WOLF CREEK
NUCLEAR OPERATING CORPORATION

John A. Bailey
Vice President
Operations

March 27, 1992

NO 92-0002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Subject: Docket No. 50-482: Licensee Event Report 91-024-01

Gentlemen:

The attached Licensee Event Report (LER) is being submitted pursuant to 10 CFR 50.73(a)(2)(v) concerning a condition that could have prevented the function of systems needed to mitigate the consequences of an accident and 10 CFR 50.73(a)(2)(ii) as a condition that resulted in the nuclear power plant being in a condition outside the design basis of the plant.

If you have any questions concerning this matter, please contact me or Mr. S. G. Wideman of my staff.

Very truly yours,

John A. Bailey

John A. Bailey
Vice President
Operations

JAB/jra

Attachment

cc: A. T. Howell (NRC), w/a
R. D. Martin (NRC), w/a
G. A. Pick (NRC), w/a
W. D. Reckley (NRC), w/a

IE22
1/1

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): Wolf Creek Generating Station

DOCKET NUMBER (2): 0 5 0 0 0 4 8 2

PAGE (3): 1 OF 1 7

TITLE (4): Deficiencies Discovered In Motor-Operated Valve Testing Program Which Caused Potential Inoperability of Safety Related Valves

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	DOCKET NUMBER (5)
									0 5 0 0 0
1 2	0 5	9 1	9 1	- 0 2 4	- 0 1	0 3	2 7	9 2	0 5 0 0 0

OPERATING MODE (9): 5

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
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)	
20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	Part 21
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: Steve G. Wideman - Supervisor Licensing

TELEPHONE NUMBER — AREA CODE: 3 1 6 3 6 4 - 8 8 3 1

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
X	B Q	I S V	W 1 2 0	Y	X	B A	I S V	A 3 9 1	Y
X	B A	F C V	M 1 2 0	Y	X	A B	I S V	V 0 8 5	Y

SUPPLEMENTAL REPORT EXPECTED (14)

YES. (If yes, complete EXPECTED SUBMISSION DATE).

X NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

In November of 1991, deficiencies were discovered in Wolf Creek Nuclear Operating Corporation's (WCNOC) program for implementing commitments to the provisions of Generic Letter 89-10 (GL 89-10), "Safety Related Motor-Operated Valve Testing and Surveillance". In response to these deficiencies a team effort was initiated to determine the operability of safety related motor-operated valves (MOV) in the MOV testing program. This team determined that 28 safety related MOVs may have been inoperable or may not have met the requirements of GL 89-10 at certain times in the past. Operability of all valves was assured prior to restart from the fifth refueling outage.

The failure of the MOVs to meet the requirements of GL 89-10 resulted from WCNOC management's failure to communicate expectations to personnel involved in the MOV program. An evaluation of existing WCNOC programs was initiated to ensure that conditions adverse to quality were being identified and promptly resolved through the appropriate corrective action process. No other similar situations were discovered. Also, a Management Action Plan was initiated to focus attention and resources on significant performance and program improvement issues so that WCNOC achieves excellence in all its activities.

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

INTRODUCTION

In November of 1991, deficiencies were discovered in Wolf Creek Nuclear Operating Corporation's (WCNOC) program for implementing commitments to the provisions of Generic Letter 89-10 (GL 89-10), "Safety Related Motor-Operated Valve Testing and Surveillance". In response to these deficiencies a team effort was initiated to determine the operability of safety related motor-operated valves (MOV) in the MOV testing program. This team determined that certain safety related MOVs may have been inoperable or may not have met the requirements of GL 89-10 at certain times in the past. This condition is being reported pursuant to 10 CFR 50.73(a)(2)(v) as a condition that alone could have prevented fulfillment of a safety function that is needed to mitigate the consequences of an accident and to 10 CFR 50.73(a)(2)(ii) as a condition that resulted in the nuclear power plant being in a condition outside the design basis of the plant.

DESCRIPTION OF EVENT

GL 89-10 requires all licensees to develop and implement a program to ensure that MOVs will perform their intended safety related functions under design basis conditions. The MOV program is to include plans and procedures to review and confirm design parameters for each MOV, based upon each valve's safety related functions; perform calculations to determine the MOV's size and switch settings; demonstrate the capabilities of each MOV to perform its functions under design basis conditions; analyze each MOV failure; implement and justify corrective actions; and trend MOV performance and corrective actions. WCNOC committed to meet the provisions of GL 89-10 and its Supplements, including development of the program by January 1, 1991, with full implementation of the program by July 1994.

On October 28, 1991, it was discovered that incorrect spring packs may have been installed in the actuators for Spray Additive Tank Outlet to Containment Spray Pump "A" Isolation Valve EN HV15 [BE-ISV] and Spray Additive Tank Outlet to Containment Spray Pump "B" Isolation Valve EN HV16 [BE-ISV]. A detailed engineering evaluation determined that, although incorrect spring packs were installed, valves EN HV15 and EN HV16 were set up properly to perform their safety related function and at no time in the past would these valves have impaired the safety function of the Containment Spray System [BE].

On November 6, 1991, during testing of Pressurizer Power Operated Relief Valve BB HV8000B [AB-RV], the valve was subject to an overthrust condition of 30,000 pounds by the motor operator. An engineering evaluation determined that the valve was capable of withstanding 5 overthrust cycles of this magnitude without structural damage occurring to the valve. Also, a review of the work history associated with this valve did not indicate that any previous overthrust condition approaching this magnitude had occurred.

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

During a Nuclear Regulatory Commission inspection conducted on November 4 through 3, 1991, deficiencies were discovered in WCNOC's program for implementing commitments to the provisions of GL 89-10. In order to resolve these deficiencies a team was initiated to examine all safety related MOVs which had been previously tested and other specific MOVs in the MOV testing program. The immediate objective of the MOV team was to ensure that the MOVs would perform their safety related functions under design basis conditions prior to restart from the fifth refueling outage.

Prior to commencing MOV work activities in response to the MOV team effort, all procedures were reviewed and revised, or written, to ensure that short term activities necessary to demonstrate operability of safety related MOVs were in full compliance with the provisions of GL 89-10. Immediate actions focused on analytically qualifying the MOVs with confirmatory static testing, using the best available industry methods and knowledge. The design procedures specified conservative inputs so that the analytical methods would conservatively envelope the credible system and field conditions which may be encountered by the MOVs under design basis conditions.

After the procedures were approved by the Plant Safety Review Committee, the MOV team re-evaluated the qualification of all safety related MOVs which may have been affected by previous MOV program activities. Torque/thrust requirements were determined for each identified MOV, as well as torque/thrust capabilities of the as-installed MOV configuration. Tests were also performed to ensure that the as-left switch settings allow the MOV to develop the required thrust under static conditions. Discrepancies between the required thrust and MOV capability, as well as test deficiencies were resolved prior to restart from the fifth refueling outage. Resolution involved any combination of physical modification of the MOV, revisions to operating procedures and/or adjustment of switch settings. In all, 120 MOVs were evaluated to ensure compliance with the MOV restart program requirements. This evaluation determined that the following 28 safety related MOVs may have been inoperable or may not have met the requirements of GL 89-10 during various periods in the past because of the inability to achieve required thrust:

Valve	Description
EM HV8807A [BQ-ISV]	Centrifugal Charging Pump (CCP)/Safety Injection (SI) Cross-Tie Isolation Valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 06001GM92FBB0D000W75-0009.
EM HV8807B [BQ-ISV]	CCP/SI Cross-Tie Isolation Valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 06001GM92FBB0D000W75-0007.

EM HV8923A [BQ-ISV] — Refueling Water Storage Tank (RWST)/SI Suction Isolation Valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 06001GM92FBB0D000W75-0008.

EM HV8923B [BQ-ISV] — RWST/SI Suction Isolation Valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 06001GM92FBB0D000W75-0006.

AL HV9 [BA-FCV] — Motor Driven Auxiliary Feedwater Pump (MDAFP) Flow Control Valve Valve. Manufactured by Masoneilan International Incorporated, Model 90-207X1.

AL HV11 [BA-FCV] — MDAFP Flow Control Valve. Manufactured by Masoneilan International Incorporated, Model 90-207X1.

AL HV34 [BA-ISV] — Condensate Storage Tank (CST) to MDAFP "B" Suction Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E-6207-5.

AL HV35 [BA-ISV] — CST to MDAFP "A" Suction Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E-6207-5.

AL HV36 [BA-ISV] — CST to Turbine-Driven Auxiliary Feedwater Pump Suction Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E-6207-4.

BB HV14 [AB-ISV] — Reactor Coolant Pump (RCP) "B" Thermal Barrier Cooler Return Isolation Valve. Manufactured by Velan Valve Corporation, Model B10-3054P-02WN.

BN HV3 [BP-ISV] — RWST Supply to Containment Spray Pump "B" Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6118-3.

EF HV38 [BI-ISV] — "B" Train Essential Service Water (ESW) To Ultimate Heat Sink Discharge Isolation Valve. Manufactured by Neles-Jamesbury, Model 8226-EX.

EF HV46 [BI-ISV] — "B" Train ESW Containment Air Cooler Discharge Isolation Valve. Manufactured by Fischer Controls Company Incorporated, Model 9220.

EG HV58 [CC-ISV] — Component Cooling Water (CCW) Supply to RCP Coolers Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6207-21.

EG HV59 [CC-ISV]	CCW Return from RCP Coolers Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6207-21.
EG HV62 [CC-ISV]	CCW Return from RCP Thermal Barriers Isolation Valve. Manufactured by Velan Valve Corporation, Model B12-3144P-02WN.
EG HV71 [CC-ISV]	CCW to Containment Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6207-23.
EG HV72 [CC-ISV]	CCW to Post Accident Sampling System (PASS) Isolation Valve. Manufactured by Yarway Corporation, Model 5515B-SA105M.
EG HV126 [CC-ISV]	CCW Supply to RCP Coolers Bypass Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6207-23.
EG HV127 [CC-ISV]	CCW Supply to RCP Coolers Bypass Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6207-21.
EG HV130 [CC-ISV]	CCW Return from RCP Coolers Bypass Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6207-22.
EG HV132 [CC-ISV]	CCW Return from RCP Coolers Bypass Isolation Valve. Manufactured by Velan Valve Corporation, Model B12-3144P-02WN.
EJ HV8716A [BP-ISV]	Residual Heat Removal (RHR) Cross-Tie Isolation valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 10000GM84FEB0D005W75-0004.
EJ HV8716B [BP-ISV]	RHR Cross-Tie Isolation Valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 10000GM84FEB0D005W75-0003.
EM HV8835 [BQ-ISV]	SI Cold Leg Isolation Valve. Manufactured by Westinghouse Electric Corporation/Hagan, Model 04000GM88FNB0D000W75-0010.
EN HV1 [BE-ISV]	Containment Recirculation Sump to Containment Spray Pump "A" Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6118-4.

EN HV7 [BE-ISV]	Containment Recirculation Sump to Containment Spray Pump "B" Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6118-4.
LF FV95 [WK-ISV]	Containment Normal Sumps to Floor Drain Tank Isolation Valve. Manufactured by Anchor/Darling Valve Company, Model E6118-5-1.

On November 22, 1991, during an investigation by the MOV team, it was discovered that RC7 Seal Water Supply Isolation Valves BB HV8351A, B, C, D [CB-ISV] and the CCP's Minimum Flow Valve BG HV8111 [CB-ISV] could not be declutched to be opened manually from the closed position. These valves are required to be manually opened after a Control Room evacuation due to a fire, in order to maintain RCP Seal integrity if a spurious signal closes the valves. A detailed engineering evaluation and field testing determined that restoration of cooling to the RCP Seals can be achieved in sufficient time as to preclude uncovering the reactor core.

In addition, it was discovered that the actuator for CCW to PASS Sample Coolers Supply Isolation Valve EG HV73 had loose mounting bolts. A detailed engineering evaluation determined that valve EG HV73 would have adequately performed its design function with the loose actuator mounting bolts. An evaluation of Volume Control Tank Low Level Isolation Valve BG LCV112C was also performed and it indicated that the valve had always met the requirements of GL 89-10 and all original design requirements.

Safety Related Function of Potentially Inoperable Valves

Valve	Safety Related Function(s)
EM HV8807A EM HV8807B	Manually stroked open during the change over from the injection mode of Emergency Core Cooling System (ECCS) operation to the recirculation mode. Closure of the valves may be required to isolate a passive failure on either side of the valves if the leakage is excessive.
EM HV8923A EM HV8923B	Must remain open following the Loss of Coolant Accident injection and recirculation phases. Closure of valves may be required to isolate a passive failure on the RWST side of the valves.
AL HV9 AL HV11	Limits flow to a preset value in the event of low pressure in the Steam Generators.

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AL HV34 AL HV35 AL HV36	Stroked closed upon receipt of a Low Suction Pressure signal from the CST.
BB HV14	Isolates leakage from the Reactor Coolant System (RCS) to CCW in the event of a Thermal Barrier Heat Exchanger tube rupture.
BN HV3	Remotely manually closed during switchover from the RWST to the Containment Sump. Isolates RWST from the Containment Sump in the event of back leakage through check valve EN V9.
EF HV38	Fully opens following a SI Signal or loss of offsite power to assure that the ESW Train "B" has a flow path into the Ultimate Heat Sink.
EF HV46	Provides remote manual Containment isolation.
EG HV58	Automatically closes on a Phase "B" Containment isolation signal. Must be capable of opening to restore cooling to the RCPs Thermal Barriers and to provide CCW to other essential components inside Containment.
EG HV59	Automatically closes on a Phase "B" Containment isolation signal. Must be capable of opening to provide cooling to the Excess Letdown Heat Exchanger for safe shutdown following isolation during accident recovery.
EG HV62	Automatically closes on a Phase "B" Containment isolation signal. Isolates on high flow from the RCPs Thermal Barriers. Must be capable of opening to provide cooling to the RCPs Thermal Barriers following isolation during accident recovery.
EG HV71	Automatically closes on a Phase "B" Containment isolation signal. Must be capable of opening to provide cooling to the RCPs Thermal Barriers following isolation during accident recovery.
EG HV72	Automatically closes on SI Signal or Low-Low CCW Surge Tank level.

EG HV126	Must be able to close to provide Containment isolation. Must be capable of opening to provide cooling to the Reactor Coolant Pumps Thermal Barriers following isolation during accident recovery.
EG HV127	Must be able to close to provide Containment isolation. Must be capable of opening to provide cooling to the RCPs Thermal Barriers and the Excess Letdown Heat Exchanger following isolation during accident recovery.
EG HV130	Manually closed on a Phase "B" Containment isolation signal. Must be capable of opening to restore cooling to Excess Letdown Heat Exchanger when EG HV60 is closed and unavailable.
EG HV132	Manually closed on a Phase "B" Containment isolation signal. Must be capable of opening to restore cooling to the RCPs Thermal Barriers when EG HV62 is closed and unavailable.
EJ HV8716A EJ HV8716B	Must isolate to provide train separation during ECCS switchover to cold leg recirculation and RHR plant cooldown mode. Opens to align for hot leg recirculation. Isolates to identify/stop leakage from the RCS. Opens to lineup Firewater to the RCS from Diesel Fire pump upon loss of RHR. Opens for ECCS injection in Modes 1 through 3.
EM HV8835	Provides remote manual Containment isolation. Stroked closed during switchover from cold leg to hot leg recirculation.
EN HV1 EN HV7	Must be manually opened upon receipt of Low-Low-2 alarm setpoint from the RWST. Isolates passive failures located on the downstream side of the valves.
LF FV95	Closes on a Containment Phase "A" isolation signal

ROOT CAUSE AND CORRECTIVE ACTIONS OF POTENTIAL VALVE INOPERABILITY

Table 1 describes valve operability under three criteria. Whether the valve was operable at time of original design, whether the valve met GL 89-10 requirements, and whether the valve was operable during the interim period between the original design requirements and GL 89-10 requirements. Also, valve operability in the open and closed direction is identified. Root cause and corrective actions are noted for each valve. Operability of all valves was assured prior to restart from the fifth refueling outage.

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ROOT CAUSE AND CORRECTIVE ACTIONS OF MOV PROGRAM FAILING TO MEET GL 89-10 REQUIREMENTS

The failure of the MOVs to meet the requirements of GL 89-10 resulted from WCNOC management's failure to communicate expectations to personnel involved in the MOV program. Management expected that MOV program personnel would verify operability of the MOVs, including initiation of prompt and thorough corrective actions in response to deficiencies identified during implementation of the program. Personnel involved with the implementation of the provisions of GL 89-10 were the same individuals who were involved with WCNOC's earlier MOV program, developed in response to IE Bulletin 85-03, "Motor Operated Valve Common Mode Failures During Plant Transients Due To Improper Switch Settings". The provisions of GL 89-10 were treated as an extension of this earlier program and, given the long time frame for implementation of GL 89-10, personnel involved with the MOV program perceived their focus to be on implementation of the details of the program rather than on resolution of emerging issues associated with MOV design, maintenance and testing. Personnel involved with the MOV program had also developed the mindset that actual proof of MOV operability depended upon dynamic test results and any potential deficiencies could remain open, until such time that dynamic tests could be performed.

Ineffective self-assessment methods utilized by WCNOC management contributed to ineffective corrective actions, in that WCNOC management failed to recognize that prompt and thorough actions were not being taken to resolve emerging MOV issues. Since the provisions of GL 89-10 were viewed as an extension of the earlier MOV program, WCNOC management did not re-evaluate the earlier program against the provisions of GL 89-10, which could have reinforced the programs' objectives and its interface with the WCNOC corrective action program. Additionally, no management assessment methods were in place to periodically monitor the MOV program performance, which could have ensured that the MOV program activities remained focused on prompt resolution of issues affecting MOV operability.

In November 1991, the Director Plant Operations initiated an evaluation of existing WCNOC programs to ensure that conditions adverse to quality were being identified and promptly resolved through the appropriate corrective action process. Managers and Supervisors were required to review the programs under their responsibility; identify any unresolved problems or issues; evaluate the impact the problem may have on safe operation of Wolf Creek Generating Station; and provide the status and plans for correcting each problem. The results of these evaluations were documented in correspondence to the Director Plant Operations, prior to restart from the fifth refueling outage. The evaluation did not discover any other instances with the exception of the MOV program, where potentially significant deficiencies were not being resolved promptly and thoroughly.

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WCNOC executive management issued Executive Policy I.7, "Management Action Plan", on February 6, 1992, to focus attention and resources on significant performance and program improvement issues so that WCNOC achieves excellence in all of its activities. Candidate Management Action Plan (MAP) issues are identified by any of the methods used by management to provide oversight of WCNOC activities. Candidate MAP issues are discussed by the executive management committee, and when deemed necessary, are adopted as a MAP issue. Each MAP issue is assigned to the appropriate manager for resolution. An action plan is developed by the Issue Manager and approved by the executive management committee. Executive management oversight of the MAP is accomplished through periodic written status reports from the Issue Manager and through periodic review meetings. The initial MAP efforts are focused on enhancing management effectiveness in communicating performance expectations, management assessment of performance, and implementation of the corrective action process.

Additional actions have also been taken to improve the effectiveness of management's attention to significant issues which have the potential to affect safe operation of WCGS. An Issues Review Group (IRG) has been implemented to ensure responsibilities and resources are appropriately assigned for significant generic regulatory and safety issues impacting the operation of WCGS. In addition, the IRG receives feedback on the resolution of various issues, and may direct additional independent review when deemed necessary.

ADDITIONAL INFORMATION

Licensee Event Report 86-043-00 discusses an event in which discrepancies in the internal wiring and terminal blocks in safety related MOV actuators were identified. The corrective actions taken in that event addressed specific circumstances and had no correlation with this event.

Notification of this conditon to the Nuclear Regulatory Commission pursuant to 10 CFR 21 is accomplished through the issuance of this report.

SAFETY SIGNIFICANCE OF EVENT

Detailed evaluations were conducted to assess the safety significance of the potential inoperability of the MOVs because their "as-built" or interim configuration did not meet original design requirements. This evaluation encompassed MOVs associated with the ECCS [BQ], Chemical and Volume Control System [CB], Auxiliary Feedwater System [BA], Containment Spray System [BE], CCW System [CC], and ESW System [BI] that were identified by the MOV team to be potentially inoperable. The evaluations were performed to address the safety concerns that certain MOVs in the safety related systems may not be

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capable of performing their safety related function under design basis conditions and to provide the technical basis to conclude whether the identified MOV inoperability would have adversely affected safe plant operation during past cycles.

The evalustions concluded that potential inoperability of the identified MOVs would have insignificant effects on the design basis analysis results had a postulated Design Basis Accident occurred during the time period in which the specific MOVs were inoperable. Therefore, the MOVs inoperability did not significantly jeopardize safe operation of the plant nor pose a threat to the health and safety of the public.

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TABLE 1

#	VALVE	CLOSE			OPEN			NOTES
		89-10	INTERIM	ORIGINAL	89-10	INTERIM	ORIGINAL	
1	EMHV8807A	N	N	Y	N	N	Y	2
2	EMHV8807B	N	N	Y	N	N	N	2
3	EMHV8923A	N	N	Y	–	–	–	2
4	EMHV8923B	N	N	N	–	–	–	2
5	ALHV0009	–	N	Y	–	N	Y	2,3
6	ALHV0011	–	N	Y	–	N	N	2,3
7	ALHV0034	N	N	N	Y	Y	Y	2,3
8	ALHV0035	N	N	N	Y	Y	Y	2,3
9	ALHV0036	Y	N	Y	Y	Y	Y	6
10	BBHV0014	Y	N	N	–	–	–	4
11	BNHV0003	Y	N	N	Y	Y	Y	2
12	EFHV0038	–	Y	Y	–	N	Y	2
13	EFHV0046	–	N	Y	–	Y	Y	7
14	EGHV0058	N	N	N	Y	Y	Y	1
15	EGHV0059	N	N	N	Y	Y	Y	1
16	EGHV0062	N	Y	Y	Y	Y	Y	10
17	EGHV0071	Y	N	Y	Y	Y	Y	2
18	EGHV0072	Y	N	Y	–	–	–	8
19	EGHV0126	N	N	N	Y	Y	Y	2
20	EGHV0127	Y	N	N	Y	Y	Y	1
21	EGHV0130	Y	N	N	Y	Y	Y	1
22	EGHV0132	N	Y	Y	Y	Y	Y	10
23	EJHV8716A	Y	N	N	Y	Y	Y	9
24	EJHV8716B	Y	N	N	Y	Y	Y	9
25	EMHV8835	N	Y	Y	Y	Y	Y	10
26	ENHV0001	N	N	N	Y	Y	Y	5
27	ENHV0007	N	N	N	Y	Y	Y	5
28	LFFV0095	N	Y	Y	Y	Y	Y	10

NOTES:

1 LOW ORIGINAL DESIGN TORQUE SWITCH SETTINGS
2 INADEQUATE CONTROL OF TORQUE SWITCH SETTINGS
3 PREVIOUS MOV CALCULATION DEFICIENCY
4 EXCESSIVE FRICTION FACTORS
5 NONCONSERVATIVE DESIGN SEALING FORCES AND MARGINS
6 MISSING SPACER IN SPRINGPACK
7 LACK OF POST-MAINTENANCE TESTING
8 INCORRECT ROTOR SETTING
9 ACTUATOR SPRINGPACK IS UNDERSIZED
10 89-10 INOPERABILITY ONLY

NOTE 1: LOW ORIGINAL DESIGN TORQUE SWITCH SETTINGS

ROOT CAUSE: The original design supplied by Anchor Darling Valve Company specified insufficient torque switch settings for the installed spring packs such that the valve actuator would not provide the minimum required stem thrust.

CORRECTIVE ACTION: WCNOC initiated new design basis torque and thrust calculations for all safety-related Anchor Darling supplied motor operated valves. Using a conservative methodology in the calculations, WCNOC determined appropriate springpack and torque switch settings needed to ensure the valve actuators would provide sufficient thrust. The valve actuators were subsequently reconfigured or modified to reflect these springpack and torque switch settings. WCNOC will continue to maintain responsibility for the design basis torque and thrust calculations, ensuring that the appropriate conservative and latest available methodologies are applied.

NOTE 2: INADEQUATE CONTROL OF TORQUE SWITCH SETTINGS.

ROOT CAUSE: Torque switch settings were set lower than design values due to improper procedural control of setting and reading of the torque switch settings. Lack of established MOV training and lack of controlled design documents governing torque switch settings contributed to the problem.

CORRECTIVE ACTION: All safety-related valves under the scope of GL 89-10 have had as-found torque switch settings documented, subsequent to field walkdown and inspection performed by the MOV Phase I Team. All setting discrepancies have been identified, and subsequent evaluations were performed to correct the discrepancies prior to restart from the fifth refueling outage. Per the corrective action developed during Phase I, torque switch settings have been recognized as design basis and any changes are subject to design change evaluation requirements of the WCNOC Quality Assurance program.

NOTE 3: PREVIOUS MOV CALCULATION DEFICIENCY.

ROOT CAUSE: Methods for calculating target thrusts used in the earlier MOV programs were revised from the original design. This effectively lowered the minimum required thrust values and torque switch settings for the affected valves.

CORRECTIVE ACTION: During Phase I, all safety-related MOV design, maintenance and testing was halted, pending review and revision of MOV program procedures. These procedures were revised to address the design basis issues, using the latest available industry methods and knowledge. After development of the design basis calculations for thrust and torque, which used conservative inputs to envelope the credible system and field conditions encountered by the MOV's, all MOV's which could have been altered due to earlier calculations were re-evaluated. Valves not meeting the revised design criteria were adjusted and retested to display required thrust capabilities under static conditions. Future dynamic testing of the MOV's will verify the analytical approach and define margins.

NOTE 4: EXCESSIVE FRICTION FACTORS.

ROOT CAUSE: Motor operated valve performance as determined analytically did not reflect valve performance during field testing. The root cause is attributed to a higher than design stem or thread friction factor for the valve. This problem is specific to this particular valve in a family of four similar valves, all of which operate under identical conditions. Excessive friction could be the result of several factors including mechanical component machining tolerances, actuator/valve wear, or lubricant degradation.

CORRECTIVE ACTION: The excessive friction factor was detected from VOTES testing conducted under the GL 89-10 program During MOV Phase I, the minimum thrust requirements were met by adjustment of torque switch settings and confirmatory VOTES testing. WCNOC understands that analytical and actual motor operated valve performance may vary and established a MOV program which ensures actual valve performance parameters meet analytically derived requirements. In addition, WCNOC is developing a tracking and trending program to ensure valve field performance is optimized.

NOTE 5, [illegible] NSERVATIVE DESIGN SEALING FORCES AND MARGINS.

ROOT CAUSE: The original design provided by the Anchor Darling Valve Company failed to include conservative minimum required thrust values. Initial review suggests that forces such as those required for valve sealing were not accounted for in the original design, thus resulting in low minimum required thrusts. WCNOC is currently working with the supplier to better understand the original design methodology.

CORRECTIVE ACTIONS: WCNOC initiated new design basis torque and thrust calculations for Anchor Darling supplied valves. The calculations utilized a conservative methodology which includes all forces currently recognized by the industry as affecting the minimum required valve thrust. Subsequently, the valve actuators were reconfigured or modified to envelope the new torque and thrust values. WCNOC will continue to maintain responsibility for the design basis torque and thrust calculations, ensuring that the appropriate conservativisms and acceptable methodologies are utilized.

NOTE 6: MISSING SPACER IN SPRINGPACK

ROOT CAUSE: The as-installed springpack was found to be missing a spacer, which resulted in low actuator output thrusts. Review of work request history found that the springpack was always returned to the as-found configuration after maintenance. Root cause of the continued deficiency is lack of maintenance knowledge of proper springpack configuration. It is inconclusive whether this was the as-shipped condition of the springpack.

CORRECTIVE ACTION: A new, complete springpack of the same model number as the original was installed in the affected valves to correct the configuration nonconformance as immediate corrective action. All valves reviewed under the GL 89-10 program with similar springpack models have been verified for the correct springpack configuration and/or evaluated for expected thrust discrepancies. Increased training and plant maintenance awareness as a result of the GL 89-10 program will ensure that proper configuration is maintained.

NOTE 7: LACK OF POST-MAINTENANCE TESTING.

ROOT CAUSE and CORRECTIVE ACTION evaluated per Licensee Event Report 87-033.

NOTE 8: INCORRECT ROTOR SETTING.

ROOT CAUSE: The close limit switch rotor setting of the subject globe valve was incorrectly set at 3 percent from the fully closed position due to personnel error in the setting of the rotor. In additions, the globe valve should have been configured for torque closure rather than limit closure. The incorrect closure configuration contributed to the overall discrepancy and was caused by insufficient personnel awareness on the part of the architect engineer in that the original design requirements for the closure configuration was not specified to the valve vendor.

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

CORRECTIVE ACTION: The limit switch rotor was readjusted to 0 percent from the fully closed position immediately after the discrepancy was noted. A review of the open and closure configurations for all globe valves falling under the GL 89-10 MOV program was conducted. The results of this review found the subject valve and three others of the same design to be incorrectly configured. A design change was issued to modify the closing circuitry for the affected valves to torque closure. Through the corrective action efforts of the WCNOC MOV program, design documentation for all GL 89-10 MOV's will be modified to clearly show proper open and close configurations. Increased training and plant maintenance awareness as a result of the GL 89-10 program will ensure that valve limit switch adjustments are correctly performed.

NOTE 9: ACTUATOR SPRINGPACK IS UNDERSIZED.

ROOT CAUSE: The actuator springpack supplied by Westinghouse would not allow the valve to develop the minimum required thrust even at high torque switch settings. The root cause for the undersized springpack has not been determined but is under investigation by the WCNOC MOV Team.

CORRECTIVE ACTION: The original springpack has been upgraded to a heavier springpack to provide the minimum required thrusts as determined through the WCNOC GL 89-10 program. All Westinghouse motor-operated valves within the scope of the GL 89-10 program have been evaluated and verified for adequate thrust capabilities. As a result of the GL 89-10 program, WCNOC has taken ownership of the design basis and will periodically test the Westinghouse valves to ensure continued operability under the program requirements.

LICENSEE EVENT REPORT (LER) FAILURE CONTINUATION

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Wolf Creek Generating Station	0 5 0 0 0 4 8 2	9 1	-- 0 2 4	-- 0 1	1 7 OF 1 7

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	B P	I I S V	A 3 9 1	Y
X	B I	I I S V	J 0 1 0	Y
X	B I	I I S V	F 1 3 0	Y
X	C C	I I S V	A 3 9 1	Y
X	C C	I I S V	V 0 8 5	Y
X	C C	I I S V	Y 1 0	N
X	B P	I I S V	W 1 2 0	Y
X	B P	I I S V	A 3 9 1	Y
X	W K	I I S V	A 3 9 1	Y