IES
UTILITIES INC.

May 20, 1994
NG-94-1445

Mr. William T. Russell
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Request for Schedule Extension to Complete Generic Letter (GL) 89-10 Activities
File: A-101b
Reference: 1) Letter from K. Young (IESUI) to W. Russell (NRC) dated April 28, 1994 (NG-94-1651)
2) Letter from L. Liu (IESUI) to J. Martin (NRC) dated March 14, 1994 (NG-94-0815)

Dear Mr. Russell:

The purpose of this letter is to request a schedule extension to complete Generic Letter (GL) 89-10, "Safety-Related Motor Operated Valve (MOV) Testing and Surveillance," activities for 51 Motor-Operated Valves (MOVs) in the IES Utilities Inc. GL 89-10 Program. The proposed schedule would extend the original completion date of June 28, 1994, to 120 days after completion of the next refueling outage (RFO 13), scheduled to begin February 25, 1995. All dynamic tests that have not yet been completed are scheduled to be completed either on-line or during RFO 13. Feedback of test data to other plant MOVs with active safety functions will be done in accordance with our grouping methodology. Completion within 120 days after the refueling outage will allow a sufficient period of time for the finalization of GL 89-10 supporting documents.

As indicated in Reference 1, this schedule extension is being submitted three weeks after the reporting requirements of GL 89-10, Supplement 6, "Information on Scheduling and Grouping, and Staff Responses to Additional Public Questions." IES Utilities Inc. is requesting this schedule extension in response to several issues which have recently affected our MOV Program. Reference 2 outlines many of the enhancements that have been made in the past few months in response to these issues. These enhancements include a re-organized and expanded MOV team, a revised degraded voltage methodology and revised test acceptance criteria. As a result of these enhancements, dynamic and static testing was suspended for three months, all previous tests were re-evaluated, the dynamic test scope was expanded, and the MOV program plan was revised. In order for the new program plan to be implemented properly, an extension beyond the original completion date of June 28, 1994 is required.

In accordance with the reporting requirements of GL 89-10, Supplement 6, the attachments to this letter provide the information needed to evaluate our justification for extending the GL 89-10 testing schedule. Attachment 1 to this letter describes our MOV Program, including the program population, assumptions used to establish switch settings, static and dynamic test completion status to date, MOV Grouping Methodology, lubrication periodicity and the active safety function for all MOVs in our program. Attachment 2 provides valve specific information including as-left capability in the form of margin above the minimum required thrust for our MOVs that have an active safety function. Attachment 3 gives an overview of the process used to assess relative risk significance. Attachment 4 summarizes the modifications and maintenance performed to improve MOV capability or margin.

Based on the best available information which is summarized in this letter and its attachments, we have reasonable assurance that MOVs not dynamically tested by June 28, 1994, will function under design basis conditions.

A064

This letter contains the following new commitments:

1) Complete the static testing of GL 89-10 Program valves by June 28, 1994.

2) Complete GL 89-10 Program activities within 120 days after completion of RFO13.

If you have any questions regarding this matter, please feel free to contact my office.

This request, consisting of this letter and the attachments, are true and accurate to the best of my knowledge and belief.

IES UTILITIES INC.

By John F. Franz
John F. Franz
Vice President, Nuclear

State of Iowa
(County) of Linn

Signed and sworn to before me on this 20th day of May, 1994, by John F. Franz.

Kathleen M. Furman
Notary Public in and for the State of Iowa

September 28, 1995
Commission Expires

JFF/RJM:so

Attachments:
1) MOV Program Description
2) Valve Specific Information
3) Overview of Safety Significance
4) Summary of Modifications and Maintenance Activities

cc:
R. Murrell
L. Liu
L. Root
R. Pulsifer (NRC-NRR)
J. Martin (Region III)
NRC Resident Office
DCRC

MOV PROGRAM DESCRIPTION

PROGRAM POPULATION

Duane Arnold Energy Center's (DAEC's) MOV Program Plan includes 128 safety related valves with motor operators, including 41 MOVs that have no active safety function. The 87 MOVs that have an active safety function are required to be set up based on the best available information. Pages 4 through 7 of this attachment identify the active safety function (if any) of all 128 MOVs in our population.

STATIC TEST STATUS

As of this date, 82 MOVs have been statically tested and evaluated. The remaining 5 MOVs will be statically tested and evaluated by June 28, 1994. Pages 8 through 9 of this attachment provide a summary of MOV VOTES testing to date.

DYNAMIC TEST STATUS

The DAEC Program Plan contains 87 MOVs with active safety functions. Of these 87 MOVs, it is not practicable to dynamically test 37 and it is not meaningful to test 14, leaving a dynamic test scope of 36 MOVs.

The 37 MOVs that are considered not practicable to be dynamically tested do not meet the definition of practicable as provided in our MOV Program Plan. Specifically, the 37 MOVs cannot be dynamically tested within system design parameters for normal operation without causing situations which might damage or impair plant equipment and/or systems, create adverse safety implications, cause a violation of DAEC Technical Specifications or challenge safety systems or personnel safety. These MOVs have been set up to function under design basis conditions using the best available information. The MOVs that are not practicable to be dynamically tested have been set up as follows:

- 11 are set up to deliver ≥ 80% margin above Minimum Required Stem Thrust [MRST] after accounting for system inaccuracies. Based on this margin, these MOVs are considered to be fully tested .
- 26 MOVs have been set up using the best available information, including plant specific dynamic test data and EPRI published test data, to ensure capability to perform their active safety function.

The 14 MOVs that are not meaningful to test dynamically are required to overcome a dp thrust that is less than or equal to 10% of the Minimum Required Stem Thrust (MRST) based on calculations utilizing a 0.5 valve factor (all these MOVs are gate valves). Additionally, the minimum margin above MRST is 153% and the minimum valve factor that could be overcome is 22, after accounting for inaccuracies. Based on these facts, these MOVs are considered to be fully tested and no dynamic tests are required.

Of the MOVs for which dynamic testing is practicable:

- 12 dynamic tests have been completed satisfactorily.

Of the 24 dynamic tests remaining, 10 will require an outage and 14 are currently scheduled to be performed on-line prior to the next refueling outage. The schedule for testing the 24 MOVs will consider our assessment of safety significance for prioritization.

Valve specific data is provided in Attachment 2.

MOV GROUPING METHODOLOGY

Our Grouping Methodology is based on the following considerations:

- Design adequacy of grouped MOVs is verified through a review and analysis of plant specific dynamic test data and EPRI published test data.

- All MOVs in our groups have or will be statically tested by June 28, 1994.

- Each group has been established through an assessment of similarities such as:

  Valve Manufacturer
  Model and Size
  Class
  Fluid Medium
  Service Condition and Active Safety Function
  Differential Pressure

LUBRICATION PERIODICITY

MOVs in our program have a stem lubrication frequency of 36 months. This frequency is justified through performance of pre-lubrication and post-lubrication static tests. To date, no lubrication degradation has been identified.

ASSUMPTIONS USED TO ESTABLISH SWITCH SETTINGS

Valve Factor:

IES has reviewed INEL and industry data as well as DAEC data to establish appropriate valve factors to be used in the thrust and torque requirements calculations. It has been determined that there is no single appropriate valve factor assumption. However, the generally accepted best estimate for valve factor for gate valves is 0.5 and for globe valves is 1.1.

Actual valve factors are calculated from test data accumulated from dynamic testing. These valve factors are compared to the original assumption of .5 or 1.1, as appropriate. If the actual is higher than the assumption, a new thrust and torque requirement will be initiated to redefine the "Minimum Required Stem Thrust" (MRST). The margin between the new MRST and as-left setting will be assessed to determine if an accepted margin exists. If not, additional testing and or modifications will be initiated, as appropriate.

Stem Factor:

Calculated based on the American Standard General Purpose Acme Screw Thread formula with a coefficient of friction equal to 0.15 ($\mu = 0.15$), unless noted otherwise.

If $\mu \neq 0.15$, then the coefficient of friction value is based on test data for that specific valve.

If μ = BALL, then a ball screw drive system is utilized and the stem factor is calculated in accordance with an industry standard equation that relates thrust to torque for a ball screw drive system.

The Stem Factor is used to determine:

- the maximum thrust under degraded voltage and elevated temperature conditions when torque is not measured during diagnostic testing

- the maximum operator output thrust @ Torque Switch Trip (TST) based on the maximum operator output torque @ TST when torque is not measured during diagnostic testing

Motor Torque:

Motor Torque is converted to actuator output thrust using Limitorque standard methodologies. The torque to thrust conversion is based on an assumed stem factor for stem to stem nut coefficient of friction of 0.15.

In addition, this conversion considers the different loads acting on the disk such as pullout efficiency for opening strokes. The application factor is set at 1.0 for GL 89-10 valves and 0.9 otherwise. The affect of reduced voltage and ambient temperature are accounted for by making the appropriate deratings of the motor starting torque.

Rate of Loading:

The static and dynamic test data are compared to ensure that no Rate Of Loading (ROL) phenomenon exists. ROL is defined as a difference between static and dynamic thrusts greater than the equipment error (as a percentage of static thrust). If ROL exists for a particular valve, then the difference between the static and dynamic test thrusts will be added to the MRST for that valve. Other valves similar to the valve with ROL will be evaluated to determine if a similar margin should be added to their MRST for potential ROL. If the actual is higher than the assumption, a new thrust and torque requirement will be initiated to redefine the MRST. The margin between the new MRST and the as-left setting will be assessed to determine if an acceptable margin exists. If the margin is not acceptable, additional testing and/or modifications will be initiated as appropriate.

As of this date, the plant specific dynamic testing evaluations show no ROL effects in accordance with the above criteria.

TEST DATA FEEDBACK

Plant specific dynamic test data and EPRI published test data regarding valve factor has been reviewed for applicability to the MOVs with active safety functions at the DAEC. Considering the as left capability of the MOVs, no operability or reportability concerns have been identified based on these reviews. As warranted, the valve factor assumption has been revised to incorporate the available information.

Additionally, the plant specific test data regarding stem factor (coefficient of friction) has been reviewed for impact on the valve weak link calculations and the control switch settings with no adverse affects identified.

This process will continue as more data becomes available.

DUANE ARNOLD ENERGY CENTER

VALVE SAFETY FUNCTION INFORMATION

MOV ID	VALVE DESCRIPTION	ACTIVE SAFETY FUNCTION			
		OPEN	CLOSE	OPEN DESCRIPTION	CLOSE DESCRIPTION
MO1900	RHR REACTOR VESSEL HEAD SPRAY ISOLATION	N	N		
MO1901	OUTBOARD REACTOR HEAD SPRAY VALVE	N	N		
MO1902	RHR LOOP B INBOARD DRYWELL SPRAY ISOLATION	Y	Y	Initiate drywell spray	Containment isolation
MO1903	RHR LOOP B DRYWELL SPRAY HDR OUTBOARD ISOLATION	Y	Y	Initiate drywell spray	Containment isolation
MO1904	RHR LOOP B LPCI OUTBOARD INJECTION ISOLATION	Y	Y	LPCI initiation	Terminate LPCI flow
MO1905	RHR LOOP B LPCI INBOARD INJECTION ISOLATION	Y	Y	LPCI initiation	Terminate LPCI flow
MO1908	RHR SHUTDOWN COOLING SUCTION ISOLATION	N	Y		Containment isolation
MO1909	RHR SHUTDOWN COOLING OUTBOARD SUCTION ISOL	N	Y		Containment isolation
MO1912	RHR PUMP-229B S/D CLNG & FUEL POOL CLNG SUCTION	N	N		
MO1913	RHR PUMP 1P-229B TORUS SUCTION ISOLATION	Y	Y	Realign for LPCI/Cont. cooling	Isolate downstream leak
MO1920	RHR PP1P-229D S/D CLNG & FUEL POOL CLNG SUCTION	N	N		
MO1921	RHR PUMP 1P-229D TORUS SUCTION ISOLATION	Y	Y	Realign for LPCI/Cont. cooling	Isolate downstream leak
MO1932	RHR LOOP B TORUS SPRAY & COOLING SUPPLY HDR ISOL	Y	Y	Initiate torus spray/cooling	Containment isolation
MO1933	RHR LOOP B TORUS SPRAY HEADER ISOLATION	Y	Y	Initiate torus spray	Containment isolation
MO1934	RHR LOOP B TORUS COOLING & TEST RETURN HDR ISOL	Y	Y	Initiate torus cooling	Containment isolation
MO1935	RHR PUMPS 1P-229B/D MINIMUM FLOW BYPASS	Y	Y	Provide pump minimum flow	Prevent flow diversion
MO1936	RHR DRAIN TO WASTE SURGE TANK OUTBOARD ISOLATION	N	N		
MO1937	RHR DRAIN TO WASTE SURGE TANK INBOARD ISOLATION	N	N		
MO1939	RHR HX 1E-201B INLET THROTTLE VALVE	Y	Y	Realign from throttling	Throttle LPCI flow
MO1940	RHR HX 1E-201B BYPASS VALVE	Y	Y	LPCI initiation	System heat removal
MO1941	RHR HX 1E-201B OUTLET ISOLATION	N	N		
MO1942	RHR SERVICE WATER CROSS TIE TO RHR SYSTEM	N	N		
MO1943A	RHRSW PUMPS 1P-22A/C CROSS TIE TO RHR	N	N		
MO1943B	RHRSW PUMPS 1P-22B/D CROSS TIE TO RHR	N	N		
MO1947	RHR HX 1E-201B SERVICE WATER OUTLET ISOLATION	Y	Y	System heat removal	Throttle to maintain press > RHR
MO1949A	RHR HX 1E-201B SHELL SIDE OUTBOARD VENT	N	N		
MO1949B	RHR HX 1E-201B SHELL SIDE INBOARD VENT	N	N		
MO1967	RHR HX 1E-201B COND DRN TO RCIC PUMP SUCTION	N	N		
MO1970	RHR HX 1E-201B DRAIN TO TORUS	N	N		
MO1989	RHR LOOP B TORUS SUCTION ISOLATION	N	Y		Isolate downstream leak
MO1998A	RHRSW/ESW B LOOP RETURN TO COOLING TOWERS	N	N		
MO1998B	RHRSW/ESW A LOOP RETURN TO COOLING TOWERS	N	N		
MO2000	RHR LOOP A INBOARD DRYWELL SPRAY VALVE	Y	Y	Initiate drywell spray	Containment isolation
MO2001	RHR LOOP A DRYWELL SPRAY HDR OUTBOARD ISOLATION	Y	Y	Initiate drywell spray	Containment isolation

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VALVE SAFETY FUNCTION INFORMATION

MOV ID	VALVE DESCRIPTION	ACTIVE SAFETY FUNCTION			
		OPEN	CLOSE	OPEN DESCRIPTION	CLOSE DESCRIPTION
MO2003	RHR LOOP A LPCI INBOARD INJECTION ISOLATION	Y	Y	LPCI initiation	Terminate LPCI flow
MO2004	RHR LOOP A LPCI OUTBOARD INJECTION ISOLATION	Y	Y	LPCI initiation	Terminate LPCI flow
MO2005	RHR LOOP A TORUS SPRAY & COOLING SUPPLY HDR ISOL	Y	Y	Initiate torus spray/cooling	Containment isolation
MO2006	RHR LOOP A TORUS SPRAY HEADER ISOLATION	Y	Y	Initiate torus spray	Containment isolation
MO2007	RHR LOOP A TORUS COOLING AND TEST RETURN HDR ISOL	Y	Y	Initiate torus cooling	Containment isolation
MO2009	RHR PUMPS 1P-229A/C MINIMUM FLOW BYPASS	Y	Y	Provide pump minimum flow	Prevent flow diversion
MO2010	RHR LOOPS A/B CROSS TIE HEADER ISOLATION	N	N		
MO2011	RHR PP1P-229A S/D CLNG & FUEL POOL CLNG SUCTION	N	N		
MO2012	RHR PUMP 1P-229A TORUS SUCTION ISOLATION	Y	Y	Realign for LPCI/Cont. cooling	Isolate downstream leak
MO2015	RHR PUMP 1P-229C TORUS SUCTION ISOLATION	Y	Y	Realign for LPCI/Cont. cooling	Isolate downstream leak
MO2016	RHR PP1P-229C S/D CLNG & FUEL POOL CLNG SUCTION	N	N		
MO2029	RHR HX 1E-201A INLET THROTTLE VALVE	Y	Y	Realign from throttling	Throttle LPCI flow
MO2030	RHR HX 1E-201A BYPASS VALVE	Y	Y	LPCI initiation	System heat removal
MO2031	RHR HX 1E-201A OUTLET ISOLATION	N	N		
MO2036	RHR HX 1E-201A COND DRN TO RCIC PUMP SUCTION	N	N		
MO2038	RHR HX 1E-201A DRAIN TO TORUS	N	N		
MO2039A	CB CHILLER 1V-CH-1A WELL WATER SUPPLY ISOLATION	N	Y		Isolate non-seismic piping
MO2039B	CB CHILLER 1V-CH-1B WELL WATER SUPPLY ISOLATION	N	Y		Isolate non-seismic piping
MO2044A	RHR HX 1E-201A SHELL SIDE OUTBOARD VENT	N	N		
MO2044B	RHR HX 1E-201A SHELL SIDE INBOARD VENT	N	N		
MO2046	RHR HX 1E-201A SERVICE WATER OUTLET ISOLATION	Y	Y	System heat removal	Throttle to maintain press > RHR
MO2069	RHR LOOP A TORUS SUCTION ISOLATION	N	Y		Isolate downstream leak
MO2077	CHILLER 1V-CH-1B DISCH TO WELL WATER ISOLATION	N	Y		Isolate non-seismic piping
MO2078	CHILLER 1V-CH-1A DISCH TO WELL WATER ISOLATION	N	Y		Isolate non-seismic piping
MO2100	CORE SPRAY PUMP 1P-211A OUTBOARD TORUS SUCTION	Y	Y	Realign for core spray	Isolate downstream leak
MO2104	CORE SPRAY PUMP 1P-211A MINIMUM FLOW BYPASS	Y	Y	Provide pump minimum flow	Prevent flow diversion
MO2112	CORE SPRAY LOOP A TEST BYPASS VALVE	N	N		
MO2115	CORE SPRAY LOOP A OUTBOARD INJECTION VALVE	N	N		
MO2117	CORE SPRAY INBOARD INJECTION VALVE	Y	Y	Core spray initiation	Containment isolation
MO2120	CORE SPRAY PUMP 1P-211B OUTBOARD TORUS SUCTION	Y	Y	Realign for core spray	Isolate downstream leak
MO2124	CORE SPRAY PUMP 1P-211B MINIMUM FLOW BYPASS	Y	Y	Provide pump minimum flow	Prevent flow diversion
MO2132	CORE SPRAY LOOP B TEST BYPASS VALVE	N	N		
MO2135	CORE SPRAY LOOP B OUTBOARD INJECTION VALVE	N	N		
MO2137	CORE SPRAY LOOP B INBOARD INJECTION VALVE	Y	Y	Core spray initiation	Containment isolation

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VALVE SAFETY FUNCTION INFORMATION

MOV ID	VALVE DESCRIPTION	ACTIVE SAFETY FUNCTION			
		OPEN	CLOSE	OPEN DESCRIPTION	CLOSE DESCRIPTION
MO2146	CORE SPRAY PUMP 1P-211B INBOARD TORUS SUCTION	Y	Y	Realign for core spray	Isolate downstream leak
MO2147	CORE SPRAY PUMP 1P-211B INBOARD TORUS SUCTION	Y	Y	Realign for core spray	Isolate downstream leak
MO2202	HPCI TURBINE STEAM SUPPLY INJECTION	Y	N	HPCI initiation	
MO2238	HPCI STEAM SUPPLY INBOARD ISOLATION	N	Y		Containment isolation
MO2239	HPCI STEAM SUPPLY OUTBOARD ISOLATION	N	Y		Containment isolation
MO2247	HPCI CONDENSER/LUBE OIL COOLER CLNG WATER SUPPLY	Y	N	Provide lube oil cooling	
MO2290A	HPCI/RCIC TURB STM EXHST VACUUM BREAKER LINE ISO	N	Y		Containment isolation
MO2290B	HPCI/RCIC TURB STM EXHST VACUUM BREAKER LINE ISO	N	Y		Containment isolation
MO2300	HPCI PUMP CST SUCTION ISOLATION	N	Y		Transfer suction from CST to torus
MO2311	HPCI PUMP DISCHARGE ISOLATION	N	N		
MO2312	HPCI FEEDWATER INJECTION ISOLATION	Y	Y	HPCI initiation	Containment isolation
MO2316	HPCI/RCIC TEST RETURN REDUNDANT SHUTOFF VALVE	N	N		
MO2318	HPCI PUMP MINIMUM FLOW BYPASS VALVE	Y	Y	Provide pump minimum flow	Prevent flow diversion
MO2321	HPCI PUMP TORUS SUCTION INBOARD ISOLATION	Y	Y	Transfer suction from CST to torus	Isolate downstream leak
MO2322	HPCI PUMP TORUS SUCTION OUTBOARD ISOLATION	Y	Y	Transfer suction from CST to torus	Isolate downstream leak
MO2400	RCIC STEAM SUPPLY INBOARD ISOLATION	N	Y		Containment isolation
MO2401	RCIC STEAM SUPPLY OUTBOARD ISOLATION	N	Y		Containment isolation
MO2404	RCIC TURBINE STEAM SUPPLY ISOLATION	Y	Y	RCIC initiation	RCIC termination
MO2405	RCIC TURBINE STEAM SUPPLY STOP VALVE	N	N		
MO2426	RCIC CONDENSER/LUBE OIL COOLER CLNG WATER SUPPLY	Y	N	Provide lube oil cooling	
MO2500	RCIC PUMP CST SUCTION ISOLATION	N	Y		Transfer suction from CST to torus
MO2510	RCIC PUMP MINIMUM FLOW BYPASS VALVE	Y	Y	Provide pump minimum flow	Prevent flow diversion
MO2511	RCIRC PUMP DISCHARGE ISOLATION	N	N		
MO2512	RCIC FEEDWATER INJECTION ISOLATION	Y	Y	RCIC initiation	Containment isolation
MO2515	RCIC PUMP DISCHARGE TEST LINE ISOLATION	N	N		
MO2516	RCIC PUMP TORUS SUCTION INBOARD ISOLATION	Y	Y	Transfer suction from CST to torus	Isolate downstream leak
MO2517	RCIC PUMP TORUS SUCTION OUTBOARD ISOLATION	Y	Y	Transfer suction from CST to torus	Isolate downstream leak
MO2700	RWCU INLET INBOARD ISOLATION	N	Y		Containment isolation
MO2701	RWCU SUCTION OUTBOARD ISOLATION	N	Y		Containment isolation
MO2740	RWCU RETURN HEADER OUTBOARD ISOLATION	N	Y		Containment isolation
MO4309A	INBOARD TORUS VENT BYPASS LINE THROTTLE VALVE	N	N		
MO4310A	DRYWELL EXHAUST THROTTLE VALVE	N	N		
MO4320A	CAD N2 SUPPLY REGULATOR PCV-4320A OUTLET ISOL	Y	Y	Initiate nitrogen makeup to containment	Isolate on high drywell pressure
MO4320B	CAD N2 SUPPLY REGULATOR PCV-4320A OUTLET ISOL	Y	Y	Initiate nitrogen makeup to containment	Isolate on high drywell pressure

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VALVE SAFETY FUNCTION INFORMATION

MOV ID	VALVE DESCRIPTION	ACTIVE SAFETY FUNCTION			
		OPEN	CLOSE	OPEN DESCRIPTION	CLOSE DESCRIPTION
MO4323A	VALVE, ISO, CAD, 1T007A-H, CAD N2 FLOW	Y	Y	Initiate nitrogen makeup to containment	Terminate nitrogen makeup to cont.
MO4323B	VALVE, ISO, CAD, 1T007A-H, CAD N2 FLOW	Y	Y	Initiate nitrogen makeup to containment	Terminate nitrogen makeup to cont.
MO4423	MAIN STEAM LINE DRAIN INBOARD ISOLATION	N	Y		Containment isolation
MO4424	MAIN STEAM LINE DRAIN OUTBOARD ISOLATION	N	Y		Containment isolation
MO4441	REACTOR FEEDWATER LOOP A INLET STOP CHECK	N	N		
MO4442	REACTOR FEEDWATER LOOP B INLET STOP CHECK	N	N		
MO4601	REACTOR RECIRC PUMP 1P-201A SUCTION ISOLATION	N	N		
MO4602	REACTOR RECIRC PUMP 1P-201B SUCTION ISOLATION	N	N		
MO4627	REACTOR RECIRC PUMP 1P-201A DISCHARGE ISOLATION	N	Y		LPCI initiation
MO4628	REACTOR RECIRC PUMP 1P-201B DISCHARGE ISOLATION	N	Y		LPCI initiation
MO4629	REACTOR RECIRC PUMP 1P-201A DISCHARGE BYPASS	N	N		
MO4630	REACTOR RECIRC PUMP 1P-201B DISCHARGE BYPASS	N	N		
MO4841A	DRYWELL RBCCW RETURN HEADER ISOLATION	N	Y		Containment isolation
MO4841B	DRYWELL RBCCW SUPPLY HEADER ISOLATION	N	Y		Containment isolation
MO8401A	MSIV-LCS LOOP A INBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Containment isolation
MO8401B	MSIV-LCS LOOP B INBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Containment isolation
MO8401C	MSIV-LCS LOOP C INBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Containment isolation
MO8401D	MSIV-LCS LOOP D INBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Containment isolation
MO8402A	MSIV-LCS LOOP A OUTBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Terminate MSIV-LCS
MO8402B	MSIV-LCS LOOP B OUTBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Terminate MSIV-LCS
MO8402C	MSIV-LCS LOOP C OUTBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Terminate MSIV-LCS
MO8402D	MSIV-LCS LOOP D OUTBOARD BLEEDOFF ISOLATION	Y	Y	Initiate MSIV-LCS	Terminate MSIV-LCS
MO8403A	MSIV-LCS LOOP A BLEEDOFF BYPASS LINE ISOLATION	Y	Y	Initiate MSIV-LCS	Long term MSIV-LCS operation
MO8403B	MSIV-LCS LOOP B BLEEDOFF BYPASS LINE ISOLATION	Y	Y	Initiate MSIV-LCS	Long term MSIV-LCS operation
MO8403C	MSIV-LCS LOOP C BLEEDOFF BYPASS LINE ISOLATION	Y	Y	Initiate MSIV-LCS	Long term MSIV-LCS operation
MO8403D	MSIV-LCS LOOP D BLEEDOFF BYPASS LINE ISOLATION	Y	Y	Initiate MSIV-LCS	Long term MSIV-LCS operation

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MOV ID	VOTES TESTING STATUS		COMMENTS
	STATIC	DYNAMIC	
MO1902	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO1903	Complete		Will be dynamically tested open against dP only.
MO1904	Complete		Will be dynamically tested. Outage required.
MO1905	Complete		Will be dynamically tested. Outage required.
MO1908	Complete	Not Practicable	
MO1909	Complete	Not Practicable	
MO1913	Complete	Not Practicable	
MO1921	Complete	Not Practicable	
MO1932	Complete		Will be dynamically tested.
MO1933	S (06-09-94)		Will be dynamically tested. Outage required.
MO1934	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO1935	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO1939	Complete		Will be dynamically tested.
MO1940	Complete		Will be dynamically tested.
MO1947	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO1989	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2000	Complete	Not Practicable	
MO2001	Complete	Complete	Dynamically tested open against dP only. More information required.
MO2003	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2004	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2005	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2006	Complete		Will be dynamically tested. Outage required.
MO2007	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2009	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2012	Complete	Not Practicable	
MO2015	Complete	Not Practicable	
MO2029	Complete		Will be dynamically tested.
MO2030	Complete		Will be dynamically tested.
MO2039A	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2039B	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2046	Complete		Will be dynamically tested.
MO2069	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2077	Complete	Not Practicable	
MO2078	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2100	Complete	Not Practicable	
MO2104	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2117	Complete		Will be dynamically tested. Refuel outage (vessel floodup) required.
MO2120	S (05-23-94)	Not Practicable	
MO2124	Complete	S (05-26-94)	Will be dynamically tested.
MO2137	Complete		Will be dynamically tested. Refuel outage (vessel floodup) required.
MO2146	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2147	Complete	Not Practicable	
MO2202	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2238	Complete	Not Practicable	
MO2239	Complete	Not Practicable	
MO2247	S (06-13-94)	Not Practicable	
MO2290A	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.

MOV ID	VOTES TESTING STATUS		COMMENTS
	STATIC	DYNAMIC	
MO2290B	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2300	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2312	Complete		Will be dynamically tested open against dP only. Outage required.
MO2318	Complete	Complete	* Considered complete * Dynamic test results are acceptable.
MO2321	Complete	Not Practicable	
MO2322	Complete	Not Practicable	
MO2400	Complete	Not Practicable	
MO2401	Complete	Not Practicable	
MO2404	Complete		Will be dynamically tested. Power operation required.
MO2426	Complete		Will be dynamically tested. Power operation required.
MO2500	Complete	Not Practicable	* Considered complete * Thrust margin available is >80%.
MO2510	Complete		Will be dynamically tested. Power operation required.
MO2512	Complete		Will be dynamically tested open against dP only. Outage required.
MO2516	S (05-31-94)	Not Practicable	
MO2517	S (06-02-94)	Not Practicable	
MO2700	Complete	Not Practicable	
MO2701	Complete	Not Practicable	
MO2740	Complete		Will be dynamically tested close against system flow only.
MO4320A	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO4320B	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO4323A	Complete		Will be dynamically tested.
MO4323B	Complete		Will be dynamically tested.
MO4423	Complete	Not Practicable	
MO4424	Complete	Not Practicable	
MO4627	Complete	Not Practicable	
MO4628	Complete	Not Practicable	
MO4841A	Complete		Will be dynamically tested. Outage required.
MO4841B	Complete		Will be dynamically tested. Outage required.
MO8401A	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8401B	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8401C	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8401D	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8402A	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8402B	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8402C	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8402D	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8403A	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8403B	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8403C	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.
MO8403D	Complete	Not Meaningful	* Considered complete * DP thrust is <10% of the required thrust.

VALVE SPECIFIC INFORMATION

Pages 3 through 5 of this attachment provide the CLOSE STROKE information for each motor operated valve with an active safety function in our MOV program. Pages 6 through 7 of this attachment provide the OPEN STROKE information for each motor operated valve with an active safety function in or MOV program. The following information is included:

MOV IDENTIFICATION

MOV ID: Plant equipment number

INSTALLED HARDWARE

MFG: Valve manufacturer
SIZE: Nominal valve size, inches
PRESS CLASS: Valve ANSI primary pressure rating, psig
TYPE: Valve type
OD: Stem outside diameter, inches
TPI: Stem threads per inch
TPR: Stem threads per revolution
LIMITORQUE OPERATOR: Includes type and size

ENGINEERING INPUTS & THRUST REQUIREMENT

μ: Coefficient of friction value used to calculate FS
FS: Calculated stem factor based on the stem geometry and μ, feet
VF: Valve factor used in the determination of MRST

Close Stroke (for MOVs with active safety function to close)
DESIGN FLOW: Expressed in gpm for water, lb/hr for steam, scfh for MSIV-LCS
LINE PRESS: Maximum expected closing line pressure, psig
MEDP: Maximum expected closing differential pressure, psid
MRST: Minimum required stem thrust to close, lbs

Open Stroke (for MOVs with active safety function to open)
DESIGN FLOW: Expressed in gpm for water, lb/hr for steam, scfh for MSIV-LCS
LINE PRESS: Maximum expected opening line pressure, psig
MEDP: Maximum expected opening differential pressure, psid
MRST: Minimum required stem thrust to open, lbs

AS-LEFT STATIC VOTES TEST INFORMATION (for MOVs with active safety function to close)

TEST DATE: The most recent static VOTES test
THRUST @ TST: VOTES measured thrust at torque switch trip, lbs
VOTES ERROR @ TST: Incorporates VOTES inaccuracies applicable to the test
TSR: Torque switch repeatability applicable to the test

VALVE SPECIFIC INFORMATION (continued)

THRUST AVAILABLE TO PERFORM ACTIVE SAFETY FUNCTION

CLOSE THRUST AVAIL: THRUST @ TST adjusted for inaccuracies and repeatability, lbs
OPEN THRUST AVAIL: Max allowed opening thrust @ disc pullout, lbs

AS-LEFT CAPABILITY

MARGIN ABOVE MRST: For the THRUST AVAIL, % MRST
MAX VF: Maximum valve factor that could be overcome assuming MRST = THRUST AVAIL

ADDITIONAL INFORMATION

Due to the possibility that new information may identify additional margins that should be considered, a more detailed assessment of those MOVs that have shown a low MARGIN ABOVE MRST has been completed. As a result of this assessment, 7 MOVs have been identified with negative margins. The following is a detailed description of those MOVs identified.

MO2318-Currently shows -17.6% margin above MRST. A dynamic test was performed satisfactorily and the thrust required was 19285#. The MRST is not being revised based on the dynamic test. This assures that additional margin will be provided during the next static test. MO2318 is capable of performing its active safety functions.

MO2740-Currently shows -30.0% margin above MRST. Evaluation of this condition concluded that MO2740 has flow over the disc for the design bases event, therefore the MRST is extremely conservative. MO2740 is capable of performing its active safety functions.

MO1904
MO2004 -The open stroke MEDP is based on stroke time testing during power operation. Therefore, degraded voltage conditions do not have to be considered for surveillance testing and the thrust limit is 250000#, which is greater than the MRST for these conditions. Activities are in progress to allow for alternate testing . The open stroke MRST for its active safety function is 63652#, for which a very large margin exists. MO1904 and MO2004 currently meet all design requirements and are capable of performing all active safety functions.

MO1905
MO2003-The open stroke MEDP is based on stroke time testing during power operation. Therefore, degraded voltage conditions do not have to be considered for surveillance testing and the thrust limit is 232500#, which is greater than the MRST for these conditions. Activities are in progress to allow for alternative testing. The open stroke MRST for its active safety function is 25140#, for which a very large margin exists. MO1905 and MO2003 currently meet all design requirements and are capable of performing all active safety functions.

MO2147- The MO2147 was set up with 21.6% margin above MRST based on a valve factor of 0.5. Currently, MO2147 shows a negative margin because a higher valve factor is being considered based on very limited test data. This assures that additional margin will be provided during the next static test. From the static test data, the actual packing load is 431# (which is 1169# less than the assumed packing load of 1500#). Therefore, MO2147 meets all design requirements and is capable of performing its active safety functions.

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VALVE SPECIFIC INFORMATION

MOV ID	MFG.	VALVE SIZE	VALVE PRESS CLASS	VALVE TYPE	STEM OD	STEM TPI	STEM TPR	LIMITORQUE OPERATOR	µ	FS	VF	CLOSE STROKE DESIGN FLOW	CLOSE STROKE LINE PRESS	CLOSE STROKE MEDP	CLOSE STROKE MRST	TEST DATE	THRUST @ TST	VOTES ERROR @ TST	TSR	CLOSE THRUST AVAIL.	MARGIN ABOVE MRST	MAX. VF (CLOSE)
MO1902	ANCHOR VAL	10	300	GATE	1.500	3.0	2	SB 2	0.150	0.0179	0.5	6840	234	233	9325	06/08/93	34261	0.1121	0.10	29114	212.2	1.8
MO1903	ANCHOR VAL	10	300	GLOBE	2.250	3.0	2	SMB 2	0.150	0.0226	1.1	6840	244	233	20796	09/13/93	32499	0.0950	0.05	29010	39.5	1.6
MO1904	ROCKWELL	20	900	GLOBE	4.500	1.0	1	SB 4	BALL	0.0147	1.1	19200	235	235	71127	08/03/93	105997	0.0900	0.05	95084	33.7	1.5
MO1905	ANCHOR VAL	20	900	GATE	3.125	3.0	3	SB 4	0.150	0.0329	0.5	19200	235	235	28745	08/04/93	90699	0.0993	0.05	80615	180.4	1.6
MO1908	ANCHOR VAL	18	900	GATE	2.625	3.0	3	SB 2	0.100	0.0243	0.5	0	169	171	20730	08/23/93	39845	0.0958	0.05	35539	71.4	0.9
MO1909	ANCHOR VAL	18	900	GATE	2.625	3.0	3	SB 2	0.150	0.0297	0.5	0	175	177	21366	08/20/93	25772	0.0958	0.05	22987	7.6	0.5
MO1913	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	60	60	7850	02/07/91	13250	0.0949	0.05	11829	50.7	1.2
MO1921	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	60	60	7850	10/18/93	1352[illegible]	0.0949	0.10	11659	48.5	1.1
MO1932	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	19200	287	239	20616	11/09/92	25490	0.0961	0.05	22729	10.2	0.6
MO1933	ANCHOR VAL	4	300	GLOBE	1.250	3.0	1	SMB 00	0.150	0.0116	1.1	360	300	247	4714							
MO1934	ANCHOR VAL	12	300	GLOBE	2.500	4.0	1	SMB 2	0.150	0.0187	1.1	19200	287	239	30550	11/10/92	54755	0.0906	0.10	47366	55.0	1.8
MO1935	ANCHOR VAL	3	300	GATE	0.875	5.0	1	SMB 000	0.150	0.0078	1.0	250	292	239	2670	11/04/92	4212	0.0994	0.10	3618	35.5	1.6
MO1939	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	9600	442	250	17419	06/23/93	21381	0.0961	0.05	19065	9.4	0.6
MO1940	ANCHOR VAL	18	300	GLOBE	3.250	3.0	1	SMB 4	0.150	0.0245	1.1	9600	442	250	61781	10/26/93	96252	0.0954	0.10	82949	34.3	1.5
MO1947	FISHER	14X6	300	GLOBE	1.250	6.0	1	SMB 0	0.150	0.0130	1.1	4800	421	408	23278	05/05/94	28366	0.0900	0.05	25446	9.3	1.2
MO1989	ANCHOR VAL	24	150	GATE	2.000	4.0	2	SMB 0	0.150	0.0190	0.5	0	52	52	6835	09/03/93	21523	0.0933	0.05	19245	181.6	1.8
MO2000	ANCHOR VAL	10	300	GATE	1.500	3.0	2	SMB 2	0.150	0.0124	0.5	6840	228	224	9028	05/16/94	16934	0.1027	0.05	15000	66.1	0.9
MO2001	ANCHOR VAL	10	300	GLOBE	2.250	3.0	2	SMB 2	0.150	0.0226	1.1	6840	244	224	20117	05/14/94	28349	0.0900	0.05	25430	26.4	1.4
MO2003	ANCHOR VAL	20	900	GATE	3.125	3.0	3	SB 4	0.150	0.0329	0.5	19200	235	235	28745	08/08/93	56877	0.0906	0.05	50991	77.4	1.0
MO2004	ROCKWELL	20	900	GLOBE	4.500	1.0	1	SB 4	BALL	0.0147	1.1	19200	235	235	71127	08/08/93	95262	0.0900	0.05	85454	20.1	1.4
MO2005	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	19200	287	239	20616	10/01/92	24283	0.0961	0.05	21652	5.0	0.5
MO2006	ANCHOR VAL	4	300	GLOBE	1.250	3.0	1	SMB 00	0.150	0.0116	1.1	360	300	247	4714	05/10/94	11828	0.0900	0.05	10610	125.1	3.2
MO2007	ANCHOR VAL	12	300	GLOBE	2.500	4.0	1	SMB 2	0.150	0.0187	1.1	19200	287	239	30550	11/18/93	46505	0.0906	0.05	41693	36.5	1.6
MO2009	ANCHOR VAL	3	300	GATE	0.875	5.0	1	SMB 000	0.150	0.0078	1.0	250	292	239	2670	11/19/92	5507	0.0994	0.10	4731	77.2	2.3
MO2012	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	60	60	7850	05/25/93	12548	0.0949	0.05	11202	42.7	1.1
MO2015	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	60	60	7850	02/09/93	14963	0.0949	0.05	13358	70.2	1.3
MO2029	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	9600	442	250	17419	11/01/93	24291	0.0961	0.05	21660	24.3	0.6
MO2030	ANCHOR VAL	18	300	GLOBE	3.250	3.0	1	SMB 4	0.150	0.0245	1.1	9600	442	250	61781	11/17/93	141466	0.0905	0.05	126839	105.3	2.4
MO2039A	PACIFIC	4	150	GATE	1.000	4.0	1	SMB 000	0.150	0.0091	0.5	310	128	128	1855	08/19/93	4017	0.0900	0.05	3603	94.3	1.7
MO2039B	PACIFIC	4	150	GATE	1.000	4.0	1	SMB 000	0.150	0.0091	0.5	310	128	128	1855	09/07/93	6526	0.0900	0.05	5854	215.6	3.1
MO2046	FISHER	14X6	300	GLOBE	1.250	6.0	1	SMB 0	0.150	0.0130	1.1	4800	421	408	23278	07/14/93	29178	0.0900	0.05	26174	12.4	1.2
MO2069	ANCHOR VAL	24	150	GATE	2.000	4.0	2	SMB 0	0.150	0.0190	0.5	0	52	52	6835	08/16/93	21532	0.0933	0.05	19253	181.7	1.8
MO2077	PACIFIC	4	150	GATE	1.000	4.0	1	SMB 000	0.150	0.0091	0.5	310	128	128	1855	04/21/94	2574	0.0900	0.10	2228	20.1	0.7
MO2078	PACIFIC	4	150	GATE	1.000	4.0	1	SMB 000	0.150	0.0091	0.5	310	128	128	1855	10/21/93	4792	0.0900	0.05	4299	131.7	2.1

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VALVE SPECIFIC INFORMATION

MOV ID	MFG.	VALVE SIZE	VALVE PRESS CLASS	VALVE TYPE	STEM OD	STEM TPI	STEM TPR	LIMITORQUE OPERATOR	µ	FS	VF	CLOSE STROKE DESIGN FLOW	CLOSE STROKE LINE PRESS	CLOSE STROKE MEDP	CLOSE STROKE MRST	TEST DATE	THRUST @ TST	VOTES ERROR @ TST	TSR	CLOSE THRUST AVAIL.	MARGIN ABOVE MRST	MAX. VF (CLOSE)
MO2100	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	61	61	6690	04/27/94	8389	0.0982	0.10	7213	7.8	0.8
MO2104	VELAN	2	600	GATE	0.750	6.0	2	SMB 000	0.150	0.0089	0.5	300	426	373	1564	04/28/94	4633	0.1169	0.10	3920	150.7	2.4
MO2117	ANCHOR VAL	8	900	GATE	1.750	3.0	3	SB 2	0.150	0.0242	0.5	3120	350	350	9717	08/10/93	28274	0.1137	0.05	24762	154.8	1.6
MO2120	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	61	61	6690							
MO2124	VELAN	2	600	GATE	0.750	6.0	2	SMB 000	0.150	0.0089	0.5	300	421	368	1553	06/16/93	4026	0.1169	0.10	3407	119.4	2.0
MO2137	ANCHOR VAL	8	900	GATE	1.750	3.0	3	SMB 2	0.150	0.0242	0.5	3120	349	349	9694	09/09/93	34843	0.1137	0.05	30515	214.8	2.0
MO2146	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	59	59	6520	06/16/93	15258	0.0984	0.05	13574	108.2	1.7
MO2147	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	59	59	6520	04/25/94	6992	0.0982	0.05	6222	-4.6	0.7
MO2238	ANCHOR VAL	10	900	GATE	2.000	3.0	2	SB 2	0.120	0.0211	0.5	130000	1121	1121	38750	09/09/93	52292	0.0982	0.02	47052	21.4	0.6
MO2239	ANCHOR VAL	10	900	GATE	2.000	3.0	3	SB 3	0.150	0.0258	0.5	130000	1121	1121	38750	10/08/93	53378	0.1046	0.05	47190	21.8	0.6
MO2290A	VELAN	2	1500	GATE	0.750	6.0	2	SMB 000	0.150	0.0089	0.5	0	68	68	894	08/19/93	3238	0.1169	0.05	2826	216.1	9.0
MO2290B	VELAN	2	1500	GATE	0.750	6.0	2	SMB 000	0.150	0.0089	0.5	0	68	68	894	08/28/93	2866	0.1169	0.10	2425	171.3	7.2
MO2300	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	3000	21	21	3752	08/02/93	11291	0.0949	0.05	10080	168.7	3.0
MO2312	ANCHOR VAL	12	900	GATE	2.250	3.0	3	SMB 3	0.150	0.0274	0.5	3000	1147	1147	61312	09/13/93	79769	0.0995	0.05	70886	15.6	0.6
MO2318	ANCHOR VAL	4	600	GLOBE	1.375	4.0	2	SMB 0	0.150	0.0150	1.1	300	1404	1404	25010	06/03/93	22980	0.0900	0.05	20614	-17.6	0.9
MO2321	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	3000	59	59	7374	09/08/93	10858	0.1073	0.05	9573	29.8	1.0
MO2322	ANCHOR VAL	14	150	GATE	1.625	4.0	2	SMB 00	0.150	0.0166	0.7	3000	59	59	7229	04/13/94	12379	0.0961	0.05	11038	52.7	1.2
MO2400	ANCHOR VAL	4	900	GATE	1.250	4.0	1	SMB 00	0.150	0.0107	0.5	20000	1121	1121	9026	09/15/93	14456	0.0974	0.05	12873	42.6	0.8
MO2401	ANCHOR VAL	4	900	GATE	1.250	4.0	1	SMB 00	0.150	0.0107	0.5	20000	1121	1121	9026	09/11/93	15691	0.0957	0.05	13997	55.1	0.9
MO2404	ANCHOR VAL	4	600	GLOBE	1.375	3.0	2	SMB 0	0.150	0.0171	1.1	20000	1121	1121	20246	09/11/93	27120	0.0900	0.05	24328	20.2	1.4
MO2500	ANCHOR VAL	6	150	GATE	1.250	4.0	1	SMB 000	0.150	0.0107	0.5	425	21	21	1537	03/30/94	4051	0.0957	0.10	3490	127.1	4.2
MO2510	VELAN	2	1500	GLOBE	0.750	6.0	2	SMB 00	0.150	0.0089	1.1	80	1355	1355	4934	01/06/94	9809	0.2100	0.05	7692	55.9	1.9
MO2512	ANCHOR VAL	4	900	GATE	1.250	4.0	2	SMB 00	0.150	0.0142	0.5	425	1146	1146	9199	08/12/93	13130	0.1058	0.05	11594	26.0	0.7
MO2516	ANCHOR VAL	6	150	GATE	1.250	4.0	1	SMB 000	0.150	0.0107	0.5	425	59	59	2055							
MO2517	ANCHOR VAL	6	150	GATE	1.250	4.0	1	SMB 000	0.150	0.0107	0.5	425	59	59	2055							
MO2700	ANCHOR VAL	4	900	GATE	1.250	4.0	1	SMB 00	0.150	0.0107	0.5	0	1139	1139	9151	08/24/93	14967	0.0957	0.05	13351	45.9	0.8
MO2701	ANCHOR VAL	4	900	GATE	1.250	4.0	1	SMB 00	0.150	0.0107	0.5	0	1129	1129	9081	08/23/93	14352	0.0957	0.05	12802	41.0	0.8
MO2740	ANCHOR VAL	4	900	GLOBE	1.500	4.0	1	SMB 0	0.150	0.0123	1.1	0	1178	1178	21663	08/18/93	16906	0.0900	0.05	15165	-30.0	0.7
MO4320A	VELAN	2	1500	GATE	0.750	6.0	1	SMB 000	0.150	0.0066	0.5	0	34	34	822	03/22/94	3813	0.0992	0.10	3276	298.5	22.0
MO4320B	VELAN	2	1500	GATE	0.750	6.0	1	SMB 000	0.150	0.0066	0.5	0	34	34	822	03/24/94	5164	0.0992	0.10	4437	439.7	32.2
MO4323A	ROCKWELL	2	1500	GLOBE	1.000	6.0	1	SMB 00	0.150	0.0082	1.1	0	2450	2450	11391	07/21/93	16103	0.0900	0.05	14445	26.8	1.5
MO4323B	ROCKWELL	2	1500	GLOBE	1.000	6.0	1	SMB 00	0.150	0.0082	1.1	0	2450	2450	11391	07/23/93	15734	0.0900	0.05	14114	23.9	1.5
MO4423	ANCHOR VAL	3	900	GATE	1.125	5.0	2	SMB 00	0.150	0.0122	0.5	350000	1121	1121	6713	08/27/93	12589	0.1009	0.05	11171	66.4	1.0
MO4424	ANCHOR VAL	3	900	GATE	1.125	5.0	2	SMB 00	0.150	0.0122	0.5	350000	1121	1121	6713	09/09/93	9700	0.0900	0.05	8701	29.6	0.7

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DUANE ARNOLD ENERGY CENTER

VALVE SPECIFIC INFORMATION

MOV ID	MFG.	VALVE SIZE	VALVE PRESS CLASS	VALVE TYPE	STEM OD	STEM TPI	STEM TPR	LIMITORQUE OPERATOR		µ	FS	VF	CLOSE STROKE DESIGN FLOW	CLOSE STROKE LINE PRESS	CLOSE STROKE MEDP	CLOSE STROKE MRST	TEST DATE	THRUST @ TST	VOTES ERROR @ TST	TSR	CLOSE THRUST AVAIL.	MARGIN ABOVE MRST	MAX. VF (CLOSE)
MO4627	ANCHOR VAL	22	900	DOUBLEDISK	2.500	2.0	1	SB	2	0.150	0.0214	0.5	28800	200	200	26882	09/05/93	37673	0.0900	0.05	33794	25.7	0.6
MO4628	ANCHOR VAL	22	900	DOUBLEDISK	2.500	2.0	1	SB	2	0.150	0.0214	0.5	28800	200	200	26882	09/17/93	36012	0.0900	0.05	32304	20.2	0.6
MO4841A	ANCHOR VAL	4	150	GATE	1.000	4.0	1	SMB	000	0.150	0.0091	0.5	350	77	77	1515	09/03/93	3029	0.1028	0.10	2595	71.3	1.7
MO4841B	ANCHOR VAL	4	150	GATE	1.000	4.0	1	SMB	000	0.150	0.0091	0.5	350	77	77	1515	09/16/93	3657	0.1028	0.05	3239	113.8	2.4
MO8401A	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	09/12/93	2098	0.1091	0.20	1620	153.9	N/A
MO8401B	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	04/01/92	4302	0.1091	0.20	3322	420.7	N/A
MO8401C	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	03/31/92	3324	0.1091	0.20	2567	302.3	N/A
MO8401D	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	03/31/92	3888	0.1091	0.20	3002	370.6	N/A
MO8402A	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	08/17/93	5145	0.1091	0.20	3973	522.7	N/A
MO8402B	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	08/23/93	4159	0.1808	0.20	3038	376.1	N/A
MO8402C	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	08/24/93	3298	0.1091	0.20	2547	299.2	N/A
MO8402D	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	41	0	638	08/23/93	2551	0.1091	0.20	1970	208.8	N/A
MO8403A	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	38	0	637	08/19/93	3664	0.1091	0.10	3122	390.1	N/A
MO8403B	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	38	0	637	08/26/93	2502	0.1091	0.20	2009	215.4	N/A
MO8403C	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	38	0	637	08/25/93	4412	0.1091	0.20	3407	434.8	N/A
MO8403D	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB	000	0.150	0.0058	0.5	90	38	0	637	08/26/93	2982	0.1091	0.05	2624	312.0	N/A

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VALVE SPECIFIC INFORMATION

MOV ID	MFG.	VALVE SIZE	VALVE PRESS CLASS	VALVE TYPE	STEM OD	STEM TPI	STEM TPR	LIMITORQUE OPERATOR	μ	FS	VF	OPEN STROKE DESIGN FLOW	OPEN STROKE LINE PRESS	OPEN STROKE MEDP	OPEN STROKE MRST	OPEN THRUST AVAIL.	MARGIN ABOVE MRST	MAX. VF (OPEN)
MO1902	ANCHOR VAL	10	300	GATE	1.500	3.0	2	SB 2	0.150	0.0179	0.5	6840	285	233	8408	25392	202.0	1.6
MO1903	ANCHOR VAL	10	300	GLOBE	2.250	3.0	2	SMB 2	0.150	0.0226	1.1	6840	295	233	18652	63722	241.6	3.9
MO1904	ROCKWELL	20	900	GLOBE	4.500	1.0	1	SB 4	BALL	0.0147	1.1	19200	1212	987	249358	250000	0.3	1.1
MO1905	ANCHOR VAL	20	900	GATE	3.125	3.0	3	SB 4	0.150	0.0329	0.5	19200	1212	987	93861	76649	-18.3	0.4
MO1913	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	8	8	2525	19600	676.2	15.8
MO1921	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	8	8	2525	19600	676.2	15.8
MO1932	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	19200	297	250	20251	33600	65.9	0.8
MO1933	ANCHOR VAL	4	300	GLOBE	1.250	3.0	1	SMB 00	0.150	0.0116	1.1	360	289	236	3853	19600	408.7	7.0
MO1934	ANCHOR VAL	12	300	GLOBE	2.500	4.0	1	SMB 2	0.150	0.0187	1.1	19200	287	239	27733	70000	152.4	2.8
MO1935	ANCHOR VAL	3	300	GATE	0.875	5.0	1	SMB 000	0.150	0.0078	1.0	250	303	250	2387	8332	249.1	4.5
MO1939	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	9600	442	250	15585	33600	115.6	1.1
MO1940	ANCHOR VAL	18	300	GLOBE	3.250	3.0	1	SMB 4	0.150	0.0245	1.1	9600	442	250	54448	180495	231.5	3.6
MO1947	FISHER	14X6	300	GLOBE	1.250	6.0	1	SMB 0	0.150	0.0130	1.1	4800	421	408	22245	33600	51.0	1.7
MO2000	ANCHOR VAL	10	300	GATE	1.500	3.0	2	SMB 2	0.150	0.0124	0.5	6840	279	224	8132	27380	236.7	1.9
MO2001	ANCHOR VAL	10	300	GLOBE	2.250	3.0	2	SMB 2	0.150	0.0226	1.1	6840	295	224	17974	58538	225.7	3.7
MO2003	ANCHOR VAL	20	900	GATE	3.125	3.0	3	SB 4	0.150	0.0329	0.5	19200	1212	987	93861	66588	-29.1	0.4
MO2004	ROCKWELL	20	900	GLOBE	4.500	1.0	1	SB 4	BALL	0.0147	1.1	19200	1212	987	249358	238283	-4.4	1.1
MO2005	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	19200	297	250	20251	33600	65.9	0.8
MO2006	ANCHOR VAL	4	300	GLOBE	1.250	3.0	1	SMB 00	0.150	0.0116	1.1	360	289	236	3853	19600	408.7	7.0
MO2007	ANCHOR VAL	12	300	GLOBE	2.500	4.0	1	SMB 2	0.150	0.0187	1.1	19200	287	239	27733	69620	151.0	2.8
MO2009	ANCHOR VAL	3	300	GATE	0.875	5.0	1	SMB 000	0.150	0.0078	1.0	250	303	250	2387	6739	182.3	3.6
MO2012	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	8	8	2525	18538	634.2	14.8
MO2015	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	0	8	8	2525	18554	634.8	14.8
MO2029	ANCHOR VAL	12	300	GATE	1.625	4.0	2	SMB 0	0.150	0.0166	0.5	9600	442	250	15585	33600	115.6	1.1
MO2030	ANCHOR VAL	18	300	GLOBE	3.250	3.0	1	SMB 4	0.150	0.0245	1.1	9600	442	250	54448	147633	171.1	3.0
MO2046	FISHER	14X6	300	GLOBE	1.250	6.0	1	SMB 0	0.150	0.0130	1.1	4800	421	408	22245	33600	51.0	1.7
MO2100	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	26	21	3204	14127	340.9	5.1
MO2104	VELAN	2	600	GATE	0.750	6.0	2	SMB 000	0.150	0.0089	0.5	300	388	387	1228	5958	385.2	4.1
MO2117	ANCHOR VAL	8	900	GATE	1.750	3.0	3	SB 2	0.150	0.0242	0.5	0	341	341	7872	38693	391.5	2.7
MO2120	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	26	21	3204	15840	394.4	5.8
MO2124	VELAN	2	600	GATE	0.750	6.0	2	SMB 000	0.150	0.0089	0.5	300	388	387	1228	6685	444.4	4.7
MO2137	ANCHOR VAL	8	900	GATE	1.750	3.0	3	SMB 2	0.150	0.0242	0.5	0	341	341	7872	44938	470.9	3.2
MO2146	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	24	21	3207	14166	341.7	5.1
MO2147	ANCHOR VAL	12	150	GATE	1.500	4.0	2	SMB 00	0.150	0.0158	0.7	0	24	21	3207	12680	295.4	4.5

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VALVE SPECIFIC INFORMATION

MOV ID	MFG.	VALVE			STEM			LIMITORQUE OPERATOR	µ	FS	VF	OPEN STROKE				OPEN THRUST AVAIL.	MARGIN ABOVE MRST	MAX. VF (OPEN)
		SIZE	PRESS CLASS	TYPE	OD	TPI	TPR					DESIGN FLOW	LINE PRESS	MEDP	MRST			
MO2202	ANCHOR VAL	10	600	GATE	1.875	3.0	2	SMB 2	0.150	0.0203	0.5	130000	1121	1121	37992	50712	33.5	0.7
MO2247	VELAN	2	1500	GLOBE	0.750	6.0	2	SMB 000	0.150	0.0089	1.1	70	61	61	884	11200	1167.0	71.4
MO2312	ANCHOR VAL	12	900	GATE	2.250	3.0	3	SMB 3	0.150	0.0274	0.5	3000	1147	1147	52191	74590	42.9	0.7
MO2318	ANCHOR VAL	4	600	GLOBE	1.375	4.0	2	SMB 0	0.150	0.0150	1.1	300	1412	1412	20951	33600	60.4	1.7
MO2321	ANCHOR VAL	14	150	GATE	1.750	4.0	2	SMB 00	0.150	0.0174	0.7	3000	126	126	13154	19600	49.0	1.1
MO2322	ANCHOR VAL	14	150	GATE	1.625	4.0	2	SMB 00	0.150	0.0166	0.7	3000	126	126	13071	19600	50.0	1.1
MO2404	ANCHOR VAL	4	600	GLOBE	1.375	3.0	2	SMB 0	0.150	0.0171	1.1	20000	1121	1121	16917	33600	98.6	2.2
MO2426	VELAN	2	1500	GLOBE	0.750	6.0	2	SMB 000	0.150	0.0089	1.1	16	372	372	1570	11200	613.4	11.9
MO2510	VELAN	2	1500	GLOBE	0.750	6.0	2	SMB 00	0.150	0.0089	1.1	80	1369	1369	3767	15506	311.6	4.7
MO2512	ANCHOR VAL	4	900	GATE	1.250	4.0	2	SMB 00	0.150	0.0142	0.5	425	1146	1146	6387	19600	206.9	1.5
MO2516	ANCHOR VAL	6	150	GATE	1.250	4.0	1	SMB 000	0.150	0.0107	0.5	425	126	126	2661	8972	237.2	2.5
MO2517	ANCHOR VAL	6	150	GATE	1.250	4.0	1	SMB 000	0.150	0.0107	0.5	425	126	126	2661	9838	269.7	2.8
MO4320A	VELAN	2	1500	GATE	0.750	6.0	1	SMB 000	0.150	0.0066	0.5	0	34	34	792	10817	1265.8	88.4
MO4320B	VELAN	2	1500	GATE	0.750	6.0	1	SMB 000	0.150	0.0066	0.5	0	34	34	792	11200	1314.1	91.7
MO4323A	ROCKWELL	2	1500	GLOBE	1.000	6.0	1	SMB 00	0.150	0.0082	1.1	0	2450	2450	7542	19600	159.9	2.7
MO4323B	ROCKWELL	2	1500	GLOBE	1.000	6.0	1	SMB 00	0.150	0.0082	1.1	0	2450	2450	7542	19600	159.9	2.7
MO8401A	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8401B	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8401C	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8401D	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8402A	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8402B	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8402C	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8402D	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	41	41	630	3348	431.4	79.9
MO8403A	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	38	38	629	3348	432.3	86.2
MO8403B	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	38	38	629	3348	432.3	86.2
MO8403C	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	38	38	629	3348	432.3	86.2
MO8403D	ANCHOR VAL	1	900	GATE	0.625	6.0	1	SB 000	0.150	0.0058	0.5	90	38	38	629	3348	432.3	86.2

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OVERVIEW OF SAFETY SIGNIFICANCE

All MOVs in our dynamic test scope have been prioritized based on safety significance in association with ERIN Engineering and Research, Inc. The prioritization process included:

- Problem Scoping (looking at functional failure modes)
- Probabilistic Safety Assessment (PSA) (evaluates the safety significance of each MOV utilizing both Level 1 and Level 2 models)
- Deterministic Evaluation (addresses MOV functional failure modes not modeled in the PSA)
- Expert Review (assessment of the combined probabilistic and deterministic ranking process by an on-site review panel)

The PSA classifies our MOVs into four risk groups as follows:

Each MOV with an active safety function modeled in the PSA is failed individually to assess its individual safety significance. The safety significance is expressed as a Risk Achievement Worth (RAW) value that represents the impact on Core Damage Frequency (CDF) (e.g.- a RAW of 2.0 indicates that the CDF is doubled if we assume failure of this component). For those MOVs that are not classified as HIGH or LOW-LOW, functionally identical MOVs are grouped and a common cause failure (CCF) applied in order to assess the group safety significance.

HIGH

Each MOV with an individual RAW ≥ 2.0 is classified in the HIGH risk significance category.

LOW-LOW

Continuously fail MOVs (as many as possible) until the CDF is doubled (i.e.- if all of these MOVs failed at once, then the CDF would double). Each of the MOVs in this group is classified in the LOW-LOW risk significance category.

MEDIUM

Each MOV (not classified HIGH or LOW-LOW) in a functional group with a CCF RAW ≥ 2.0 is classified in the MEDIUM risk significance category.

LOW

The remaining MOVs are classified in the LOW risk significance category.

Page 2 of this attachment provides a list of all HIGH and MEDIUM category MOVs. Page 3 of this attachment provides a list of all MOVs in our dynamic test scope.