

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Richard A. Muench
Vice President Engineering

November 7, 1996

ET 96-0094

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
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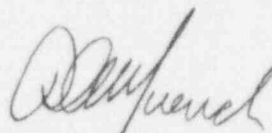
Subject: Docket No. 50-482: Licensee Event Report 96-010-00

Gentlemen:

The attached Licensee Event Report is being submitted pursuant to 10 CFR 50.73(a)(2)(i) concerning a failure to comply with the Technical Specifications.

If you should have any questions regarding this submittal, please contact me at (316) 364-8831 extension 4034, or Mr. Terry S. Morrill at extension 8707.

Very truly yours,



Richard A. Muench

RAM/jad

Attachment

cc: L. J. Callan (NRC), w/a
W. D. Johnson (NRC), w/a
J. F. Ringwald (NRC), w/a
J. C. Stone (NRC), w/a

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TITLE (4)
Failure Of Motor Operated Valve EFHV0034, "ESW B To Containment Air Coolers"

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	9	96	96	010	00	11	7	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE 1 POWER 100%	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)
	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
	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 Terry S. Morrill Manager Regulatory Services	TELEPHONE NUMBER (Include Area Code) 316-364-8831-8707
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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)

YES (If yes, completed EXPECTED SUBMISSION DATE)	X NO	EXPECTED	MONTH	DAY	YEAR
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ABSTRACT:

On October 9, 1996, during routine valve testing, motor operated valve EFHV0034, "ESW B To Containment Coolers," failed to fully close. The cause of this failure was determined to be inadequate pre-tensioning of the torque switch contact finger. Subsequent reviews showed: 1) the valve actuator was replaced during the eighth refueling outage, 2) the post-installation VOTES test results reflected this inadequate pre-tensioning, and 3) the valve first failed to fully close upon demand on July 28, 1996. However, due to programmatic deficiencies, personnel error, and a lack of a questioning attitude, these indicators were incorrectly overlooked. Because the valve actuator was not operable since the replacement of the actuator in March 1996, this placed the plant in non-compliance with technical specifications and as such this event is reportable in accordance with 10 CFR 50.73(a)(2)(i). Corrective actions included repairing the valve actuator, providing training, and revising the applicable program requirements.

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Plant Conditions Prior to the Event:

MODE = 1
Reactor Coolant Pressure = 2234 psig
Reactor Power = 100%

Basis for Reportability:

10 CFR 50.73(a)(2)(i) requires each licensee to report any operation or condition prohibited by the plant's technical specifications.

Wolf Creek Nuclear Operating Corporation Technical Specification 3.7.4 states:

"At least two independent essential service water (ESW) loops shall be OPERABLE."

The associated action statement reads:

"With only one ESW loop OPERABLE, restore at least two ESW loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours."

When valve EFHV0034 failed to operate correctly on July 28, 1996, it rendered the associated train of ESW inoperable. The valve performance was in-fact inadequate since the replacement of the valve actuator in March 1996. This placed WCGS in noncompliance with the action statement for Technical Specification 3.7.4. Noncompliance with Technical Specification 3.7.4 is reportable per 10 CFR 50.73(a)(2)(i).

Description of Event:

On October 9, 1996, during routine valve testing, motor operated valve EFHV0034, "ESW B To Containment Coolers," [BI] failed to fully close. Subsequent reviews showed: 1) the valve actuator was replaced in March 1996, during the eighth refueling outage, 2) the post-installation VOTES test, performed on March 10, 1996, reflected the inadequate pre-tensioning of the torque switch contact finger, and 3) the valve first failed to fully close upon demand on July 28, 1996. The investigation further showed that during the July 28, 1996, event the control room operators re-stroked the valve several times. During the subsequent restroking activities the control room operators dispatched a nuclear station operator to visually observe valve performance. The nuclear station operator reported the valve was performing satisfactorily. The control room operators incorrectly assumed the valve had experienced a non-repeatable position limit-switch indication problem, and the

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valve was returned to service and declared operable without the identification of a root cause.

Root Cause and Corrective Actions:

Root Cause:

The failure of motor operated valve EFHV0034 to close on demand on October 9, 1996 can be attributed to three individual failures. Any one of the three individual failures, if corrected prior to October 9, 1996, would have prevented the failure of EFHV0034 to close on demand.

• Hardware Failure:

Based on a review of the latest VOTES diagnostic switch trace dated March 10, 1996, for EFHV0034 in conjunction with trouble shooting activities performed on October 9, 1996, it is concluded that the failure mechanism for the event was the lack of proper torque switch contact finger tension. The lack of tension precluded the MOV from consistently completing its entire closing direction function. The torque switch was not adjusted properly while performing maintenance during the actuator replacement in the eighth refueling outage.

• Failure to identify or correct the problem during the July 28, 1996, event:

Operations personnel did not sufficiently pursue the root cause of the July 1996, failure after observing that the valve was not providing proper closure indication. Even though the specific test acceptance criteria was satisfied (Slave Relay test only verifies open indication), the initial failure of the valve to provide closure indication should have prompted the pursuit, identification, and correction of the failure. Repeat cycling of the valve to obtain acceptable indication results did not identify or correct the initial failure mechanism which still existed. These actions exhibit a lack of a questioning attitude. A more rigorous pursuit would have identified the failure mechanism which ultimately resulted in the October 1996, failure.

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- Failure to identify the problem during VOTES testing on March 10, 1996:

The VOTES diagnostic switch trace from the March 1996, test revealed that the failure mechanism existed after the actuator was replaced during the eighth refueling outage. However, the acceptance criteria specified by Procedure MGE LT-099, "MOV Diagnostic Testing," does not specifically direct the individual performing the trace analysis to verify that sufficient current is being conducted during the bypass portion of the stroke, and confirm that adequate contact finger tension is present, therefore, the failure mechanism that ultimately led to the October 1996, failure would have been identified and corrected on March 10, 1996.

Contributing Factors:

- Past failures (prior to the eighth refueling outage) which produced identical indication but had different root causes.

Events of July 1995, and October 1995, had a different root cause than the recent events of July 1996, and October 1996. The root cause of the 1995, failures were determined to be marginally low torque switch settings. However, at the time of the July 1996, failure, it was still presumed that the failures were identical as those observed previously, even though the MOVs had already been refurbished with increased torque switch settings during the eighth refueling outage.

- The lack of a questioning attitude.

System engineering not recognizing the significance of repeated failures during their Action Request Review Process was a contributing factor to the October 1996, event. If a more rigorous questioning attitude had been employed during the action request reviews associated with the earlier failures, the problem may have been corrected prior to October 1996.

- Failure to have adequate procedures. Procedures MGE LT-001, "Torque Switch Balancing," MGE LT-004, "Maintenance of Limitorque Valve Operators Type SMB 000," and MGE LT-009, "Limitorque Model SMB Limitswitch Adjustment"

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The subject condition of inadequate torque switch contact finger tension is not a commonly observed problem. As such, MGE LT-001, MGE LT-004, and MGE LT-009, have historically relied upon skill of the craft for detection of such unusual conditions. However, these MOVs were refurbished and replaced during the eighth refueling outage without detection of the contact finger condition. Therefore, if the procedures that apply to the area of interest would have specifically addressed the subject failure mechanism, the problem would have been identified and corrected during refurbishment/replacement activities in eighth refueling outage.

- There is currently a significant backlog of work for the MOV engineer. If not, he would have been more proactive in investigating and coordinating the resolution of the July 28, 1996, failure.

Corrective Actions

Immediate:

1. Trouble shooting was performed on October 9, 1996, per Work Package 116284-1 to investigate the failure of EFHV0034 to close on demand. The troubleshooting discovered that insufficient torque switch contact finger tension existed. The tension on the contact finger was adjusted and the torque switch contact was cleaned during the trouble shooting activity.
2. An assessment was performed to determine if the EFHV0034 event was a generic problem that could potentially affect other MOVs. All safety related MOVs utilizing a torque switch of the same design as used in EFHV0034 were evaluated for susceptibility to a similar failure. Specifically, all MOVs possessing SMB-000 Operators. The design of the SMB-000 torque switch is much more susceptible to this type of failure due to the unique "leaf-style" design. With the leaf-style design, a relatively long contact finger/leaf forms a mating point with the contact. Tension must be applied to the finger to maintain the mating point with the contact.

The evaluation was performed through a review of the latest VOTES diagnostic test traces for all 42 Generic Letter 89-10, safety related SMB-000 actuators/valves. Inadequate torque switch contact finger tension is apparent in the "VOTES Switch Trace" because the 60 Hz sinusoidal wave form which is normally present is a flat line during the bypass portion of the open or close stroke.

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Through this review, it has been determined that there are no other actuators of similar design which are experiencing this problem. VOTES traces were examined in both the opening and closing direction for possible signs of this type of failure, and no cases were identified. Based on this data, it has been concluded that this problem does not generically affect other valves throughout the plant.

- 3) As a result of this sequence of failures, the area of diagnostic analysis via the VOTES technology was reviewed. The objective of the assessment was to determine if the diagnostic tools currently available were being utilized to their maximum potential. It has been determined that all relevant performance characteristics and operating parameters were adequately addressed.
- 4) Action Request 18246 was initiated to perform a partial VOTES test (switch probes only) on EFHV0034 during work week 97/01/05. The purpose of the test is to confirm that the trouble shooting activities performed on October 9, 1996, are effective.

Long Term:

The following corrective actions will prevent recurrence:

1. Revise Procedure MGE LT-099.

The VOTES testing acceptance criteria will specifically prompt the individual performing the trace analysis to verify that current is being conducted through the torque switch contact during the open and close bypass portion of the valve stroke. This verification effort ensures that adequate torque switch contact finger tension is present. This action will be completed by November 15, 1996.

2. Revise Procedures MGE LT-001, MGE LT-004, and MGE LT-009.

These maintenance procedures will contain specific guidance relative to the inspection and/or verification of torque switch contact finger tension for SMB-000 switches. This check would minimize the recurrence of a similar failure. This action will be completed by November 15, 1996.

3. Develop a plan to eliminate the MOV work backlog.

An action plan will be developed to eliminate the backlog of MOV related work in a timely fashion. This plan will include assignment of additional resources. This action plan will be developed by November 29, 1996.

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4. Place PIR 96-2528 in the requalification training program for electrical maintenance

The inclusion of this subject matter into the training program will increase the awareness level of this failure mechanism to appropriate personnel and would minimize the recurrence of a similar failure. This action will be completed by November 15, 1996.

5. Classify PIR 96-2528 as required reading for operations.

Communicating this sequence of events to operations personnel would increase the awareness level of this type of issue. The significance of this type of failure and importance of sufficiently pursuing the root cause to avoid recurrence is emphasized. This PIR will be forwarded to operations personnel for required reading with a due date of December 13, 1996.

6. Communicate expectations at the November 12, 1996, Operation's staff meeting.

Discussion of the sequence of events with the Shift Supervisors to emphasize the significance and recurring nature of these failures. Expectations in regard to sufficiently pursuing the root cause when safety-related equipment fails to perform as designed shall be communicated. This action will be completed by November 15, 1996.

7. Discuss PIR 96-2528 with system engineering.

Communicating this sequence of events to system engineers may be beneficial for their future reviews of action requests. The series of failures associated with this issue may have been corrected earlier if a more rigorous questioning attitude had been employed during action request reviews associated with earlier failures. The contents of this PIR will be communicated to system engineering personnel via group meetings. This action has been completed.

Safety Significance:

If an automatic actuation of the emergency safety features actuation system (ESFAS) had occurred, Valve EFHV0034, would have traveled to its safety-related position (open position) as required. The inadequately pre-tensioning of the torque switch contact finger only affected the valve's travel in the closed position. The safety-related position for this valve is open. Therefore, if the valve was in any other position, other than the full open position, and an ESFAS signal had occurred the valve would have opened.

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Other Previous Occurrences:

LER 89-019-00: This LER documents a failure of Valve BG HV-8110, "Centrifugal Charging Pump Minimum Flow Valve," to fully close. The root cause of this event was determined to be a faulty relay, which was found to be sticking in its energized (closed) position with no power to the coil. The relay was removed and repaired. The root cause and corrective actions associated with this LER would not have prevented occurrence of the event being documented in LER 96-010-00.