

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

Report No.: 99900100/81-01

Company: Limitorque Corporation
P.O. Box 11318
Lynchburg, VA 24506

Cognizant Design Organization:

Westinghouse Electric Corporation
Nuclear Energy Systems
P.O. Box 335
Pittsburgh, PA 15230

Equipment Environmental Qualification Program:

Independent Verification Inspection No. 1

Report No. 2 - Review Test Set-Up and Revised Test Plan

Equipment Identification:

Component: Valve Actuator

Type: SMB

Size: 00

Mfg.: Limitorque Corp.

Bill of Material: 680034

Serial No.: 321472

Inspection Conducted: January 22 - January 23, 1981

Inspectors:

A. B. Bennett
A. B. Bennett, Sr. Electrical Engineer

4/14/81
Date

J. C. Glynn
J. C. Glynn, Sr. Nuclear Engineer

5/15/81
Date

D. G. McDonald
D. G. McDonald, NRC Consultant, Los Alamos

2/14/81
Date

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Approved By:

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4-14-81
Date

Summary: The test facility at Limitorque Corporation was inspected January 22, 1981 - January 23, 1981 for the purpose of examining the test set-up and reviewing the current revision of the test plan associated with the subject Environmental Qualification Test Program.

Results: The results of the test facility inspection indicate that it is capable of performing environmental qualification testing in accordance with current regulatory requirements. The personnel attending the test facility exhibited a high degree of knowledge concerning the performance of LOCA/MSLB environment testing.

The review of the test plan resulted in the following outstanding items. These items will be reviewed during future inspections of the Limitorque qualification test program.

1. Acceptance Criteria

All of the acceptance criteria relating to equipment performance are not contained in the test plan.

2. Aging and Baseline Data

These data were not reviewed.

3. Detailed Test Procedures

Detailed test procedures, based upon the requirements of the test plan, were not available for review.

DETAILS SECTION

Prepared By: A. B. Bennett

A. Persons Contacted

W. J. Denkowski - Limatorque Corporation
J. B. Drab - Limatorque Corporation
C. W. Anderson - Westinghouse Electric Corporation
A. Ball - Westinghouse Electric Corporation
J. W. Mock - Westinghouse Electric Corporation
E. A. Olson - Westinghouse Electric Corporation
M. J. Zegar - Westinghouse Electric Corporation

B. Inspection of the Test Facilities

1. Objectives

The objectives of this area of the inspection were to:

- (a) Observe the test chamber, heat and steam/spray supplies and associated piping, valves and instrumentation.
- (b) Observe the test specimen mounting arrangement, including electrical and mechanical interfaces.
- (c) Discuss the test performance details with the personnel that will be performing and monitoring the test.
- (d) Review the test instrumentation requirements and calibration documentation.
- (e) Review the dummy test results.
- (f) Review detailed test procedures required for performing the LOCA/MSLB exposure test.

2. Findings

The test chamber is approximately 8' high x 3' diameter. Steam entry is into the top of the chamber and divided internally such that steam is applied to all surfaces of the test unit. The valve operator is mounted on a flange through which electrical connections and the load cell actuator housing enter the unit. The load cell is mounted on the housing outside of the chamber and is monitored during the test to determine proper valve actuator operation.

A dummy test unit consisting of a valve actuator, the same physical size as the test unit, and mounted in the same manner as the test unit, had been used in the chamber for test runs to obtain the required

temperature/time profile. Plots of temperature versus time were prepared from data taken during the test runs. Temperature was sensed from several thermocouples installed in various locations in the test chamber. These data were used to determine exact thermocouple locations for the actual environmental test. Although only one temperature ramp was performed on the dummy unit, two high temperature ramps at the initial phase of the test will be performed on the actual test specimen.

The critical test parameters, such as test chamber temperature and pressure are automatically recorded during the test performance. Direct readout instruments are also used for monitoring test chamber temperature and pressure during test performance.

An events/time chart will be prepared for reference during performance of the LOCA exposure test. This chart benchmarks the time for performance of test parameters such as actuator cycling operations, load cell readings, etc. and is based upon the temperature/pressure profile requirements outlined in the test plan. Except for this chart, no detailed test procedures are used for performance of the LOCA test by Limitorque personnel.

Test instrumentation requirements were reviewed and calibration records spot checked for compliance with QA requirements. Calibration of the pressure transducers that will be used in the test chamber during the LOCA exposure test was being performed and part of the calibration procedure was observed by the inspection team. From the results of this review and observation of the calibration activities it is concluded that proper control was being maintained regarding calibration requirements.

The test unit was mounted on the flange that will be installed on the test chamber during the actual test run. The mounting arrangement employed represents the worse-case mounting arrangement. Although the valve actuator is gasketed and normally airtight, the test unit will be vented during the LOCA exposure test to simulate worse-case conditions.

C. Review of the Test Plan

1. Objectives

The objectives of this area of the inspection were to:

- (a) Review the procedure generally for conformance to regulatory requirements.
- (b) To review the changes made to the test plan since an initial review conducted at Westinghouse Electric Corporation, Monroeville, PA on December 15 thru 19, 1981.

2. Findings

Test Plan No. 680034 is applicable to the Environmental Qualification Test Program for the subject valve actuator. Revision B of the test plan, the current issue, was reviewed during the inspection. The following observations were noted during the review of the test plan.

(a) Acceptance Criteria

Not all of the acceptance criteria are contained in or referenced by the test plan. Some of the acceptance criteria is contained in WCAP 9688, and others in separate documents that are not part of either the test plan or the WCAP. For example, Limitorque presented a document that contained insulation resistance criteria and thrust and torque requirements of the valve actuator. While the operational parameters are recorded during performance of the LOCA exposure test and the results addressed in the final report, the information should be available for reference during interim inspections prior to test performance.

(b) Aging and Baseline Data

Aging and baseline data were missing from the test plan. In addition, the criteria and detailed calculations regarding the basis for selecting aging parameters were missing. For example, the activation energy of one of the components in the actuator assembly (phenolic terminal block) is lower than the activation energy used to determine the temperature/time parameters for a 40 year life. (It was noted that both glass reinforced phenolic and melamine terminal blocks are installed in the test actuator assembly.) Although the results, criteria, justification, etc. will be addressed in the final report, the information should be available for reference during test set-up and performance.

(c) Operation of the Valve Actuator During Aging and Environmental Tests

It was noted that the valve actuator is operated at a constant voltage of 100% during the test. NUREG-0588 (Section 2.2(10)) specifies that the power supply be varied throughout the design range during operational testing. Limitorque explained that the reason for operating at 100% voltage concerns the loading of the valve actuator (connected to the maximum mechanical load for that particular actuator during operational testing). It was suggested that those items that vary with NUREG-0588 guidelines be addressed and justified in the final report. NUREG-0588 is used by the NRC staff as guidance in assessing the adequacy of the environmental qualification of safety related electrical equipment.