Consumers Power Company

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81-01 #11

Mr J G Keppler, Regional Administrator
US Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

MIDLAND NUCLEAR COGENERATION PLANT
DOCKET NOS 50-329 AND 50-330
UNDERRATED TERMINAL STRIPS ON LIMITORQUE VALVE OPERATORS
File: 0.4.9.47 Serial: 20729

Reference: J W Cook letters to J G Keppler, same subject:

1) Serial 11190, dated February 13, 1981
2) Serial 11976, dated April 24, 1981
3) Serial 12041, dated July 8, 1981
4) Serial 13665, dated September 11, 1981
5) Serial 14617, dated November 20, 1981
6) Serial 14690, dated February 12, 1982
7) Serial 17503, dated June 4, 1982
8) Serial 17565, dated August 6, 1982
9) Serial 19070, dated October 22, 1982
10) Serial 20680, dated January 30, 1983

This letter, as were the referenced letters, is an interim 50.55(e) report concerning the terminal strip voltage ratings on Limitorque valve operators. Attachment 1 provides a status of the corrective actions in progress to resolve this problem.

Another report, either interim or final, will be sent on or before June 7, 1983.

James W. Cook

WRB/lr

Attachment: 1) MCAR 46, Interim Report #11, "Qualification Concerns for Various Components on Limitorque Valve Operators," dated February 23, 1983

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CC: Document Control Desk, NRC
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SUBJECT: MCAR 46 (issued 1/15/81)
Qualification Concerns for Various Components on Limitorque Valve Operators

INTERIM REPORT 11

DATE: February 23, 1983

PROJECT: Consumers Power Company
Midland Plant Units 1 and 2
Bechtel Job 7220

Description of Deficiency

The following deficiencies are covered by MCAR 46:

a) The use of underrated terminal blocks in Limitorque operators

b) The use of terminal blocks without proper environmental qualification in Limitorque operators

c) Additional concerns regarding qualification of various Limitorque operator components

These concerns are detailed below.

A. Underrated Terminal Blocks

While replacing a damaged terminal block on a Limitorque operator, Bechtel determined that some of the terminal blocks used for the termination of the leads from the 460 V motor were rated less than 460 V. These Limitorque operators, when used on safety-related valves, must function on an emergency core cooling actuation signal (ECCAS). In addition to being a personnel safety hazard, the potential exists for a short circuit/flashover, which could render the valves inoperative.

B. Environmental Qualification

During random inspection for underrated terminal blocks, it was discovered that in some cases terminal blocks from manufacturers not covered by existing qualification reports were used.

Limitorque provided the following information on environmental qualification of terminal blocks in its July 31, 1981, letter.

The Buchanan 0524 has been qualified by analysis. To supplement the qualification by analysis, Limitorque is currently running a type test on the Buchanan 0524 terminal block. The Buchanan 0824 terminal blocks are not qualified and must be replaced.

Some of the Limitorque operators having Buchanan 0824 type terminal blocks have been used on safety-related valves located inside containment. These operators must function on an ECCAS. The potential exists for a terminal block to fail during its intended service life because of aging and radiation effects, which would render the valve inoperable and prevent proper operation of the safety-related system.

C. Additional Qualification Concerns

During June 1982, a random inspection was made of safety-related Limitorque valve operators supplied through various valve manufacturers and installed inside the reactor building. This inspection resulted in various potential concerns regarding qualification of these Limitorque operators.

Summary of Investigation and Historical Background

A. Underrated Terminal Blocks

1. The manufacturer's name was the only form of identification found on a damaged terminal block. To order a replacement for the damaged terminal block, it was therefore necessary to measure the block's critical dimensions and compare them with those for blocks listed in Marathon Catalog 10M79. This comparison indicated that the terminal blocks used for the termination of the leads from the [illegible] V motor could have been rated less than 460 V. Eight [illegible]itorque operators on Bechtel Purchase Order (P.O. [illegible] 132-AC were inspected, and eight were found [illegible] underrated terminal blocks (Marathon 100 Series and Cinch [illegible]es 140 Series). Thus, Bechtel determined that some terminal blocks in Limitorque valve operators may be underrated for their intended function. The other ten operators inspected had Marathon 300 Series terminal blocks that are correctly rated for the intended service. Purchase Order 7220-M-132 is with Henry Pratt Company for the supply of nuclear service butterfly valves.

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2. Representatives from Limitorque and Henry Pratt visited the Midland jobsite on January 31, 1981. After inspecting the terminal blocks, they confirmed the results of Bechtel's investigation.

3. Random inspection was performed by Limitorque during the week of May 11, 1981, to establish the magnitude of the presence of the underrated terminal blocks in the Limitorque operators. Limitorque provided Bechtel with detailed reports of its inspection. After review of the inspection reports, Bechtel determined that underrated terminal blocks were not used on any Q-listed purchase orders except P.O. 7220-M-132(Q).

4. Seven different types of terminal blocks were identified (Buchanan 0222, 0524, and 0824; Marathon 300 Series; Beau 7600; Kulka 622; and General Electric EB-5) during the random inspection referred to in Item 3 above. All seven types are acceptable for 460 V service.

5. Arrangements were immediately made by Bechtel to inspect any unshipped valves upon receipt at the Midland jobsite for underrated terminal blocks. Inspection results are tabulated in Item B.7 below.

6. Limitorque/Henry Pratt submitted the terminal block replacement procedure and Certificate of Compliance for the terminal blocks that Bechtel project engineering approved upon review. The actual replacement of all underrated terminal blocks on Limitorque's Purchase Order 7220-M-132(Q) was undertaken by Bechtel construction personnel under the supervision of Limitorque service engineering during the second week of June 1982. The replacement work is now complete; all operators on P.O. 7220-M-132(Q) were inspected.

7. Bechtel has received the inspection/replacement report from Limitorque for the work described in Item A.6 above.

8. Limitorque's letter dated June 25, 1981 (Ref: MCAR 46, Interim Report 4, Item A.1), states that terminal block types Buchanan 0524 and Beau 7600 were previously rated for 600 V service using the breakdown voltage method of rating. A concern was raised because no documents are currently available at Bechtel to support this statement. Limitorque

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has now provided additional documentation showing that the terminal blocks in question were previously rated at 750 V and 600 V, respectively.

B. Environmental Qualification

1. During the random inspection of underrated terminal blocks, referred to in Item A.3 above, Buchanan 0824 terminal blocks were found on three Limitorque operators purchased from Westinghouse on P.O. 7220-M-123A for nuclear service stainless steel valves. Voltage rating data submitted by Limitorque for these terminal blocks were found acceptable. However, these terminal blocks are unacceptable because of Limitorque's previously cited finding that these blocks "are not" environmentally qualified and "must be replaced."

2. According to Limitorque, the use of unqualified terminal block type Buchanan 0824 is limited to P.O. 7220-M-123A(Q)-AC with Westinghouse Electric, based on Westinghouse's specific requirements. These blocks are not qualified and would require replacement with properly qualified terminal blocks. Based on random inspection results, it was concluded that Buchanan 0824 terminal blocks are not used on any other purchase order.

3. Of the seven terminal blocks listed in Item A.4 above, Limitorque stated that terminal blocks types Buchanan 0222, Buchanan 0524, Curtis Type L, Marathon 300 Series, and General Electric EB-5 were environmentally qualified for inside containment, but were unable to provide the required qualification documentation.

4. Limitorque presently has no specific plans for an environmental testing of the remaining terminal block types Kulka 622 and Beau 7600 for outside containment use.

5. Environmental qualification documentation for terminal block types specified in Item B.3 remains indeterminate pending Bechtel review, and acceptance of supporting documentation to the qualification documentation.

6. Bechtel field engineering has generated Nonconformance Report (NCR) 3780 against valves 2MO-1111, 2MO-1101B, and 2MO-1120B purchased from Westinghouse Electric on P.O. 7220-M-123A(Q)-AC, Items 4.2, 5.4, and 5.8, respectively. This NCR was initiated at the request of project engineering because of the presence of an unqualified terminal block, Buchanan 0824.

7. The following 18 operators were to be inspected upon receipt from the vendors at the jobsite for the presence of nonconforming terminal blocks. The status is as follows:

P.O. Number	Item (Quantity)	Terminal Block (TB)/ Remarks
7220-J-255A(Q)	23(8)	TB Kulka 622
7220-M-117(Q)	5.1(1)	TB Marathon 300; valve converted to manual
7220-M-117(Q)	5.2(1)	*
7220-M-117(Q)	5.3(1)	*
7220-M-117(Q)	5.4(1)	*
7220-M-168(Q)	1.5(1)	TB Buchanan 0222
7220-M-398(Q)	1.1(1)	TB Kulka 622
7220-M-398(Q)	1.2(1)	TB Kulka 622
7220-M-398(Q)	3.1(1)	TB Kulka 622
7220-M-398(Q)	3.2(1)	TB Kulka 622
7220-M-398(Q)	3.3(1)	TB Kulka 622

*Valves were converted to manual. Arrangements are being made to ensure that operators will not be used in any application until they are properly inspected and identified problems are resolved.

All operators listed above are located outside containment. The terminal blocks' voltage ratings are acceptable. However, environmental acceptability is pending review and acceptability of the Limitorque qualification documentation described in Item B.5 above.

C. Additional Qualification Concerns

1. The motor nameplate ambient temperature rating on various motors installed on some Limitorque operators is 40C.

Limitorque has verbally stated that the Class B insulation motors rated for a 40C ambient temperature have not undergone qualification testing in accordance with IEEE Std 382-1971 for the specified normal, accident, and post-accident environment. Class H insulation motors are rated for 50C ambient temperature, but the qualification testing in accordance with IEEE Std 382-1972 for these motors is presently unknown.

2. No identification was evident on certain materials internal to the Limitorque operators (e.g., wiring, insulation, etc). It is not presently known whether these types are qualified for the service conditions.

3. Various orientations of installed operators were observed. It is not presently known whether the operators are qualified for all installed orientations.

4. Drain plugs on operators were observed to be both in place and removed. Orientation of the operators did not always result in the drain holes being at the lowest point of the installed operator. It is not presently known whether the existence of the drain plug or the orientation of the drain hole is essential to proper operation of the operator or is in conformance with the qualification tests for the operator.

5. Various Limitorque operator limit switch gear frames were observed to be made of a white metal. It is not presently known whether these gear frames are qualified for the service conditions.

6. Information obtained from purchase order files and QVDP files does not agree with the installed components.

7. It is presently not known whether space heaters are qualified or required to be qualified.

8. Various O-rings are located throughout the actuator. It is not presently known whether these components are qualified for the service conditions.

9. Unidentifiable terminal blocks (nonpower lead connectors inside the operators) were observed in other Limitorque operators. It is not presently known whether these components are qualified for the service conditions.

To discuss concerns listed above, a meeting was held at Limitorque on August 31, 1982. Limitorque has conducted a component qualification document search for each safety-related Limitorque operator. Bechtel review of the subject component identification data is scheduled to be completed by the end of May 1983.

Safety Implications and Reportability

1. Seven of the eight valve operators having underrated terminal blocks are located in the component cooling water and service water systems and are used on safety-related valves. These must function on an emergency core cooling actuation signal. The potential exists for a short circuit/flashover, which could render the valves inoperative.

   Based on the potential safety concerns, this item was considered reportable. This deficiency was reported by Consumers Power Company on January 14, 1981, to R. Sutfin, R. Cook, and R. Knop of the Office of Inspection and Enforcement, Region III, U.S. Nuclear Regulatory Commission, as a reportable deficiency for Midland Plant Units 1 and 2 in accordance with 10 CFR 50.55(e).

2. Of the concerns expressed above, it is believed that Limitorque operators having a motor rating of 40C ambient temperature and Class B insulation have not been qualified for safety-related service inside the containment. Therefore, the operators may not perform their safety functions under postulated post-accident conditions. However, this concern and the remaining concerns listed above should be regarded as indeterminate because insufficient information exists to classify them otherwise. The status of these concerns is still under investigation and is dependent on the results of the Limitorque component qualification document search. The status will be reported accordingly in future interim reports.

Probable Cause

A. Underrated Terminal Block

   According to Limitorque, it does not stock Marathon 100 Series terminal blocks. However, Limitorque believes (according to its January 21, 1981, letter) that when its field service engineer

visited the Midland jobsite in November 1977 to increase the number of points on the terminal blocks for 66 operators (P.O. 7220-M-132), he may have procured the subject terminal blocks locally. Limitorque further explained that an additional 20 terminal blocks (140 Series, manufactured by Cinch Jones) were shipped to Midland to make up for quantities damaged in an earlier shipment. These blocks are similar to Marathon Series 100 blocks and may have been used by the Limitorque service engineer to terminate the 460 V motor leads. According to Limitorque's July 1, 1982, letter, the root cause for the presence of underrated terminal blocks was the lack of adequate training for a newly employed field service engineer.

B. Unqualified Terminal Block

According to Limitorque's July 1, 1982, letter, Buchanan 0824 terminal blocks have not been tested for environmental qualification. These terminal blocks were furnished with actuators built in 1974 to the specific requirements of an individual valve manufacturer. However, the terminal blocks were considered qualified by analysis at the time they were supplied. The Buchanan 0824 uses nylon construction, which is unacceptable in today's nuclear industry. It is Limitorque's opinion that this terminal block would pass a nuclear qualification test; however, because of the stigma attached to the use of nylon in this application, the terminal block would still be considered unacceptable.

C. Additional Qualification Concerns

The additional concerns addressed above are still being evaluated. A discussion on the probable causes of these concerns will be covered in future interim reports.

Corrective Action

A. Underrated Terminal Blocks

During Limitorque's June 1982 inspection/replacement trip to the Midland jobsite, all underrated terminal blocks were replaced by correctly rated Marathon 300 Series terminal blocks on operators purchased on P.O. 7220-M-132(Q). The reports from Limitorque and the field covering the inspection/replacement activities and documentation of terminal block types Buchanan 0524 and Beau 7600 have been accepted. Thus, this deficiency will be considered

completely resolved, pending the completion of the arrangements for three operators on P.O. 7220-M-117(Q) as specified under Item 7 on Page 5 of this report.

B. Unqualified Terminal Blocks

1. Bechtel review of the resubmitted qualification report from Limitorque is expected to be complete by February 28, 1983.

2. The physical verification of the type of the terminal blocks used on each safety-related Limitorque operator will be included together with the inspection process to verify other concerns.

3. Dispostion of NCR 3780 is scheduled to be completed by March 11, 1983.

C. Additional Qualification Concerns

The data sheets submitted by Limitorque (based on its document search) are being reviewed by Bechtel. The review is scheduled to be complete by the end of May 1983.. Based on the results of this review, the unqualified components/operators shall be replaced with qualified components/operators in accordance with the applicable requirements. Further required action will be reported in future interim reports.

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