Omaha Public Power District
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Omaha, Nebraska 68102-2247
402/636-2000

October 14, 1994
LIC-94-0177

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

References:
1. Docket No. 50-285
2. Letter from NRC (S. D. Bloom) to OPPD (T. L. Patterson) dated June 3, 1993 (TAC No. M75832)
3. Letter from NRC (T. P. Gwynn) to OPPD (T. L. Patterson) dated March 24, 1994 (Inspection Report 50-285/94-05)
4. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated June 16, 1994
5. NRC Memorandum from B. W. Sheron dated July 12, 1994
6. Letter from NRC (S. D. Bloom) to OPPD (T. L. Patterson) dated August 3, 1994 (TAC No. M75664)

SUBJECT: Additional Information Requested to Assist Closure of NRC Generic Letter 89-10 at Fort Calhoun Station

Reference 6 requested additional information to assist closure of the Nuclear Reactor Regulation (NRR) staff review of the Fort Calhoun Station Generic Letter 89-10 Program. Attached please find the Omaha Public Power District's response to this request.

If you should have any questions, please contact me.

Sincerely,

W. G. Gates
Vice President

Attachments

c: LeBoeuf, Lamb, Greene & MacRae
L. J. Callan, NRC Regional Administrator, Region IV
S. D. Bloom, NRC Project Manager
R. P. Mullikin, NRC Senior Resident Inspector

A064 1/1

The Omaha Public Power District (OPPD) provides the following information as requested in Reference 6 to assist closure of NRR staff review of the Fort Calhoun Station (FCS) Generic Letter (GL) 89-10 Program:

(a) Summary of information detailed in Enclosure 2 of Reference 5 (items 04.04 through 04.07 and Part 1 issues).

04.04 The information contained in paragraphs a. through g. of this section is provided in the attached spread sheets (Attachment 2). These are similar to the spread sheets provided to the NRC Inspectors during the inspection documented in Reference 3. OPPD has completed the test activities which have demonstrated each program Motor Operated Valve's (MOV) design basis capability.

Although the NRC staff is preparing a supplement to GL 89-10 on the need to consider valve mispositioning as part of GL 89-10 programs at PWRs, OPPD is not waiting for issuance of this supplement to address this issue. Mispositioning was addressed in our design basis review for each program valve.

04.05 OPPD has completed the design basis review for each GL 89-10 MOV. The NRC's review of this information is documented in paragraph 1.1 of Reference 3.

The status of OPPD's action for Pressure Locking and Thermal Binding is documented in paragraph 1.4 of Reference 3. OPPD will address the proposed Generic Letter being prepared by NRR on pressure locking and thermal binding of gate valves upon its issuance.

04.06 OPPD has verified the proper sizing and switch settings of each program MOV in accordance with GL 89-10. The NRC's review of this information is documented in paragraph 1.2 of Reference 3.

04.07 OPPD has verified the design basis capability of each program MOV. The NRC's review of each sampled MOV's capability and of our program's adequacy is documented in paragraph 1.3 of Reference 3.

Diagnostic Test Equipment Accuracy - OPPD uses the equipment accuracies supplied by our diagnostic equipment vendor. The NRC's review of this subject is documented in paragraph 1.11.9.b of Reference 3.

Grouping - OPPD has not used grouping to complete the initial testing and design basis reviews required to establish our GL 89-10 Program. However, grouping will be used as discussed in GL 89-10, Supplement 6, for future dynamic test verifications of switch settings. Specifically, two groups have been formed consisting of the eight High Pressure Safety Injection Valves (HPSI), and the other being the four Low Pressure Safety Injection Valves (LPSI).

During periodic testing, three of the HPSIs and two of the LPSIs will be dynamically tested to verify switch settings. The remaining valves in these groups will be statically tested. The other 15 GL 89-10 Program valves will be periodically tested statically and dynamically (as discussed in section 04.08 below) to verify switch settings.

04.08 OPPD will perform periodic verification testing of Program valves to verify MOV capability every five years or three refueling outages, whichever is longer. The NRC's review of this item is documented in paragraph 1.5 of Reference 3. Static testing will be performed on each Program valve. Full flow dynamic testing will be used for each Program valve with the following exceptions:

- HPSIs - As previously discussed, three valves of this group will be dynamically tested. The three valves to be dynamically tested are those with the lowest Safety Open Thrust Margin percentage as determined during initial testing. The three valves are HCV-312, HCV-320 and HCV-321.

- LPSIs - As previously discussed, two valves of this group will be dynamically tested. The two valves (HCV-327 and HCV-329) to be dynamically tested are those with the lowest Safety Open Thrust Margin percentage as determined during initial testing.

- HCV-150 and HCV-151 - These gate valves, the PORV Block Valves, are two stage approach valves, as defined in GL 89-10, due to the inability to practically test in-situ. A prototype valve was tested under full design basis conditions. The test data from this testing was used to establish switch settings for the in-situ valves and subsequent static testing was performed to set the in-situ valves to these switch settings. Future verification testing will consist of static tests to ensure switch setting maintenance and to monitor for MOV degradations. Verification will not include dynamic testing.

- HCV-383-3 and HCV-383-4 - These butterfly valves, the Containment Sump Isolation Valves, are two stage valves, as defined in GL 89-10, due to the inability to practically perform a full flow dynamic test in-situ. An analytical approach has been applied to these valves to verify the ability to operate during a design basis event. This approach, performed by Kalsi Engineering, Incorporated, included using the EPRI Butterfly MOV Guide and the Manufacturer's Data. This analytical approach has shown that unseating torque is greater than dynamic torque for each MOV's Design Basis. Therefore, the hydrostatic test pump test used to gather obtainable differential pressure data during the initial test program will continue to be used to verify each MOV's ability to operate at design basis differential pressure. This test will be used to verify switch settings and monitor for MOV degradations.

- HCV-347 and HCV-348 - These gate valves, the Shutdown Cooling Isolation Valves, are two stage approach valves, as defined in GL 89-10, due to the inability to achieve greater than 50% full design basis flow during testing. An analytical approach has been applied to these valves to verify the ability to operate during a design basis event. This approach was performed by Kalsi Engineering using their KEIGATE Program. This Program is based on the many differential pressure tests of gate valves performed by and summarized by Kalsi Engineering. The results of this analytical approach have validated the current switch settings for these valves. Future verification testing of these valves will use the results of the analytical approach and continue to include static testing as well as the partial flow differential pressure testing used during the initial test program.

- LCV-218-2 - This gate valve, the Volume Control Tank Outlet Valve, was originally scheduled to be tested as a full flow and differential pressure valve. However, the initial testing was only able to produce 18.5% of design basis differential pressure. As a result, this valve was designated a two stage approach valve as defined by GL 89-10. An analytical approach has been applied to this valve to verify the ability to operate during a design basis event. This approach was performed by Kalsi Engineering using their KEIGATE Program. The results of this analytical approach have validated the current switch settings for this valve. Future verification testing of this valve will use the results of the analytical approach and static testing. Differential testing will not be employed on this valve due to the lack of useful data obtained from the initial flow test.

04.09 The NRC's review of this information is documented in paragraph 1.11.9.h of Reference 3. OPPD has completed its review of MOV failures and has completed implementation of our tracking and trending program.

04.10 As submitted in Reference 4, OPPD completed implementation of GL 89-10 on May 27, 1994.

04.11 Quality Assurance Program involvement in OPPD's GL 89-10 Program is limited to surveillances and audits. OPPD utilizes other OPPD organizations which are not a part of the GL 89-10 Program, as well as outside organizations, to provide independent oversight and review of our Program. The NRC's review of this subject is documented in paragraph 1.9 of Reference 3.

Part 1 The Part 1 Inspection items were reviewed and accepted during the Part 2 Inspection with the exception of item 1.11.9.e. Item 1.11.9.e will be discussed in section (b) of this letter. The NRC's review of these items is documented in paragraph 1.11 of Reference 3.

(b) Update of actions taken on inspection followup items and ongoing issues that were to be completed by June 28, 1994, as documented in Reference 3.

Inspection Followup Item 285/9405-01 (paragraph 1.2 of Reference 3) - This item deals with the inspectors' concern that torque switch repeatability, which was accounted for in the minimum required thrust, was not accounted for in the upper limits for valve and actuator ratings. OPPD has reviewed this item and is preparing a revision to procedure SEI-5, "Methodology and Switch Setting," to include torque switch repeatability in the upper limits for the valve and actuator ratings.

Inspection Followup Item 285/9405-02 (paragraph 1.4 of Reference 3) - This item deals with pressure locking and thermal binding and states "pending the anticipated issuance of a generic letter on this subject, this issue was identified as an inspection followup item." Paragraph 1.4 of Reference 3 documents the NRC's review of the current action by OPPD on this issue. As stated in Section 04.05 of paragraph (a) above, OPPD will address the proposed generic letter on this subject upon issuance.

Inspection Followup Item 285/9405-03 (paragraph 1.10 of Reference 3) - This item deals with the observed conditions of MOV valve stems and packing glands (i.e., grease globs on valve stems, boric acid buildup on stem and packing gland, paint chips in stem grease and valve packing leak). OPPD has reviewed this item and is revising the existing preventive maintenance work plan to inspect those Program MOV valves, which are stroked during the operating cycle, on a periodic basis to ensure that the conditions of the valve stems and packing areas have not deteriorated to a point that the operability of the valves would be impaired.

Inspection Followup Item 285/9405-04 (paragraph 1.11.9.e of Reference 3) - This item deals with the use of the standard Limitorque equations at reduced voltages less than 70%. This item specifically applies to HCV-1386 (66.6% reduced voltage), the only Program valve with a reduced voltage less than 70%. OPPD has obtained preliminary test data from the Commonwealth Edison Company AC Motor Test Program. A review of the data for the specific motor size involved indicates that the Limitorque equation would apply down to 60% of rated voltage. OPPD plans no further action on this item.

Items requiring completion prior to June 28, 1994:

Paragraph 1.3 of Reference 3 - Resolution of two stage approach MOVs. As discussed in section 04.08 of paragraph (a) above, the analytical evaluations have been completed for all two stage approach valves in the Program. The two stage approach valves have switch settings which are supported by their respective analytical evaluations. Future verification testing of the two stage approach valves will include the results of the analytical approach.

(c) Summary of MOV enhancements that are planned for future implementation.

OPPD has no enhancements planned for any GL 89-10 MOVs.

(d) Statement of long-range intent related to rectifying the capability problems with the feedwater isolation valves as discussed in Reference 3.

The NRC questioned the ability of the feedwater isolation valves (FWIVs) to isolate, against a 1200 psid line pressure from a main feedwater pump, during a Feedwater Line Break (FWLB) accident. After discussion with NRR personnel, it was determined that the FWLB was not part of the FCS design basis requirements. The FWIVs are required to close against the 600 psid line pressure developed by a condensate pump and the failure of a feedwater regulating valve.

The required safety functions can be met with the existing components as described above. OPPD has evaluated the possibility of replacing the FWIVs and has concluded that the existing valves (HCV-1385, HCV-1386, HCV-1103 and HCV-1104) meet the licensed design basis for FCS. As these valves meet the FCS licensed design basis, there is no identified "capability problem." Therefore, OPPD does not plan to replace these feedwater isolation valves.

(e) Current status of resolving PORV issues related to TMI Action Item II.D.1 (Reference 2).

OPPD completed installation of 15 ft-lb motors in the PORV Block Valves, HCV-150 and HCV-151, in October, 1993, during the 1993 Refueling Outage. Following motor replacement, the MOVs were statically tested, verifying each valve's capability to perform its design function, as discussed in section 04.08 of paragraph (a) above.

FCS GENERIC LETTER 89-10 MOV DATA

MOV TAG #	ACT. SIZE	O.A.R.	APP. FACT.	PULL/ RUN EFF.	VOLT RATING	START TORQUE	MOTOR SPEED	VALVE MAN.	VALVE TYPE	VALVE SIZE	PRESS. RATING	DISC DIAM.	STEM DIAM.	ASSU. VALVE FACTOR (O/C)	ASSU. STEM Coef of Frict. (O/C)	PITCH/ LEAD	DESIGN BASIS DP (O/C)	SAFETY DIR / SAFETY DESIGN BASIS DP	SAFETY FUNCT. DEGRAD VOLT. %	SAFET. FUNCT FLUID TEMP	SAFETY FUNCT FLOW RATE	AMB ASCID TEMP	TEST METHOD
HCV-150	SMB-00	59.4	0.9	40/50	460	15	1800	CRANE	GATE	2.5	2500	2.62	1.125	0.3	0.2	25/.5	2485/2361	C/2361	84.11	668	130,000	225	PROTOTYPE
HCV-151	SMB-00	59.4	0.9	40/50	460	15	1800	CRANE	GATE	2.5	2500	2.62	1.125	0.3	0.2	25/.5	2485/2361	C/2361	83.78	668	130,000	225	PROTOTYPE
HCV-258	SMB-00	46.8	0.9	40/50	460	10	1800	CRANE	GATE	3	150	2.972	0.75	0.3	0.2	167/.333	-65/.0	O/-65	76.9	150	120	122	IN-SITU
HCV-265	SMB-00	46.8	0.9	40/50	460	10	1800	CRANE	GATE	3	150	2.972	0.75	0.3	0.2	167/.333	-65/.0	O/-65	81.56	150	120	122	IN-SITU
HCV-268	SMB-00	34	0.9	40/50	460	10	1800	VELAN	GATE	3	150	2.555	1.125	0.3	0.2	.2/.4	118/98	O/118	81.2	150	120	122	IN-SITU
HCV-308	SMB-000	21.3	0.9	60/60	460	5	1800	CRANE	GATE	2	1500	1.9943	0.75	0.3	0.2	167/.167	-1426.2/-516.4	O/-1381.6	90.17	120	400	174	IN-SITU
HCV-311	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	74.85	120	212	174	IN-SITU
HCV-312	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	76.3	120	212	174	IN-SITU
HCV-314	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	75.59	120	212	174	IN-SITU
HCV-315	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	76.99	120	212	174	IN-SITU
HCV-317	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	74.32	120	212	174	IN-SITU
HCV-318	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	75.78	120	212	174	IN-SITU
HCV-320	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	76.23	120	212	174	IN-SITU
HCV-321	SMB-00	36.2	0.9	40/50	460	25	1800	VELAN	GLOBE	2	1500	1.689	1.125	1.1/0.9	0.2	.2/.2	1426.2/1426.2	O/1398	77.6	120	212	174	IN-SITU
HCV-327	SMB-0	35	0.9	40/55	460	40	1800	AMET/CAL	GLOBE	4	1500	3.07	2	1.1/0.9	0.2	.25/.25	436.7/436.7	O/195	75.52	120	1000	123	IN-SITU
HCV-329	SMB-0	35	0.9	40/55	460	40	1800	AMET/CAL	GLOBE	4	1500	3.07	2	1.1/0.9	0.2	.25/.25	436.7/436.7	O/195	76.37	120	1000	123	IN-SITU
HCV-331	SMB-0	35	0.9	40/55	460	40	1800	AMET/CAL	GLOBE	4	1500	3.07	2	1.1/0.9	0.2	.25/.25	436.7/436.7	O/195	73.15	120	1000	123	IN-SITU
HCV-333	SMB-0	35	0.9	40/55	460	40	1800	AMET/CAL	GLOBE	4	1500	3.07	2	1.1/0.9	0.2	.25/.25	436.7/436.7	O/195	77.3	120	1000	123	IN-SITU
HCV-347	SMB-2	72	0.9	40/55	460	60	1800	VELAN	GATE	10	1500	9.34	2.5	0.5	17/.2	.33/.33	2060/188	C/188	89.82	300	3000	174	TWO STAGE
HCV-348	SMB-3	133	0.9	36/50	460	60	3600	VELAN	GATE	12	1500	12.05	2.75	0.5	0.2	.33/1	265/188	C/188	83.41	300	3000	174	TWO STAGE
HCV-383-3	SMB-00/HBC2	16.3/70	0.9	50/60	460	25	1800	ALL. CHAL.	BUTFLY	24	150	24	3	0.3	NA	NA	66.2/47	O/66.2	92.59	230	3180	174	TWO STAGE
HCV-383-4	SMB-00/HBC2	16.3/70	0.9	50/60	460	25	1800	ALL. CHAL.	BUTFLY	24	150	24	3	0.3	NA	NA	66.2/47	O/66.2	91.39	230	4800	174	TWO STAGE
HCV-1384	SMB-00	36.2	0.9	40/50	460	7.5	1800	CRANE	GATE	4	900	3.81	1.25	0.3	0.2	.25/.25	1198/1198	C/1198	91.96	60	260	114	IN-SITU
HCV-1385	SMB-4T	124.95	0.9	40/60	460	150	3600	CRANE	GATE	16	900	13.84	3	0.5	0.2	.33/1	1197/485	C/485	71.38	440	3458	124	IN-SITU
HCV-1386	SMB-4T	124.95	0.9	40/60	460	150	3600	CRANE	GATE	16	900	13.84	3	0.5	0.2	.33/1	1197/485	C/485	66.64	440	3458	124	IN-SITU
LCV-218-2	SMB-00	31.9	0.9	40/50	460	10	1800	VELAN	GATE	4	150	3.53	1.375	0.3	0.2	.25/.5	-104.3/70	C/70	75.7	120	120	122	TWO STAGE
LCV-218-3	SMB-00	26.3	0.9	40/50	460	10	1800	CRANE	GATE	3	150	3	0.75	0.3	0.2	167/.333	99/99	O/99	91.97	150	120	122	IN-SITU
SPECIAL CATEGORY																							
HCV-1103	SMB-4T	147.9	0.9	38/55	460	150	3600	CRANE	GATE	16	900	13.84	3	0.5	0.2	.33/1	1197/485	C/485	71.75	440	3458	124	STATIC
HCV-1104	SMB-4T	147.9	0.9	38/55	460	150	3600	CRANE	GATE	16	900	13.84	3	0.5	0.2	.33/1	1197/485	C/485	67.54	440	3458	124	STATIC

1993 RFO - GENERIC LETTER 89-10 - MOV TEST STATISTICS

		STATIC											STROKE TIME		DYNAMIC							
MOV TAG #	SAFE DIR.	MIN. REQUIRED THRUST (C/O) (1)	MIN. REQUIRED TORQUE (C/O) (1)	MAX THRUST/ TORQUE AT CST (1)	MAX TOTAL THRUST (C/O) (1)	MAX TOTAL TORQUE (C/O) (1)	SHUT TSS	AVL. THRUST CST (2)	TOT. THRUST CST (2)	TOTAL THRUST	TOTAL TORQ.	COEF. OF FRIC. RUN (C/O)	COEF. OF FRIC. AT CST	OPEN	CLOSE	THRUST AT 100% DP(SAFE DIR) (2)	% DESIGN BASIS DP DURING TEST	% SAFETY SHUT - THRUST MARGIN	% SAFETY OPEN - THRUST MARGIN (2)	COEF. OF FRIC. RUN (C/O)	COEF. OF FRIC. AT CST	VALVE FACTOR (SAFETY DIR.)	LOAD SENS. BEHAVIOR (SHUT)
HCV-150	SHUT	10984/3798	173.1/59.9	14519/247	14619/11648	264/264	2.375	11421	12640	13919	183	10/.122	0.151	10.9	11.09	NA(9)	NA(9)	NA	NA	NA	NA	NA	NA
HCV-151	SHUT	10984/3798	173.1/59.9	14619/247	14619/11648	264/264	3	11497	12137	13155	178.7	11/.145	0.158	13.16	13.42	NA(9)	NA(9)	NA	NA	NA	NA	NA	NA
HCV-258	OPEN	2599/1569	10.52/11.61	5968/204.1	5968/6951	275/275	1.5	3214	4214	5915	NA(8)	NA	NA	14.93	15.28	1833.44	175.69	NA	279.12	NA	NA	NA	0.2(5)
HCV-265	OPEN	1939/1765	20.4/18.54	6798/159	6798/6798	264/264	2.125	4823	4992	6273	53.51	32/NA	0.14	15.58	15.86	2412.41	175.38	NA	181.79	169/2.86	0.124	0.37	2.4
HCV-268	OPEN	3084/2316	44.72/33.58	7827/115	10268/12321	264/264	1.5	7064	7366	9110	93.17	18/.73	0.1	7.33	7.52	3927.28	101.48	NA	39.82	17/1.9	0.086	0.95	-6.1
HCV-308	OPEN	2784/2265	13.84/13.61	5476/54.27	6704/5639	99/99	1.25	3272	4272	6684	NA(8)	NA	NA	8.44	8.82	2004.99	117.19	NA	130.52	NA	NA	0.40(5)	0.5(5)
HCV-311	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/26-	1.625	8952	9905	13220	114	.057/.71	0.142	7.716	7.94	3857.04	99.34	NA	239.09	NA/.43	NA	1.05	1.3
HCV-312	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.5	9835	9951	13053	102	68/1.88	0.11	7.42	7.69	4585.09	97.19	NA	185.25	NA/.35	NA	0.9	1
HCV-314	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.75	8562	8765	12607	134	1.2/3.9	0.15	7.5	7.83	4443.23	95.16	NA	194.35	NA/.44	NA	1.1	-3.5
HCV-315	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.75	9915	10122	12823	110.3	32/1.72	0.133	7.91	8.13	3680.02	98.21	NA	255.4	NA/.31	NA	1.05	-2
HCV-317	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.75	9720	10756	12679	134	61/1.19	0.166	7.17	7.31	3734.17	97.84	NA	250.25	NA/.67	NA	1.01	-3.5
HCV-318	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.625	9327	9440	12420	108.3	74/1.47	0.122	7.82	8.07	3418.34	96.35	NA	282.61	NA/.30	NA	0.92	5.2
HCV-320	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.25	8315	8928	12507	94	12/1.3	0.11	7.3	7.54	5240.46	99.79	NA	149.57	NA/.16	NA	0.96	4.6
HCV-321	OPEN	3734/4312	43.4/50.1	14619/264	14619/13079	264/264	1.5	8743	9133	12251	106	56/.36	0.117	7.61	8.48	4923.55	97.92	NA	165.64	NA/.41	NA	0.84	-4.6
HCV-327	OPEN	4083/4667	80.1/91.6	25063/526	25063/25063	526/526	1.125	12579	13120	21642	122	10/.17	0.033	9.84	10.01	2233.48	94.38	NA	917.07	NA/.74	NA	0.93	-6.4
HCV-329	OPEN	4083/4667	80.1/91.6	25063/526	25063/25063	526/526	1.5	9787	10160	16720	211	49/.49	0.11	9.23	9.46	1891.21	100.66	NA	1101.13	NA/.46	NA	0.82	-9.9
HCV-331	OPEN	4083/4667	80.1/91.6	25063/526	25063/25063	526/526	1	13009	13305	20551	NA(7)	NA(7)	NA(7)	9.44	9.6	1680.02	100.12	NA	1252.13	NA/.23	NA	0.61	-11.8
HCV-333	OPEN	4083/4667	80.1/91.6	25063/526	25063/25063	526/526	1.5	14071	14263	18309	243	188/.582	0.11	9.52	9.78	1515.97	100.89	NA	1398.44	0/.664	0.101	0.51	1.4
HCV-347	SHUT	10245/69729	222/1510	51394/1550.5	51394/75110	1271/1687	2.5	36649	39198	40841	751	176/.80	0.14	63.54	64.03	10089.7(10)	92.7(10)	277.9	NA	163/NA	0.14	0.565	2.72
HCV-348	SHUT	15322/19528	401.6/638.8	84480/2649.7	99001/93479	3630/3630	1	25790	29595	79062	NA(8)	NA	NA	23.07	27.86	28290.91(10)	85.83(10)	-6.12(11)	NA	NA	NA	NA	2.85(5)
HCV-383-3	OPEN	NA	1725/1725	NA/2642	NA	2642/2642	1.625(3)	1805/1799	1805/1799	NA	2319/2224	NA	NA	9.32	9.55	2207.8(4)	91.8(4)	NA	5.9	NA	NA	NA	NA
HCV-383-4	OPEN	NA	1725/1725	NA/2642	NA	2642/2642	1.5(3)	1880/1738	1880/1738	NA	2314/2334	NA	NA	9.35	9.53	1664.01(4)	101.21(4)	NA	40.5	NA	NA	NA	NA
HCV-1385	SHUT	60480/91866	3856/2034	116670/5673	175984/101546	8250/8250	1.5	77801	80767	115033	NA(8)	NA	NA	28.2	28.94	51032.47	126.49	52.98	NA	NA	NA	0.62(5)	3.3(5)
HCV-1386	SHUT	60624/91435	4120/2732	102594/4641	181030/103929	8048/8048	2.25	75664	77455	102565	4402	52/.57	0.26	27.98	28.85	43408.92	121.45	54.12	NA	88/NA	0.28	0.55	13.6
LCV-218-2	SHUT	2927/2221	52.3/39.7	4069/76	12835/14619	264/264	1.375	5145	6038(6)	9147	113	2/.63	0.1	8.74	8.82	4550.19(4)	18.5(4)	28.04	NA	22/NA	0.11	NA	3.5
LCV-218-3	OPEN	2625/1587	13.3/12.1	9281/116	10020/8439	275/275	3	4845	5845	7636	NA(8)	NA	NA	8.4	8.66	3868.54	100.05	NA	118.12	NA	NA	1.22(5)	-15.3(5)
SPECIAL CATEGORY																							
HCV-1103	SHUT	60480/91866	1740/3298.6	149450/5610	175984/101546	5610/5610	1.25	114829	116367	164807	NA(8)	NA	NA	32.62	34.75	NA	NA	NA	NA	NA	NA	NA	NA
HCV-1104	SHUT	62739/95297	2418/3673	126696/5610	175984/101546	5610/5610	1	101534	102782	161478	NA(8)	NA	NA	33.14	34.45	NA	NA	NA	NA	NA	NA	NA	NA
1992 RFO - GENERIC LETTER89-10 - MOV TEST STATISTICS																							
HCV-1384	SHUT	6686/6686	88.2/88.2	14000/184.6	15500/15500	204.4/204.4	1.75	7053	7950	9913	91.5	NA	0.116	20.13	20.21	6427	99.7	33.4	NA	NA	NA	0.3(5)	NA

(1) ALL MAXIMINS ARE CORRECTED FOR TEST EQUIP ERROR EXCEPT TORQUE VALUES WHERE TORQUE IS NOT MEASURED
(2) TORQUE VALUES FOR HCV-383-3/4 (C/O)
(3) FINAL TORQUE SWITCH SET AT 5/5
(4) TWO STAGE APPROACH VALVE, NO FLOW HYDRO DP TEST
(5) ESTIMATE AS DYNAMIC THRUST NOT BY DIRECT MEASUREMENT
(6) DUE TO SMALL WINDOW, CST SET BY STALL TORQUE VICE STALL THRUST
(7) TORQUE SIGNAL UNREADABLE
(8) TORQUE TRANSDUCER NOT USABLE
(9) TWO STAGE APPROACH VALVE, UNABLE TO TEST IN-SITU ; VALVES SET PER PROTOTYPE TEST
(10) TWO STAGE APPROACH, < 80% FLOW
(11) MARGIN BASED ON SPRING PACK PRELOAD. SEE SEI-10 FOR DETAILS