NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Catawba Nuclear Station, Unit 2	0 5 0 0 0 4 1 4	1 OF 0 4

TITLE (4)
Valve Motor Operators Wiring Not Environmentally Qualified

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 8	0 5	8 6	8 6	— 0 3 5 —	0 1	0 2	0 9	8 7	Catawba, Unit 1	0 5 0 0 0 4 1 3
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THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

OPERATING MODE (9)	3								
POWER LEVEL (10)	0 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
Roger W. Ouellette, Associate Engineer - Licensing	7 0 4 3 7 3 - 7 5 3 0

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On August 5, 1986, it was determined that several electrical valve motor operators contained wiring for which the environmental qualification could not be verified. The valve operators were supplied by Limitorque Corporation. The investigation was initiated following the discovery of similar wiring problems at McGuire Nuclear Station. Further investigation identified numerous other valve operators which contained unqualified wiring. Both units have been in all modes while the unqualified wiring was installed. Unit 2 was in Mode 3, Hot Standby, at the time of discovery. Unit 1 was operating at approximately 70% power at the time of discovery.

This incident is assigned Cause Code B, Design, Manufacturing, Construction/ Installation Deficiency. The supplier of the valve operators did not ensure that only environmentally qualified wiring was utilized during the manufacturing process.

This incident is reportable pursuant to 10 CFR 50.73, Section (a)(2)(ii)(B).

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BACKGROUND

10 CFR 50.49 defines the requirements for environmental qualification of electric equipment important to safety. The equipment qualification program must include and be based on temperature, pressure, humidity, chemical effects, radiation, aging, and other effects.

Limitorque valve motor operators (VMOs) utilize internal wiring to connect various limit and torque switches to control valve operation. All components utilized within the operator must be environmentally qualified when used in a 10 CFR 50.49 applicable situation.

DESCRIPTION OF INCIDENT

On January 14, 1986, the NRC issued Information Notice 86-03 concerning environmental qualification wiring deficiencies in Limitorque VMOs which had been discovered at Zion Station in late September 1985, and subsequently at Sequoyah Plant. The Information Notice was reviewed for applicability to Duke Power applications. Realizing potential applicability, Limitorque was requested to provide the control wiring manufacturer and style for VMOs supplied for Catawba, McGuire, and Oconee to ensure traceability as required by 10 CFR 50.49.

Limitorque responded on May 16, 1986, to the request for Catawba VMO information. Their information indicated that during the early years of manufacture, the specific type of wiring used was not retained in their records. However, company policy was to use type TW or TEW PVC insulated wire. The company later switched to Raychem Flantrol wiring. In 1978, the company again switched to Rockbestos SIS, completing the manufacture of Catawba VMOs.

Based on the Limitorque information, it was concluded that Limitorque VMOs containing the PVC wire were used only outside of containment at all of the Duke nuclear units. The worst case outside containment harsh environment is either a pipe rupture temperature excursion to 212 degrees F or post-accident recirculation radiation of 3.1E 6 Rads (TID). The PVC wire was then evaluated and determined to be qualified for use in the harsh environment. This evaluation was concluded on July 25, 1986. At this time, it was determined that Limitorque VMOs were environmentally qualified.

On July 28, 1986, an NRC I&E group began an inspection of the environmental qualification data for Limitorque VMOs. This inspection ended on July 31, 1986, and concluded that the data was complete. The I&E group then inspected several VMOs at McGuire Nuclear Station. During that inspection, unidentifiable wiring was found within a Limitorque VMO.

Catawba personnel were notified of the McGuire findings shortly after discovery. On August 4, 1986, the Limitorque information was evaluated to identify suspect VMOs based on shop order number. Unit 2 suspect VMOs were inspected initially, beginning on August 4, 1986, at 2400 hours, with inside containment operators. All unidentifiable and type TW or TEW jumper wire was replaced with qualified wire at the time of inspection.

On August 12, 1986, Unit 1 began the end-of-cycle 1 refueling outage. All Unit 1 Limitorque VMOs were inspected during the outage and all unidentifiable and type TW or TEW jumper wire was replaced with qualified wire at the time of inspection.

CONCLUSION

This incident is assigned Cause Code B, Design, Manufacturing, Construction/ Installation Deficiency. Limitorque Corporation did not ensure that only environmentally qualified components were supplied with the VMOs. The unidentifiable insulation was determined to be Hypalon from analysis by Duke Power and CHEM-BAC Laboratories, Inc. This insulation is not environmentally qualified.

The unqualified wiring was found internal to the VMOs and provided connection between operator limit switches and torque switches in the open coil circuits. These internal connections may have been installed after testing, but before shipment, by Limitorque. Test reports were also provided by Limitorque indicating that all VMOs were qualified.

Additional identifiable wiring was found internal to the Limitorque VMOs. This wiring insulation was marked as type TEW and TW PVC but the specific temperature rating was not marked. An evaluation was performed which concluded that type TEW PVC insulation was qualified for use outside containment in harsh environment. A similar PVC material was tested to 380 degrees F and 8.26 E7 Rads. However, this PVC wiring has also been replaced during inspections. Inspections of all Limitorque VMOs on both units are complete at this time.

There have been no previous incidents concerning equipment qualification at Catawba.

CORRECTIVE ACTION

(1) Inspections of both unit's Limitorque VMOs were initiated and all questionable internal wiring was replaced.

SAFETY ANALYSIS

The environmental conditions within the Reactor and Auxiliary Buildings after an accident are of such an extreme nature that certain specifications for wiring in valve actuators are required. The synergistic effects of high radiation and high temperature are considered to be the most detrimental. However, synergetics do not have to be considered because the actuators will not experience both radiation and high temperature at the same time.

One type of wire was found in some Environmentally Qualified limitorque actuators at Catawba that was not qualified for worst case conditions in the locations in which they were found. This type was Hypalon. Worst-case environments at Catawba have been determined as follows:

(1) Inside Containment: 1.3 E 8 Rads, 330 degrees F

(2) Outside Containment: 3.1 E 6 Rads, 212 degrees F

Hypalon has been rated as follows:

5.1 E 7 Rads, 302 degrees F

Note: 5.1 E 7 Rads is a recommended service limit per EPRI Report NP-2129, however it appears that a higher limit could be acceptable.

The in-containment valves that either contained Hypalon wire or possibly contained Hypalon wire have been identified (i.e., the wire replaced could not be determined). It should be noted that the temperature within a Limitorque Limit Switch Compartment may be substantially below the external environmental temperatures until temperature equalization would occur over time. Also, approximately eight days after a LOCA, all plant environmental conditions will be back to normal with the exception of radiation. Subsequent testing of Hypalon wire, that was removed from actuators at McGuire, was initiated. The wire was tested at 2.0 E 8 Rads exposure which is higher than worst-case conditions at Catawba. The wire was functionally verified that it would not breakdown enough to cause a valve to change positions unexpectedly (i.e., the valve would have remained functional). Based on the above, it is safe to assume that all of the affected valves would have performed their safety functions.

During the period of time of uncertain wire qualification, no unexpected incidents occurred which involved the release or potential release of radioactive material to the environment. Thus, the health and safety of the public were not affected by this incident.

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HAL B. TUCKER
VICE PRESIDENT
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February 9, 1987

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Catawba Nuclear Station, Unit 2
Docket No. 50-414

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Revision 1 to Licensee Event Report 414/86-35 concerning Limitorque valve motor operators being found to contain non-environmentally qualified wiring due to a manufacturing deficiency. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

RWO/10/sbn

Attachment

xc: Dr. J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
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NRC Resident Inspector
Catawba Nuclear Station

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