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REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9406030018 DOC.DATE: 94/05/25 NOTARIZED: NO DOCKET #
FACIL:50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
AUTH.NAME AUTHOR AFFILIATION
JURY,K.R. Carolina Power & Light Co.
PEARSON,M.P. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 94-002-00:on 940425,all three MSIVs were declared inoperable due to failure to meet TS required closure time.Caused by inadequate testing procedures.Addl MSIV accumulator tanks installed.W/940525 ltr.

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	NRR/DRCH/HOLB	1 1	NRR/DRIL/RPEB	1 1
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10 CFR 50.73

Carolina Power & Light Company
Robinson Nuclear Plant
PO Box 790
Hartsville SC 29550

Robinson File No: 13510C
RNP/94-1081
May 25, 1994

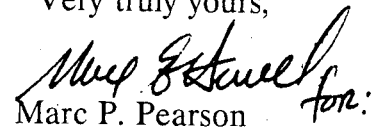
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
LICENSEE EVENT REPORT NO. 94-002-00

Gentlemen:

The enclosed Licensee Event Report (LER), is submitted in accordance with
10 CFR 50.73.

Very truly yours,


Marc P. Pearson
General Manager
H. B. Robinson S. E. Plant

RDC:llg
Enclosure

c: Mr. S. D. Ebnetter, Regional Administrator, USNRC, Region II
Ms. B. L. Mozafari, USNRC Project Manager, HBRSEP
Mr. W. T. Orders, USNRC Senior Resident Inspector, HBRSEP

9406030018 940525
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11

NRC FORM 366
(5-92)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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 (MNB 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.

FACILITY NAME (1)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT 2

DOCKET NUMBER (2)

050-261

PAGE (3)

1 OF 8

TITLE (4)

PLANT CONDITION OUTSIDE DESIGN BASIS DUE TO MSIV INOPERABILITY

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 NAME	DOCKET NUMBER
04	25	94	94	002	00	05	25	94	FACILITY NAME	DOCKET NUMBER
										05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	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	
		20.405(a)(1)(iii)		<input checked="" type="checkbox"/> 50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)	
		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

K. R. Jury: Regulatory Affairs

TELEPHONE NUMBER (Include Area Code)

(803) 383-1363

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, complete EXPECTED SUBMISSION DATE).

☒

NO

EXPECTED SUBMISSION DATE (15)

MONTH

DAY

YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On January 29, 1994, H. B. Robinson Steam Electric Plant (HBRSEP), Unit 2 was in hot shutdown conditions. During Main Steam Isolation Valve (MSIV) operability testing, all three MSIVs were declared inoperable when they failed to meet the Technical Specification (TS) required closure time. Each valve was secured in its TS required closed position; however, the "B" MSIV drifted partially open, placing the plant outside of the TS containment integrity requirements.

Plant staff subsequently determined that previous MSIV testing may not have consistently demonstrated MSIV operability. A complicating factor was that a design enhancement related to inadequate MSIV air accumulator volume was not pursued following its initial identification. A modification was implemented on February 7, 1994 to correct this design deficiency, and all three valves were subsequently declared operable.

This condition had minimal impact on actual plant safety. During the time that this condition was discovered, conditions did not exist that would have caused radiological release limits to be exceeded. Based on the possibility that the MSIVs may have been inoperable in the past, and the associated TS action was not taken, we concluded that this condition was reportable on April 25, 1994, pursuant to 10 CFR 50.73(a)(2)(i)(B).

NRC FORM 366A
(5-92)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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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H. B. ROBINSON, UNIT 2	050-261	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 8
		94	002	00	

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

I. DESCRIPTION OF EVENT

On January 29, 1994, H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 was in hot shutdown conditions and at normal operating temperature and pressure. During post maintenance testing following removal, testing, and re-installation of the "A" Main Steam Isolation Valve (MSIV) (EIIIS Code: ISV) control solenoid, the MSIV failed to close within five seconds with non safety-related instrument air supplied to the valve actuator. Technical Specification (TS) 3.4.1.e states that the reactor shall not be heated above 350 degrees F unless the main steam stop valves (i.e., MSIVs) are operable and capable of closing in five seconds or less. TS 4.7.1 states that the MSIVs are tested at each refueling interval to verify closure time of five seconds or less, and that the valves are tested at no flow and at no load conditions. On January 30, 1994, at 2223 hours, the "C" MSIV was tested to verify its capability to close within five seconds after receiving a close signal at "no flow and at no load conditions" (i.e., Reactor Coolant System (RCS) at 547 degrees F and no steam flow). This MSIV also failed to meet the stroke time requirements. As a result of the "A" and "C" MSIVs failing to meet stroke time requirements, the "B" MSIV was tested; it also exceed the five second requirement.

Because the stroke times for all three valves were in excess of five seconds, the valves were declared inoperable in accordance with TS 3.4.1.e., and each valve was secured in its closed position in accordance with the action statement of TS 3.6.3 for an inoperable containment isolation valve. Subsequent testing determined that with instrument air isolated to the MSIV actuators (i.e., only the safety-related MSIV air accumulators providing the actuating motive force), all three valves required in excess of five seconds to close.

At approximately 2134 hours, control room operators noticed that the "B" MSIV position indicator was showing dual indication (i.e., dual indication means that the valve is between full open and full closed). The dual indication occurred because with instrument air isolated, an insufficient pressure differential existed across the actuator piston (see attached diagram) to keep the valve shut. As a result, the "B" MSIV drifted partially open for a period of approximately eight minutes. This condition placed the plant outside of the containment integrity requirements of TS 3.6.3. Instrument air was subsequently unisolated to the "B" MSIV, which resulted in the valve closing, and remaining closed.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

I. DESCRIPTION OF EVENT (Continued)

On April 25, 1994, following a review of the completed root cause investigation of the MSIV failures, Plant management determined that the previous practice of testing the MSIVs with instrument air valved in may not have adequately demonstrated valve operability. Review of historical test data identified that MSIV testing was performed in this configuration (i.e., with instrument air valved in) from 1984 to 1994. As a result, the capability of the MSIVs to perform their design function may not have been consistently demonstrated since 1984. Accordingly, the applicable TS action was not entered during that time period for inoperable MSIVs.

The following pertinent historical data provides the circumstances surrounding this condition.

During November, 1984, the NRC conducted an inspection of MSIV testing. This inspection resulted in a Notice of Violation (NOV) 84-44-02 which stated that, contrary to American Society of Mechanical Engineers (ASME) Code requirements invoked by TS 4.0.1.a, the MSIVs, as "fail-safe" valves were not being tested by "observing the operation of the valves upon loss of actuator power." NRC Inspection Report 84-44 interpreted the requirement as meaning that the MSIVs should be tested without use of instrument air as the source of actuator power since instrument air is a non-safety grade system.

On January 8, 1985, the MSIVs were tested under Special Procedure SP-647, "Main Steam Isolation Valve Operability Test," with steam line pressure at approximately 980 psig, no pressure differential across the valve, and with instrument air isolated. The safety-related MSIV air accumulators provided the only motive force to close the valves during the test. However, the test did not adequately confirm that closure times were within five seconds. Conclusions from the testing were that all three MSIVs closed; however, they drifted open within ten minutes after closing (i.e., accumulator pressure alone could not keep the valves closed with no differential pressure across the valve.) To compensate for this concern, a temporary nitrogen source was added to the valve actuators to provide the additional motive force to keep the valves closed in the event of a loss of instrument air.

LICENSEE EVENT REPORT (LER)
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. DESCRIPTION OF EVENT (Continued)

Our response to NOV 84-44-02 on March 8, 1985, stated that the Procedure OST-702, "ISI Secondary Side Valve Test," was intended to meet the ASME Section XI Code requirements. The response further stated that the test was performed at cold shutdown conditions, and that Procedure OST-501, "Main Steam Isolation Valve (Refueling)," satisfied the operability requirements of TS 4.7 (i.e., MSIV closure within five seconds) at hot, no load conditions. At that time, no changes to Procedure OST-501 were considered necessary. This response summarized the results of the January 8, 1985, test and stated that a bottled nitrogen backup to the MSIV actuators had been provided on an interim basis to ensure adequate pressure is available to close the valves within the safety analysis assumption for steam generator tube rupture. Procedure OST-702 was subsequently revised to isolate instrument air.

The temporary nitrogen backup was removed during 1986 by modification M-882. This modification also installed a redundant solenoid in the closing side of the actuator vent path, preventing the motive closing air from being vented off of the actuator. However, post modification testing did not ensure the valves would close within five seconds.

II. CAUSE OF EVENT

A complicating factor for this condition was that a design enhancement related to MSIV air accumulator volume was not pursued following its initial identification. NRC Information Notice 85-84, "Inadequate Inservice Testing of Main Steam Isolation Valves," referenced ASME Section XI, and stated that reliance should not be placed on non-safety related systems (e.g., instrument air) to mitigate the consequences of an accident. Failure to comprehensively evaluate and act upon this information during 1985 resulted in potential failure of the valves to meet the TS required five second closure time when tested in the 1994 test configuration. Testing the MSIVs with instrument air supplied to the actuators masked the fact that the accumulators were not sufficiently sized to close the valves within five seconds under "hot, no load conditions." Previous analyses and reviews of changes to MSIV testing procedures did not address the inconsistency between the Updated Final Safety Analysis Report (UFSAR) statement that the instrument air system is not required to function during accident conditions, and the previous reliance on instrument air to meet TS required closure times.

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II. CAUSE OF EVENT (Continued)

Contributing factors for this condition were inadequate post modification test procedures for modification M-882 to demonstrate MSIV operability, and the failure to comprehensively evaluate and act upon available operating experience information and a subsequent Information Notice (IN) from the NRC concerning the air accumulator design deficiency.

In 1985, an analysis was received from another utility that their MSIVs would fail to close if instrument air was not utilized as an additional motive force. The utility implemented a modification to increase the accumulator volume to ensure required closure times of the MSIVs with instrument air isolated. NRC Information Notice 85-84, "Inadequate Inservice Testing of Main Steam Isolation Valves," referenced ASME Section XI, and stated that reliance should not be placed on non-safety related systems (e.g., instrument air) to mitigate the consequences of an accident. As a result, modification M-882 was implemented to ensure an adequate pressure source was available for closure of the MSIV's. During the development of this modification, the plant staff assumed that the accumulators would have sufficient volume to close the MSIVs if a solenoid valve was added to the vent path to prevent venting of the accumulator air. However, as stated above, the post-modification testing did not verify acceptable closure times.

III. ANALYSIS OF EVENT

TS 3.4.1.e states that the reactor shall not be heated above 350 degrees F unless the main steam stop valves (i.e., MSIVs) are operable and capable of closing in five seconds or less. TS 4.7.1 states that the MSIVs are tested at each refueling interval to verify closure time of five seconds or less, and that the valves are tested at no flow and at no load conditions. While not specifically required, we have interpreted that this testing should be at maximum steam pressure, which is the most challenging testing condition for meeting the five second closure time requirement. Additionally, the testing should be performed under worst case conditions (i.e., instrument air is isolated.) Since MSIV testing was not consistently performed under these condition from 1984-1994, MSIV operability may not adequately have been demonstrated.

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III. ANALYSIS OF EVENT (Continued)

Under certain postulated accident conditions (i.e., main steam line break), failure of a MSIV to close within five seconds could have resulted in a release of radioactive material that exceeds 10 CFR Part 100 limits. However, during the time that the MSIVs may not have been adequately tested, no condition existed that would have resulted in radiological release criteria being exceeded.

The basis of TS 4.7 states that the MSIVs serve to limit an excessive RCS cooldown rate and the resultant reactivity insertion following a main steam line break accident. The five second closure time requirement is conservative with respect to the accident analysis for a main steam line break. The capability of the MSIVs to shut against and isolate a pressurized steam generator is implicit in the UFSAR analysis for the main steam line break accident and steam generator tube rupture scenarios. The UFSAR states that the intact steam generators will blowdown for a short period of time until the MSIVs close approximately 14 seconds after a break. As a result, any release to the environment would be limited to a small fraction of the 10 CFR Part 100 limits in the event of a main steam line break.

Based on the possibility that the MSIVs may have been inoperable in the past without the associated TS action being taken, and the "B" MSIV drifting partially open in violation of the TS 3.6.3 containment integrity requirements, this report is submitted pursuant to 10 CFR 50.73 (a)(2)(i)(B) as operation in a condition prohibited by TS.

IV. CORRECTIVE ACTIONS

On February 7, 1994, additional MSIV Accumulator tanks were installed and provide an increased volume of compressed air to assist MSIV closure within the required five second time period. Following completion of this modification and subsequent post-modification testing, all three valves were declared operable.

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H. B. ROBINSON, UNIT 2		050-261		<table border="1"> <tr> <td>YEAR</td> <td>SEQUENTIAL NUMBER</td> <td>REVISION NUMBER</td> </tr> <tr> <td>94</td> <td>-- 002 --</td> <td>00</td> </tr> </table>		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	94	-- 002 --	00
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IV. CORRECTIVE ACTIONS (Continued)

Procedure OST-501 is now conducted with the plant in hot shutdown condition with the main steam header warmed and pressurized. The procedure establishes a no flow condition downstream of the MSIVs and is performed with instrument air isolated.

Procedure OST-702 was revised to allow hot testing of the MSIVs by including sections to establish a no flow condition downstream of the MSIVs and isolation of instrument air during the MSIV operability portion of the test.

The Design Basis Document for the Main Steam System will be revised to include references to the licensing basis for the system and supporting calculations and studies that define the details of expected MSIV performance.

The UFSAR will be revised to ensure that it correctly characterizes the accident mitigation requirements for the MSIVs.

V. ADDITIONAL INFORMATION

A. Component Failures

None

B. Previous similar events

None

NRC FORM 366A
(5-92)

U.S. NUCLEAR REGULATORY COMMISSION

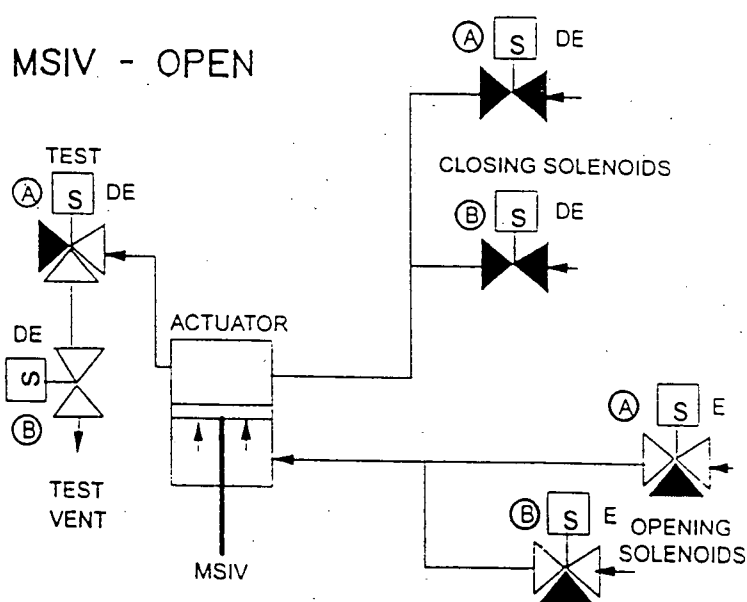
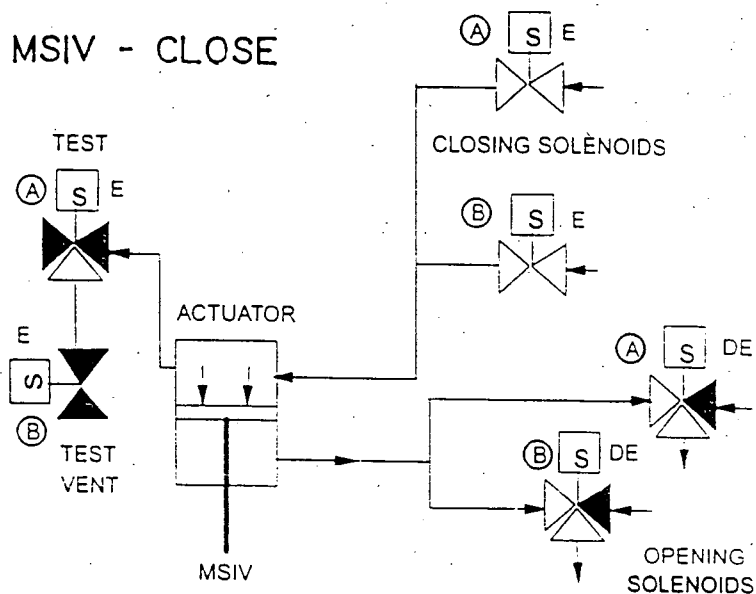
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DIAGRAM: MSIV DUAL POSITION INDICATION



SUMMARY OF MOVs RANKED HIGH OR MEDIUM BY PSA PRIORITIZATION

MOV ID	PSA RANKING	COMMENTS (see Note 1)
MO2238	High	Dynamic testing cannot be performed (HELB isolation valve).
MO2239	High	Dynamic testing cannot be performed (HELB isolation valve).
MO2400	High	Dynamic testing cannot be performed (HELB isolation valve).
MO2401	High	Dynamic testing cannot be performed (HELB isolation valve).
MO2700	High	Dynamic testing cannot be performed (HELB isolation valve).
MO2701	High	Dynamic testing cannot be performed (HELB isolation valve).
MO2404	High	
MO2426	High	
MO2512	High	
MO2202	High	Dynamic testing has been performed.
MO2247	High	Dynamic testing cannot be performed (dP cannot be created).
MO2312	High	
MO1940	High	
MO2030	High	
MO1905	Medium	
MO1932	Medium	
MO1934	Medium	Dynamic testing has been performed.
MO2005	Medium	Dynamic testing has been performed.
MO2007	Medium	Dynamic testing has been performed.
MO1947	Medium	Dynamic testing has been performed.
MO1902	Medium	Dynamic testing cannot be performed (sprays the drywell).
MO1903	Medium	
MO2000	Medium	Dynamic testing cannot be performed (sprays the drywell).
MO2001	Medium	Dynamically tested open against dP only. More information required.
MO2003	Medium	Dynamic testing has been performed.
MO2046	Medium	

Note 1: A blank COMMENTS field indicates that the MOV will be dynamically tested.

SUMMARY OF PSA PRIORITIZATION FOR MOVs SELECTED FOR DYNAMIC TESTING

MOV ID	PSA RANKING	COMMENTS
MO1903	Medium	
MO1904	Low-Low	
MO1905	Medium	
MO1932	Medium	
MO1933	Low-Low	
MO1934	Medium	Dynamic testing has been performed.
MO1935	Low-Low	Dynamic testing has been performed.
MO1939	Low-Low	
MO1940	High	
MO1947	Medium	Dynamic testing has been performed.
MO2001	Medium	Dynamically tested open against dP only. More information required.
MO2003	Medium	Dynamic testing has been performed.
MO2004	Low-Low	Dynamic testing has been performed.
MO2005	Medium	Dynamic testing has been performed.
MO2006	Low-Low	
MO2007	Medium	Dynamic testing has been performed.
MO2009	Low-Low	Dynamic testing has been performed.
MO2029	Low-Low	
MO2030	High	
MO2046	Medium	
MO2104	Low-Low	Dynamic testing has been performed.
MO2117	Low	
MO2124	Low-Low	
MO2137	Low	
MO2202	High	Dynamic testing has been performed.
MO2312	High	
MO2318	Low-Low	Dynamic testing has been performed.
MO2404	High	
MO2426	High	
MO2510	Low	
MO2512	High	
MO2740	Low-Low	
MO4323A	Low-Low	
MO4323B	Low-Low	
MO4841A	Low-Low	
MO4841B	Low-Low	

SUMMARY OF MODIFICATIONS AND MAINTENANCE ACTIVITIES

The following is a summary of the modifications and maintenance activities completed or planned to improve the performance of our MOVs:

- ◆ The motor for MO-1908 was upsized from 40 ft-lb to 60 ft-lb to overcome forces due to closing the valve cold (leaving cold shutdown) and opening it hot (to establish shutdown cooling).
- ◆ The power cables for MO-2401, MO-2511 and MO-2512 were upsized to minimize voltage drop, thereby increasing voltage available at the motor terminals.
- ◆ The motors for MO-2238 and MO-2400 were upsized from 60 ft-lb to 80 ft-lb and 10 ft-lb to 15 ft-lb (respectively). MO-2516 power cables were upsized and the yoke clamp replaced.
- ◆ Thermal Overload (TOL) monitors have been installed for each MOV with an active safety function. While TOL monitors do not improve MOV capability or margin, they do provide additional information to the operators as to MOV status.
- ◆ The MO-2312 overall actuator ratio (OAR) was changed to increase torque output and its stem/stem nut will be changed to restore stroke time within the new OAR.