/79
D. M. Hunnicutt, Chief, Components Section II,
Vendor Inspection Branch Date

Summary

Inspection on March 26-29, 1979 (99900100/79-01)

Areas Inspected: Implementation of 10 CFR 50, Appendix B criteria, other NRC requirements, and applicable Codes and standards including: action on previous inspection findings; review of vendor activities; training; welding control consisting of welding procedure specifications, welding material control and welder qualifications; qualification of NDE personnel; control of special processes; design control; and valve actuator staking problem. The inspection involved fifty (50) inspector-hours on site by two (2) NRC Inspectors.

Results: In the eight (8) areas inspected, no deviations were identified in seven (7) areas. The following were identified in the remaining area:

Deviations: Welding Control: Subprocedure QCP-12.F, "Welding," did not provide welding parameters necessary to control the SMAW and GMAW processes for floor stand welding and the procedure was not qualified.

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Records of qualification for the person who performed the welding were not maintained.

Unresolved Items:

None.

Details Section I

(Prepared by R. E. Oller)

A. Persons Contacted

- *H. Beers, Plant Superintendent
- *W. Denkowski, Vice President of Engineering
- C. Formica, QA Administrator
- *K. Groone, Manufacturing Engineer
- K. Kurtz, QC Administrator
- F. McKenzie, Gage Lab Technician
- *T. Mignogna, Vice President and General Manager
- *W. Vignola, QC Manager
- A. Wilkes, Manager of Special Processes

*Attended the Exit Meeting.

B. Action on Previous Inspection Findings

- (1) (Closed) Deviation A (Report No. 78-01): Failure to perform the required internal audit of the QC system area K "Calibration System" during the 12 month period prior to June 13, 1978. The inspector found that in accordance with Limatorque's response letter dated July 17, 1978, the above QC system area was audited on August 7, 1978. Discussions with the auditor established that he was verbally instructed to follow the internal audit procedure QCP-14.
- (2) (Closed) Deviation B (Report No. 78-01): With regard to the report of internal audit conducted on January 9, 1978, the audit checklist nonconforming items A.6, E.3, and E.4 were not submitted to the QC Manager, nor were the Audit Deficiency Notifications (ADN) issued by the QC Department for these items as required by the QA Manual. The inspector found that in accordance with Limatorque's response letter dated July 17, 1978, ADNs were issued for items marked "rejected" in the August, 1978, audit report, and the auditor was verbally instructed concerning the requirement in procedure QCP-14 to issue ADNs when applicable.
- (3) (Closed) Deviation C-1 (Report No. 78-01): With regard to calibration requirements, two (2) hand type "Takette" digital tachometers were not identified by serial numbers or calibration labels and no calibration records were maintained for

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these devices. The inspector found that these devices now have serial numbers and calibration labels on them and calibration record cards are being maintained.

- (4) (Closed) Deviation C-2 (Report No. 78-01): With regard to calibration, a protractor No. QC-98 did not have an attached calibration sticker nor was there a calibration record card for this device as required. The inspector found that in accordance with Limitorque's letter dated July 17, 1978, protractor No. QC-98 was replaced with protractor No. 636. The calibration record card for protractor No. 98 shows it was scrapped. A calibration record card is being maintained for protractor No. 636.
- (5) (Closed) Deviation C-3 (Report No. 78-01): With regard to calibration, a dial/caliper No. QC-780 was not identified in Procedure QCP-7.D calibration interval list. The inspector found that this device is now listed in the revised calibration procedure QCP-7.D with an assigned calibration frequency of every six (6) months.
- (6) (Closed) Deviation C-4 (Report No. 78-01): With regard to calibration, optical comparator No. QC-716 was not identified in Procedure QCP-7.D calibration interval list, nor was there an outside calibration service certificate of calibration showing traceability of the referenced standard to the National Bureau of Standards as required by the QC Manual.

The inspector found that although this device is still not listed in revised procedure QCP-7.D. it was added to a draft copy during the inspection. It has been calibrated and there is a certificate of calibration available.

- (7) (Closed) Deviation C-5 (Report No. 78-01): With regard to calibration, the record was not maintained current for a voltmeter, No. QC-710, located on the motor test bench. The attached calibration sticker showed a calibration date of April 1978, while the record card showed a calibration date of August 1977. The inspector found that this device was taken out of service and scrapped on February 8, 1979. This action was recorded on the records.

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C. Review of Vendor's Activities

1. Objective

The objective of this area of the inspection was to assess the vendor's activities and their impact on future NRC inspections.

2. Method of Accomplishment

The preceding objective was accomplished by:

- a. Review of the QC Manual, Revision 4, dated January 15, 1977, and related Quality Control Procedures (QCP).
- b. Discussions with cognizant personnel.
- c. Review of a list of customers to whom Limitorque supplied safety related valve operators during the period of January 1, 1978, through March 22, 1979.

3. Findings

a. Deviations From Commitments

None.

b. Unresolved Items

None.

c. Other Findings

- (1) The QC Manual, Revision 4, and certain QC procedures, specifically No. QCP-5, are obsolete. These documents have not been revised to delete references to Limitorque's King of Prussia organization and activities since their relocation to the Lynchburg Plant. Limitorque's management committed to issue an updated QC Manual by April 30, 1979, and stated that the affected QC procedures would be revised. This item will be reviewed during a subsequent inspection.
- (2) During the period of January 1, 1978, to March 22, 1979, Limitorque supplied safety related valve operators to 53 customers consisting of valve manufacturers, electric utility companies, and suppliers or distributors.

- (3) The current orders for safety related valve operators will extend over several years in decreasing quantities.

D. Training

1. Objectives

The objectives of this area of the inspection were to verify that the following items were controlled in accordance with the QC Manual and applicable NRC requirements:

- a. A written system has been established to assure that indoctrination and training of personnel performing activities affecting quality is implemented in accordance with applicable Codes.
- b. Appropriate written agenda are used.
- c. Records of training sessions agenda and attendance are maintained.
- d. The agenda includes subject matter adequate to provide an understanding of the general and detailed aspects of the QC Program, Codes, standards and applicable technical disciplines.
- e. The instructors are suitably qualified.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QC Manual, Section 1.B, Revision 3, paragraph 1.B.5, concerning training and indoctrination.
- b. Review of Limitorque's "Quality Control Training Manual."
- c. Review of the records of training for 14 QC inspectors during the period from July 18, 1977, through February 27, 1979.
- d. Discussions with cognizant personnel.

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3. Findings

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

E. Welding Control

1. The objectives of this area of the inspection were to verify that the following activities were controlled in accordance with the QC Manual and applicable NRC requirements.
 - a. A system has been established to assure that welding is controlled in accordance with acceptable practices.
 - b. The welding procedures used in production welding are prepared, qualified, and controlled in accordance with the QC Program.
 - c. The welding materials purchase, acceptance, storage, issuance, and use are controlled and documented in accordance with detailed procedures.
 - d. The welders are qualified in accordance with acceptable practices.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QC Manual, Section 5.C, "Special Processes."
- b. Review of Operating Subprocedure No. 12.F, "Welding," Revision 1, to determine whether or not the procedure contained adequate welding parameters and was qualified.
- c. Review of welding material procurement invoices No. 20693 and No. 22631 on standing purchase order No. SM-206 for Type 7024 and Type 308 electrodes.
- d. Observation in the weld shop of manual metal arc and gas metal arc welding machines and facilities including weld wire and coated rod stored in closed cabinets.
- e. Review of Drawing No. 60-161-0067-3, "Floor Stand," to determine what type of welding instructions were provided.
- f. Discussions with cognizant personnel.

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3. Findings

a. Deviations From Commitment

See Notice of Deviation, Items A and B.

b. Unresolved Items

None.

F. Qualification of NDE Personnel

1. Objectives

The objectives of this area of the inspection were to verify that the following items were controlled in accordance with applicable NRC requirements:

- a. A written system has been established to assure that measures to control the qualification of personnel performing special processes (other than welding) has been documented.
- b. The above system has been implemented such that the subject personnel are properly qualified in accordance with NRC and the manufacturer's requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QC Manual, Subsection 8.C, "Nondestructive Examination."
- b. Review of ASNT Recommended Practice No. SNT-TC-1A (June, 1975 Edition).
- c. Review of records of qualification, certification, and eye examination for six (6) dye penetrant examination technicians.
- d. Review of records of QC classes and NDE qualifications for four (4) dye penetrant examination technicians.
- e. Review of operating procedure No. QCP-11, Revision 6, "Nondestructive Testing Procedures."
- f. Discussions with cognizant personnel.

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3. Findings

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

G. Control of Special Processes

1. Objectives

The objectives of this area of the inspection were to verify that the following items were controlled in accordance with the QC Manual and applicable NRC requirements:

- a. A system has been established to assure that the special processes of carburizing and induction hardening of worm shafts and gears are performed in accordance with written procedures which are prepared and approved in accordance with the QC Program.
- b. The personnel performing these processes are qualified.
- c. The equipment and materials used are controlled and/or calibrated when required.
- d. The results are documented and reviewed for acceptability as required.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QC Manual, Section 5, "Manufacturing Process Control."
- b. Review of the following operating QCP Subprocedures:
 - No. 12.A, "Heat Treating"
 - No. 12.B, "Metallurgical Test Specimen"
 - No. 12.C, "Carbon Determination"
 - No. 12.D, "Records"
 - No. 12.E, "Induction Hardening"
- c. Observation of the carburizing furnace facilities and calibration status of the thermocouples, recorders, and controllers.
- d. Review of the C.I. Hayes', "Operating Instruction Manual," for the carburizing equipment.

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- e. Observation of the induction hardening equipment and calibration status of the meters.
- f. Review of the "Operating, Installation and Maintenance Instruction" manual by Lindburgh Engineering for the induction hardening equipment.
- g. Review of the induction hardening log book for parts.
- h. Review of production records for carburizing consisting of a Test Specimen Report, a Microhardness Test Report, and a Carbon Determination Report.
- i. Observation of the use of the Knoop Microhardness tester and the Leca Carbon Determiner and other laboratory equipment.
- j. Review of a "Shop Order" card and drawing, controlling the movement of part No. 60-420-0001, "worm shaft gear," from the Gear Department to the Heat Treating Department.
- k. Discussions with cognizant personnel.

3. Findings

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

H. Exit Interview

- a. The inspectors met with management representative denoted in paragraph A of Details Section I at the conclusion of the inspection on March 29, 1979.
- 2. The following subjects were discussed:
 - a. Areas inspected.
 - b. Status of corrective and preventive action for the previous outstanding items.
 - c. The deviations identified in this report.
- 3. The manufacturer's representatives were requested to formulate their corrective and preventative action responses to the

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deviations in accordance with the three (3) conditions identified in the inspection report cover letter.

4. Management's questions related to clarification of the above items.

Details Section II

(Prepared by J. R. Agee)

A. Persons Contacted

- *W. J. Denkowski, Vice President Engineering
- *C. P. Formica, Quality Assurance Administrator, Manager
Applications Engineering
- W. A. Moore, Test Laboratory Supervisor

*Attended Exit Interview.

B. Design Control

1. Objective

The objective of this area of the inspection was to review Limitorque activities, functions, and documentation related to the design and manufacture of Class 1E valve actuators for nuclear applications.

2. Method of Accomplishment

The preceding objective was accomplished by:

- a. Discussions with the manager of applications engineering concerning the design and manufacture of valve actuators.
- b. Review of customer contracts and specifications for valve actuators, manufactured to Class 1E criteria, for operation of Class I and II valves in safety related applications, (example: Specification S023-507-5, dated June 1, 1974).
- c. Review of Quality Control Procedures (QCP)-15, Design Control Procedure in which it was determined that several generic models of the valve actuator have been designed, qualification tested, and manufactured to meet the criteria of established codes and standards for Class 1E application. Qualification test reports reviewed include the following:
 - (1) Qualification Type Test Report, Limitorque Valve Actuators for PWR Service, tested per IEEE Standards 382-1972, dated December 9, 1975.

- (2) Seismic Qualification, Limitorque Valve Actuators, test per IEEE 344-1975 (test conclusions, dated January 2, 1976).
 - (3) Limitorque DC Valve Actuators for Nuclear Power Station Service Conditions, per IEEE Standards -382, -323, and -344, dated April 30, 1976.
 - (4) Nuclear Power Station, Qualification Type Test Report, Limitorque Valve Actuators for BWR Service, dated May 13, 1976.
 - (5) Qualification Type Test Report, Limitorque Valve Actuators for Class 1E.
- d. Review of QCP-16, Order Entry and Processing Procedure in which it was determined that valve actuators are tailored to the specifications of each customer's purchase order by the order entry applications engineering group. Sizing of the valve actuator and the integral motor are specified to meet customer valve thrust requirements that are translated to the Limitorque Bill of Material, Form P-250. This Bill of Material requires minimum dual verification of contents before final approval by applications engineering manager for procurement of materials for manufacture of the specified Class 1E valve actuator.
 - e. Review of Limitorque document, SEL, Selection Index for sizing valve actuators for valve thrust requirements.
 - f. Review of Limitorque Motor Specification and Motor Curves for use in SMB valve actuators.
 - g. Inspection of incoming motors and comparison of motor invoices with Specification RCP 242, Limitorque D/S 21-49-001-1. Witnessed functional tests of incoming motors (for SMB valve actuators) and verified the test curves met the required design functional performance curves. Verified the tests were conducted in compliance with QCP-9, Test Laboratory Procedure, covering such functional tests as voltage, current, speed, cycle, locked rotor, and high potential which are in compliance with routine tests for induction motors per NEMA Standard MG 1-12, and IEEE Standard 112.
 - h. Inspection of production test practices and verified production bench tests were being completed in compliance

with QCP-5.C, Test Bench Inspection Procedure. Also, verified the tests results were recorded on assembly inspection reports QC 002/003/006/008. These test results are normally not issued with the QA package but are available to the customer along with other certifications, upon request.

3. Findings

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

C. Valve Actuator Staking Problems

1. Objectives

The objectives of this area of the inspection were to:

- a. Review valve actuator designs.
- b. Discuss field inspection findings, identified as staking problems, related to Limatorque valve actuators at four (4) specific nuclear power stations.
- c. Review customer purchase orders for valve actuators.
- d. Review Limatorque documentation related to the manufacture and shipment of valve actuators to specific nuclear generating sites.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of actuator design and discussions with Limatorque engineering management concerning valve actuator assembly, operation, and staking problems.
- b. Review of the mechanical interface of a valve actuator to a valve stem by the valve stem nut and determining that the valve stem nut provides thrust for movement of the valve stem. The valve stem nut is retained in position by a lock nut which requires peening or staking to the drive sleeve.
- c. Review of the following thirteen (13) randomly selected Limatorque production orders for valve actuators for

nuclear safety related applications which have been manufactured and shipped:

<u>Production Order</u>	<u>Value Actuator</u>
(1) 3B4563	263142-143C
(2) 3B4760	270280-285
(3) 3B4760	270042-045
(4) 3B9378	279697-720
(5) 3C1640	288358-359
(6) 3C1710	278635-636
(7) 3C1710	283674-675
(8) 3C3961	288332-339
(9) 3C3961	288338-337
(10) 3C4104	287991
(11) 3C4104	287992
(12) 3D1472B	291618
(13) 3D1472B	291619

Contract requirements for the above orders required Limitorque to supply the stem nut properly staked in four (4) of the orders while in the remaining nine (9) orders that stem nut was to be shipped to the customer (the valve supplier). The valve supplier had the responsibility for interfacing the valve stem nut with the valve stem and staking, as required.

Limitorque does not normally sell and ship directly to a nuclear site and therefore does not maintain a cross reference file of a specific product to a specific nuclear site. However, the Limitorque valve actuator production history can be tracked by the order number and/or serial number displayed on the nameplate on the valve actuator housing (Note: this nameplate is separate from the nameplate on the related valve yoke).

Limatorque is amenable to supplying valve actuator production data upon request and receipt of valve actuator order number and/or serial number.

3. Findings

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