Consumers Power
POWERING MICHIGAN'S PROGRESS
Big Rock Point Nuclear Plant, 10269 US-31 North, Charlevoix, MI 49720

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Plant Manager

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Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6 - BIG ROCK POINT PLANT -
LICENSEE EVENT REPORT 90-005 - MOTOR OPERATED VALVE FAILURE RESULTING IN
PLANT SHUTDOWN - REVISION 1

Licensee Event Report (LER) 90-005 (Motor Operated Valve Failure Resulting in Plant Shutdown - Revision 1) is attached. This event is reportable to the NRC per 10CFR50.73(a)(2)(i).

This revision describes our actions during the 1990 Refueling Outage and updates the NRC as requested in Inspection Report 90-010.

William L Beckman
Plant Manager

CC Administrator, Region III, USNRC
NRC Resident Inspector - Big Rock Point

Attachment

OC1290-0001-BL01

IE22

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)
Motor Operated Valve Failure Resulting in Plant Shutdown

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
0 8	0 3	9 0	9 0	–	0 0 5	–	0 1	1 2	1 4	9 0		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)			
	N	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	0 3 7	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)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	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
R J Alexander, Technical Engineer	AREA CODE 6 1 6 — 5 4 7 – 1 6 5 3

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	
B	B M	V 2 0	R 3 7 8	N							

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 3, 1990 at 1006 hours, Operations personnel performed a surveillance test on a Core Spray motor-operated valve. On the first attempt, the valve failed to open. At 1440 hours it was decided to initiate a plant shutdown since troubleshooting and repair efforts were expected to take more than twenty-four hours. An Unusual Event was declared. At 0145 hours on August 4, all control rods were inserted and plant temperature was less than 212°F thus the Unusual Event was terminated.

On August 5 a setpoint change was completed to increase the torque setting of the valve and at 1415 hours the valve was successfully tested and declared operable. At 1421 hours reactor start-up commenced.

Cause of the failure was attributed to increased torque requirement while testing the valve under a high differential pressure condition.

During the 1990 Refueling Outage diagnostic testing on the existing valve operator confirmed that adequate margin for required design conditions existed. Disassembling the valve revealed four rings of aluminum packing and a broken carbon bushing. This discovery is postulated as being the cause of the stem binding.

The valve was reassembled with non-aluminum packing and the operator was replaced with an equivalent refurbished unit. The torque switch has been placed in the "boost" position.

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

Description of Event

On August 2, 1990 Operations personnel performed an augmented surveillance test on MO-7071 back-up core spray system (BM) motor-operated valve (20). This testing was initiated to monitor valve performance following a failure which occurred on August 13, 1989. At 0045 hours the valve failed to open and corrective action efforts were initiated. Repairs were completed to the electrical contactor with subsequent successful operation and operability declared at 2215 hours.

On August 3, 1990 the valve was tested again on an augmented surveillance and failed to open at 1006 hours. At 1440 hours it was conservatively decided to initiate a plant shutdown since troubleshooting and repair efforts were expected to take longer than twenty-four hours (LCO duration) and an Unusual Event was declared. At 0145 hours on August 4 the Unusual Event was terminated since all control rods (AA) were inserted and primary system (AD) temperature was less than 212°F.

Troubleshooting activities on August 3 actuated the valve control circuit (motor-disconnected) 116 times with no failures. An Automatic Controls Company (A626) representative inspected the operator visually and felt for loose contacts or connections. Everything appeared intact. At this point, torquing out became more suspect and the motor was reconnected. At 0600 hours on August 4 testing was terminated following twenty successful strokes at low differential pressure.

On August 5, a setpoint change was completed to increase the torque setting of the valve in the open position. This change was concurred with by both Rotork Corporation and Anchor Darling (A391), the manufacturer of the valve. At 1415 hours the valve was successfully tested and declared operable. At 1421 hours reactor start-up commenced. On August 6 at 0416 hours the valve was successfully stroked at high differential pressure per the augmented testing program.

Cause of Failure

It was concluded following troubleshooting and corrective action that the reason for valve operator failure was insufficient torque capability. The increase in torque required was attributed to valve unseating forces. In the 1989 Refueling Outage, the valve disc was replaced to improve leak tightness. The unseating forces at the time were noticeably increased. This combined with the high differential pressure test had increased the torque needed to open the valve.

During the 1990 Refueling Outage, additional testing was performed on the valve operator confirming manufacturer's data that adequate margin for design conditions existed. The valve was then disassembled in the presence of the vendor's representative (Anchor Darling). The only observed difficulty was the presence of four rings of Garlock (G040) aluminum packing under a broken carbon bushing in the stuffing box. The vendor representative believed that any binding in the valve would have been due to this condition. This packing was thought to have been completely removed because of a binding problem experienced with the same packing

in another plant motor-operated valve. Therefore, since diagnostic testing results on the valve operator were acceptable, it is concluded that the presence of Garlock aluminum packing in the stuffing box may have resulted in binding of the valve and the resulting failure to stroke under high differential pressure. To strengthen this conclusion, the removed operator may be sent to Rotork for inspection/testing/refurbishment in early 1991.

Corrective Action

The setpoint change which adjusted the operator to the "boost" position in the opening direction bypassed the opening torque switch to allow the full capability of the motor of approximately 150 ft. lbs.

A refurbished operator of the same size has been installed on MO-7071. The valve has been reassembled with non-aluminum packing. The torque switch position will remain in the "boost" position as described in the paragraph above. This operator exceeds the calculated operating requirements for the valve, but does not exceed valve allowable thrust. Satisfactory operation of valve/operator has been verified with diagnostic testing at maximum differential pressure by externally pressurizing the spool piece upstream of the valve.

Action to Prevent Recurrence

A review of the failure history of this valve has been conducted. In itself, the findings were inconclusive.

Three (3) other valves using Rotork operators were not evaluated because they are not subject to high differential pressure and the maintenance history of these valves revealed no failure or changes in switch settings. Because of another motor-operated valve failure to stroke, and most recently MO-7071, using Garlock aluminum packing has been discontinued. Efforts have been made to remove the aluminum packing from motor-operated valves at Big Rock Point.

Safety Assessment

Big Rock Point has two redundant piping systems to provide core spray from the fire water system in the event of a primary system break. Each core spray system has redundant valves in series to control fire water system flow. MO-7071 is the primary valve (ie, closest to the reactor) in the back-up system. Automatic actuation is provided by a 480 volt AC powered Rotork valve actuator (VOP-7071). The actuator causes the valve to open when both reactor pressure is below 200 psig and reactor water level is less than two feet nine inches above the top of the core. Normal system pressure will result in a differential pressure when opening MO-7071 of approximately 110 psi.

The testing performed and the failures which occurred were assumed to be under high differential pressure. This higher differential pressure can only occur, during the valves intended safety function use, if reactor pressure is trapped in the spool piece between MO-7071 and the upstream check valve VPI-303 following

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testing. Under these assumptions the differential pressure across MO-7071 would be equal to the difference between trapped reactor pressure, 1335 psig; and core spray system actuation pressure, 200 psig.

Because of the low probability of a high differential pressure condition occurring during opening of MO-7071 and considering that the primary core spray train was operational during the event, the safety significance of the event was low.