NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

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TITLE (4)

Inadequate Valve Operator Torque Settings Due To Manufacturer Deficiency

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)
									N/A	0 5 0 0 0
1 0	2 4	8 6	8 6	0 5 7	0 3	0 8	2 1	8 7		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
5		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
0 0 0		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X 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)	10 CFR 21
		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
Julio G. Torre, Assistant Engineer - Licensing	7 0 4 3 7 3 - 8 0 2 9

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 October 24, 1986, it was determined that up to fifty-three station valves' motor actuator torque switches may have been set incorrectly. These settings could have resulted in the actuators not providing adequate torque to allow the valve to perform their safety related function. These actuators were all manufactured by Rotork. When the valve actuators were set up, torque settings were based upon information verbally supplied by Rotork. These settings assumed linearity between the 40% torque rating (setting #1) and the 100% torque rating (setting #5). Testing of one actuator revealed the torque output not to be linear. All fifty-three actuators have been reset so that sufficient torque will be developed by the actuator. Both units have been in all modes while the switch settings were in question. Units 1 and 2 were both in Mode 5, Cold Shutdown, at the time of discovery.

This incident is assigned Cause Code B, Design, Manufacturing, Construction/ Installation Deficiency. The valve actuator vendor did not supply accurate information to set up the output torque for the actuators.

The health and safety of the public were unaffected by this event.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

BACKGROUND

Rotork Actuators are used for remote control of plant valves (EIIS:V). The actuators are driven by a 600 Volt, 3 Phase AC motor (EIIS:MO). The size of the motor depends on the size of the valve and the force (torque) necessary to open and close the valve. Rotork actuators have five torque switch settings which at the time of this event were thought to represent 40%, 55%, 70%, 85%, and 100% of their rated torque. The torque switch setting for each actuator is determined based on the maximum differential pressure (D/P) expected on its associated valve during normal and abnormal events within the design basis.

DESCRIPTION OF INCIDENT

On October 23, 1986, valve 1NV312A was being repaired. Unit 1 was in Mode 5, Cold Shutdown, and was in the process of end of Cycle 1 Refueling, and Unit 2 was in Mode 5, Cold Shutdown, due to a forced outage for main generator replacement. The motor and wormgear had been replaced the day before, and the valve's actuator was then being calibrated per procedure IP/0/A/3820/04, Operating Checkout of Limitorque and Rotork Valve Actuators. After setting the torque switch to the specified setting, per the procedure, the technicians decided to check the torque output while the actuator was on the test bench. Upon checking the output, they discovered that it was much lower than required. At approximately 1500 hours, the technicians contacted the responsible Staff Engineer and told him of their findings. The Staff Engineer requested that they perform a 5 point performance curve (percent torque output vs. torque switch setting) while the valve was still on the bench. There are 5 torque switch setting positions on a Rotork Actuator. At this time, it was thought that setting 1 represented 40% of rated torque and setting 5 represented 100% of rated torque.

Based on verbal communication with Rotork, a linear (straight) curve was assumed from 40% to 100%. Rotork and their service organization had been aware of Duke's use of this Setting Curve. Their service representatives also made torques switch setting adjustments conforming to this curve. When the technicians performed the 5 point performance curve, a non-linear curve was discovered and was typically lower than the Setting Curve. Valve 1NV312A was determined to be incapable of providing the required torque for proper operation.

On October 24, 1986, at approximately 0800 hours, the Staff Engineer contacted the responsible Duke Power design group and informed them of the curve/setting problem. Review of additional Duke test data, and data requested from Rotork, substantiated the initial finding was not unique to that one actuator. This discovery caused concern that actuators adjusted to the Setting Curve may not provide adequate torque to allow valves to fully perform their safety function. The design group was requested to evaluate all safety related valves that might have been affected and determine corrective action necessary to allow power escalation. While the design group was working on this, the Staff Engineer submitted a Station Problem Report (SPR) to correct valve 1NV312A per the test data that had been obtained. A Variation Notice (VN) was initiated to correct

the valve. At approximately 2100 hours, the design group provided a list of affected valves. It was determined that fifty-two valves (in addition to 1NV312A) that contained Rotork actuators were not normally set at 100% (Setting 5). Due to uncertainties involved, worst case scenarios for undertorque actuators were evaluated, and either increased torque switch settings or test verification/reset was recommended for the fifty-two actuators. Actuators that would allow operation at maximum torque, without damage to the actuator or valve, were to be set at 100% (Setting 5). Actuators that would not allow operation at maximum torque were to be removed and calibrated on the test bench.

On October 25, 1986, VN's were initiated to correct the valves that had been identified. Also, valve 1NV312A was corrected under a separate Work Request.

On October 31, 1986, a VN was initiated to correct valve 2NV037A which was later identified to need re-adjusting.

By November 19, 1986, all VNs were completed and all affected valves were determined to be operable.

CONCLUSION

This incident is assigned Cause Code B, Design, Manufacturing, Construction/ Installation Deficiency. Rotork did not supply accurate information to set up the output torque for valve actuators. From verbal information supplied by Rotork, a linear (straight) Setting Curve ffom 40% rated torque to 100% rated torque was implied. Rotork had been aware of use of this Setting Curve and their service representatives had also made torque switch setting adjustments conforming to this curve. Duke determined from testing that the Rotork Setting Curve did not represent actual actuator performance. This misinformation allowed Duke to potentially set actuator torque switches to settings below that required to assure full operability of valves. Affected safety-related valves were identified and variation notices were issued to correct the settings and assure that they would open and close properly.

NRC IE Bulletin 85-03, issued on October 15, 1985, requested that licensees develop and implement a program to ensure that switch settings on certain safety-related motor operated valves are selected, set and maintained correctly to accommodate the maximum differential pressures expected on these valves during both normal and abnormal events within the design basis. The requested implementation date for this program is November 15, 1987. Based on this request and further investigation, Duke has committed to performing sufficient design reviews, field testing, and station modifications (if required) to ensure all safety-related motor-operated valves (MOVs) will perform their intended function. Duke is currently in the process of assessing the actions, maintenance priorities, and currently in the process of assessing the actions, maintenance priorities, and resources required to meet this commitment and will submit a schedule for completion of the operability verification on each unit by February 2, 1987.

There have been two previous incidents in which safety related valves have been inoperable due to torque settings being too low (see LERs 413/85-68 and 413/86-36).

CORRECTIVE ACTION

(1) The correct setting for valve 1NV312A was determined and a Variation Notice was issued to correct this valve.

(2) Valves which required re-adjusting were identified and Variation Notices were issued to correct these valves.

(3) The Variation Notices were completed and the affected valves were determined operable.

(4) Duke Power Company has committed to implement a program by November 15, 1987 to ensure that torque switch settings on all safety-related MOV's are selected, set and maintained correctly. This commitment was made per NRC IE Bulletin 85-03.

SAFETY ANALYSIS

Of the entire population of safety-related valves utilizing Rotork actuators, the following valves remained operable at all times:

(1) Valves with their torque switch settings at maximum, corresponding to a torque output known to be adequate.

(2) Valves which, when tested, exhibited adequate torque with existing switch settings.

(3) Valves shown to be operable by in-place testing with worst case actual system differential pressure.

In addition, although not verified for Catawba, other valves also may have been operable for a lower, more accurate differential pressure (versus the worst case actual system D/P).

The valves remaining from the original population were grouped according to similarities in application or function. For these valves, it was not possible to conclude that all would have been fully operable under all accident conditions when worst case torque curves are assumed. Therefore, the respective safety functions could not be verified under all accident conditions. However, the following factors should be considered for these affected valves:

(1) All of the operators were assumed to perform at the worst case level. Our in-house testing has shown that the vast majority of operators perform significantly better than worst case assumption.

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(2) No credit was taken for any conservatisms used in the operator sizing process. IE Bulletin 85-03 work is continuing to review this area.

(3) For many of these affected valves, alternate means were available to perform the safety function (additional non-Rotork valve in series with the affected valve, manual operation of the affected valve, valve normally in safe position, etc.).

The systems identified as containing affected Safety-Related valves are:

(a) Chemical and Volume Control System
(b) Component Cooling System
(c) Residual Heat Removal System
(d) Ice Condenser Refrigeration System
(e) Safety Injection System
(f) Nuclear Service Water System
(g) Containment Hydrogen Purge System
(h) Breathing Air System
(i) Instrument Air System
(j) Containment Air Release and Addition System

Many of these valves are containment isolation valves.

During the period of time of uncertain valve operability, no incidents occurred which involved the release of potential release of radioactive material. Thus the health and safety of the public were not affected by this event.

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HAL B. TUCKER
VICE PRESIDENT
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August 21, 1987

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

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413
LER 413/86-57, Revision 3

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Licensee Event Report 413/86-57, Revision 3, concerning inadequate valve operator torque settings due to a manufacturer's 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/sbn

Hal B. Tucker

JGT/108/sbn

Attachment

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