NORTH ATLANTIC ENERGY SERVICES COMPANY
SEABROOK STATION

GENERIC LETTER 89-10
DESIGN BASIS CLOSURE

Revision 0

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CLOSURE OF SEABROOK STATION GL 89-10 PROGRAM

Executive Summary

This document describes the bases for Seabrook Station's closure of the design-basis verification phase of NRC Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." Seabrook's MOV Program has been designed as a living program. Accordingly, information obtained through operating experience and industry information will be evaluated and if determined applicable will be factored into the Seabrook Station Motor Operated Valve Program. This report describes the approach that Seabrook Station used to address Generic Letter 89-10 and documents the results of the Motor-Operated Valve Program implemented at Seabrook Station. This report documents actions taken to date, as well as a description of the longer-term program developed for the periodic verification testing of safety-related motor-operated valves (MOV's). This program verified and ensures MOV operability under design-basis differential pressure and flow conditions.

Seabrook Station committed to develop a detailed program to address the recommendations provided in NRC Generic Letter 89-10. All safety-related MOV's and position-changeable MOV's in safety-related piping systems were evaluated as part of the program. This program includes determining the system conditions for each individual safety related motor-operated valve including maximum system pressure, maximum differential pressure, flow conditions, maximum ambient temperatures and minimum voltage at the motor leads. Based on the maximum operating conditions required valve torque and thrusts were determined. Maximum torque and/or thrust values were determined taking into account the weak link of the component. Based on the above information, minimum and maximum torque switch setpoints were calculated. Finally, each individual motor operator was tested under static conditions to assure that the valve set up is acceptable. Additionally, dynamic testing was performed on 60 of the valves. A combination of analysis, static testing and dynamic testing at design basis conditions demonstrated the operability of all safety related MOVs.

Seabrook Station Procedure ES1850.003, "Motor Operated Valve Performance Monitoring" is the controlling document for the implementation of Generic Letter 89-10. ES1850.003 assures that motor-operated valves are maintained, in a condition such that they will be capable of performing their design function throughout the life of the plant. This procedure provides a predictive maintenance capability so that adverse trends can be detected and corrected in accordance with Seabrook Station's preventative maintenance activities.

MOV performance parameters provided in this report are correct and current at the time of the report preparation. Actual MOV performance parameters are controlled as part of the North Atlantic Design Control Program.

1.0 **PURPOSE**

The purpose of this document is to summarize the actions taken to address the generic letter recommendations and to provide a basis for closure of the design-basis phase of Generic Letter 89-10. This document will also describe the actions taken to support MOV activities. MOV design changes that have been incorporated as a result of Seabrook's MOV activities are summarized and results of MOV inspections are discussed.

2.0 **BACKGROUND**

The NRC issued I.E. Bulletin 85-03, "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings" on November 15, 1985. This bulletin requested licensees to develop and implement a program to ensure that switch settings on certain safety-related motor-operated valves were selected, set and maintained correctly to accommodate the maximum differential pressures expected on these valves during both normal and abnormal events within the design basis. Motor-operated valves in the high pressure coolant injection/core spray and emergency feedwater systems that are required to be tested for operational readiness were included in the population of valves addressed for this bulletin.

Subsequently, on June 28, 1989, the NRC staff issued Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance,". This generic letter expanded the scope of the aforementioned I.E. Bulletin 85-03 to include all safety-related as well as all position changeable MOVs. Position changeable MOVs were defined as any motor-operated valve in a safety-related system that is not blocked from inadvertent operation from the control room, the motor control center or the valve itself. The NRC justified expansion of the safety-related MOV population to be considered based on NRC extrapolations of test results in response to I.E. Bulletin 85-03.

The generic letter provided recommendations to the licensees for the development of adequate programs to ensure operability of safety-related MOV's under all design basis conditions. The generic letter provided the following recommendations:

a) Each licensee review and document the design basis for each MOV.

b) Based on the results of the design basis review establish correct motor-operator switch settings.

c) The valve should be demonstrated to be operable by testing the valve under maximum design basis differential pressure and/or flow conditions. Explanations should be documented for any cases where testing at the design basis differential pressure or flow conditions could not be performed.

d) Prepare and revise procedures to assure that correct switch settings are determined and maintained for the life of the plant.

e) The design basis review should include an examination of the pertinent design and installation criteria for each particular valve including effects of reduced voltage on the actuator capability.

f) Documentation of the test methods used to accomplish testing the valve under design basis differential pressure and flow conditions.

g) Provide a list for review of deficiencies, misadjustments and degraded conditions discovered by licensees as a result of I.E. Bulletin 85-03 for review.

h) Each MOV failure and corrective action including repairs should be analyzed and documented. This data should be periodically examined as part of a trending program .

i) Provides the recommended schedule to address the Generic Letter.

j) A periodic MOV testing program should be established. The periodic inspection frequency should be based on the licensee's evaluation and should consider the safety importance of each MOV as well as its maintenance and performance history. Post maintenance testing guidelines should be established to ensure MOV operability following maintenance.

The NRC requested that licensees complete all design basis reviews, analyses, verifications, tests and inspections that have been instituted within five years or three refueling outages, whichever is later, from the date of issuance of the generic letter (June 28, 1989).

The NRC staff held public workshops to discuss the generic letter and to answer questions regarding its implementation. Subsequently, the NRC staff issued additional guidance for generic letter implementation as Generic Letter supplements. The following generic letter supplements were issued:

- Supplement 1, "Results of the Public Workshop", was issued on June 13, 1990. This supplement excluded all items located in duct work such as dampers, weir and sluice gates, MOVs that do not change position during any accident scenario and are inhibited from mispositioning and MOVs whose position have no bearing on any system operation were excluded from the generic letter program. The following exceptions to testing at design basis conditions with sufficient technical justification was provided: 1. if testing is damaging to the plant or specific MOV, 2. if testing creates a violation of technical specifications or other licensing conditions and 3. if data on similar valves with appropriate design-basis test data is available.

- Supplement 2, "Availability of Program Descriptions", was issued on August 3, 1990. This supplement delayed the commencement of MOV inspections by six months or until at least January 1, 1991.

- Supplement 3, "Consideration of Results of NRC-Sponsored Tests of Motor-Operated Valves", was issued on October 25, 1990. This supplement requested BWR licensees to assess the applicability of data from the NRC sponsored MOV tests to determine the "as-is" capability of the HPCI, RCIC and RWCU motor-operated valves.

- Supplement 4, "Consideration of Valve Mispositioning in Boiling Water Reactors", was issued on February 12, 1992. Supplement 4 deleted the recommendation for inadvertent mispositioning of MOVs from the control room from the scope of the generic letter for BWR licensees.

- Supplement 5, "Inaccuracy of Motor-Operated Valve Diagnostic Equipment", was issued on June 28, 1993. Supplement 5 addressed the inaccuracy of diagnostic test equipment inaccuracy as a result of industry sponsored testing.

- Supplement 6, "Information on Schedule and Grouping, and Staff Responses to Additional Public Questions", was issued on March 4, 1994. This Supplement further clarified NRC positions on the schedule for completing MOV testing to verify design-basis capability. Supplement 6 provided detailed guidance for valve grouping including specifying a required minimum number of valves to be tested in each valve group. This supplement also provided staff responses to other general public questions.

Supplement 7 to be issued will address valve mispositioning for PWR units. Seabrook plans to reevaluate its position on inadvertent valve mispositioning of all program valves once the NRC issues their official position on valve mispositioning for PWR units. Seabrook plans to remove MOVs from the enhanced MOV Program for valves that have been included solely based on inadvertent mispositioning.

3.0 **PROGRAM SCOPE**

All safety-related motor operated valves were evaluated for inclusion in the generic letter motor-operated valve program at Seabrook Station. Additionally, motor-operated valves that are installed in safety-related systems that have no active safety function and only have a safety function to maintain pressure boundary integrity were also reviewed and considered for incorporation into the Program. The program developed to address the Generic Letter consisted of the following:

- Performing an initial screening to determine the MOVs to be included in the Program.
- Ranking all the MOVs based on their safety significance using the Seabrook Probabilistic Safety Assessment results.
- Determining the operating conditions as well as the design basis conditions for valve operation.
- Calculating the worst case maximum differential pressure for valve operation and identifying the corresponding flow and temperature conditions.
- Calculating the required thrust/torque for valve operation.
- Determining the maximum allowable thrusts of the weak link component of the valve and actuator combination.
- Calculating the minimum and maximum torque switch setpoints.
- Calculating the thrust/torque acceptance range as appropriate to support diagnostic testing of each valve.
- Performing the required diagnostic testing to verify that the valve is set within the acceptable range.
- Performing dynamic testing of the testable valves in accordance with the grouping criteria.
- Developing a periodic maintenance and verification program for the valves to ensure that valve operability is maintained throughout the life of the plant.
- Development of a trending program that addresses MOV degradations and corrective actions.

4.0 **PROGRAM OBJECTIVE**

The objective of the Seabrook Station MOV Program is to provide assurance that the MOVs in service at Seabrook are capable of operating under all design basis differential pressure and flow conditions for the life of the plant.

5.0 PROGRAM DESCRIPTION

Seabrook's Motor-Operated Valve Program is described in station procedure ES1850.003, "Motor Operated Valve Performance Monitoring". The objective of procedure ES1850.003 is to provide assurance that the MOVs at Seabrook are maintained in a condition so that they are capable of performing their design function throughout the life of the plant. A secondary objective is to provide a predictive maintenance capability so that adverse trends can be detected and corrected as part of the preventive maintenance program. All motor-operated valves in service at Seabrook Station are included in the MOV Program. For safety-related MOVs, the program requirements are based on the recommendations presented in NRC Generic Letter 89-10. ES1850.003 defines the preventative maintenance activities for each individual valve. It also defines the periodic testing requirements for the Generic Letter MOVs. Actual MOV work activities, both preventive maintenance and periodic testing, are scheduled and controlled by the Station Work Control Program

6.0 SEABROOK STATION MOV PROBABILISTIC SAFETY ASSESSMENT

Two discrete evaluations were performed to incorporate the Seabrook Station Probabilistic Safety Assessment (SSPSA) into the Generic Letter MOV Program. The second evaluation reviewed Seabrook's Generic Letter valve population. The two evaluations are described below.

6.1 1990 SSPSA Evaluation

All MOVs that are in service at Seabrook Station are qualitatively categorized by priority based on the results of the Seabrook Station Probabilistic Safety Assessment. Table 1 provides the listing of all motor-operated valves identifying the SSPSA priority for each valve. Each valve was assigned one of the following priorities based on its safety significance:

- Priority 1: MOVs which are important to safety and are required for safe shutdown and have been identified by the SSPSA and whose failure mode is consistent with Generic Letter 89-10 concerns. There were 49 MOVs in this category.
- Priority 2: MOVs which are important to safety and are required for safe shutdown and have been quantified as "transfer over mission time" in the SSPSA but whose failure mode is not specifically addressed in the Generic Letter unless the valve is mispositioned. There were 49 MOVs in this category.
- Priority 3: The remaining MOVs which are important to safety and required for safe shutdown but whose safety significance has been evaluated as less critical than those valves designated priority 1 or 2. There were 24 MOVs in this category.
- Priority 4: All other MOVs that do not have safety significant functions but are important to power generation.

The valves categorized as priority 1, 2 and 3 were initially included in the enhanced MOV Program based on the requirements of the generic letter. These valves and selected priority 4 valves that are installed in safety related systems were evaluated in accordance with the recommendations presented in the generic letter.

6.2 SSPSA Evaluation of Seabrook's Response to Generic Letter 89-10 (1993 Evaluation)

In 1993, an evaluation was conducted to assess the safety significance of MOVs within the Generic Letter 89-10 program as well as other potentially safety significant MOVs. This evaluation was an update to the earlier evaluation conducted in 1990 and is performed as part of the Seabrook Station Probabilistic Risk Assessment Program which is a living program. The outcome of the review identified the three following categories of MOVs with respect to Generic Letter 89-10 concerns:

1. MOVs that are only position changeable valves. These are valves that do not have to open/close to perform their safety function but may have to be operated if mispositioned.

2. MOVs that must open/close to perform their safety function and that experience high differential pressures when required to actuate. High differential pressure was defined as a differential pressure greater than 600 psid.

3. MOVs that must open/close to perform their safety function and experience low differential pressure when required to actuate. Low differential pressure was defined as differential pressure less than 600 psid.

Engineering Evaluation 93-44 documented the review of Seabrook's Generic Letter 89-10 MOV Program. This review assessed the risk significance and applicability of Generic Letter 89-10 related issues as they pertain to the Seabrook MOV Program and other plant programs. Each MOV in the Seabrook Generic Letter 89-10 Program was reviewed. The purpose of the review was to identify the valves that are potentially risk significant from an 89-10 perspective and to identify the MOVs that are clearly not risk significant from an 89-10 perspective.

This evaluation consisted of a functional and risk significance determination in light of Generic Letter 89-10 concerns. Attributes considered in this evaluation included design and PRA related functional requirements, failure rates (both pre and post Generic Letter 89-10 set-up), potential inter and intra-system common mode failures, valve margin, operating delta P, the knowledge gained by other non-Generic Letter 89-10 tests, surveillances or PMs as well as an explicit consideration of the potential for mispositioning of the MOV.

In addition, as part of this evaluation, a review of research underway within the industry and the NRC was also conducted. This review consisted of investigating the up to date information available on both PWR and BWR mispositioning as well as safety significance.

The end product of this evaluation was a grouping of MOVs based upon safety significance. The metrics used to assign this significance consisted of the MOV's potential impact upon core damage frequency and containment performance. Future revisions to periodic verification testing will factor this information into the evaluation for extending test frequencies.

The original PRA priorities based on the 1990 SSPSA evaluation have been updated to reflect the 1993 evaluation. Priorities 1 through 5 are categorized as test groups. Priority 6 addresses valves that are position changeable. These test groups are defined in this report following Table 1. In Table 1 the test groups are used in the PRA priority column. Additionally Priority 7 was added to include valves that were not ranked in the 1993 SSPSA Evaluation. Table 1 documents the latest risk based categorization of all Generic Letter 89-10 MOVs, as well as all other MOVs in service at Seabrook.

TABLE 1
SSPSA LISTING FOR ALL SEABROOK MOVs

VALVE ID	1990 PRA Priority	1993 PRA Priority	FUNCTION
AS-V-175	3	5	Train 'A' HELB Isolation - AUX Steam Supply to PAB And WPB
AS-V-176	3	5	Train 'B' HELB Isolation - AUX Steam Supply to PAB And WPB
CBS-V-2	1	5	RWST to RHR/CBS Pump Suction Isolation (Train 'A')
CBS-V-5	1	5	RWST to RHR/CBS Pump Suction Isolation (Train 'B')
CBS-V-8	1	3	Isolation Valve for Containment Recirc Sump Tank 101A
CBS-V-11	1	4	Containment Spray Header Train 'A' Isolation Valve
CBS-V-14	1	3	Isolation Valve for Containment Recirc Sump Tank 101B
CBS-V-17	1	4	Containment Spray Header Train 'B' Isolation Valve
CBS-V-38	3	5	SAT Supply to RWST Isolation Train 'A'
CBS-V-43	3	5	SAT Supply to RWST Isolation Train 'B'
CBS-V-47	2	5	RWST to SI Pump 'A' Suction Isolation
CBS-V-49	2	6	RWST to SI Pump 'A' Suction Isolation
CBS-V-51	2	5	RWST to SI Pump 'B' Suction Isolation
CBS-V-53	2	6	RWST to SI Pump 'B' Suction Isolation
CC-V-137	1	5	PCCW Isolation to CBS HX 'A'
CC-V-145	1	3	PCCW Isolation to RHR HX 'A'
CC-V-266	1	5	PCCW Isolation to CBS HX 'B'
CC-V-272	1	3	PCCW Isolation to RHR HX 'B'
CC-V-395	2	3	PCCW Isolation from RCP 'B' Thermal Barrier
CC-V-428	2	3	PCCW Isolation from RCP 'A' Thermal Barrier
CC-V-434	2	6	PCCW Isolation from Excess Letdown HX
CC-V-438	2	3	PCCW Isolation from RCP 'C' Thermal Barrier
CC-V-439	2	3	PCCW Isolation from RCP 'D' Thermal Barrier
CC-V-1092	2	6	PCCW Loop 'B' Isolation to Thermal Barrier HX 'B'
CC-V-1095	2	6	PCCW Loop 'B' Isolation from Thermal Barrier HX 'B'
CC-V-1101	2	6	PCCW Loop 'A' Isolation to Thermal Barrier HX 'A'
CC-V-1109	2	6	PCCW Loop 'A' Isolation from Thermal Barrier HX 'A'
CGC-V-14	3	6	Containment Purge Exhaust Isolation IRC
CGC-V-28	3	6	Containment Purge Exhaust Isolation IRC
CO-V-59	4	7	FW Heaters 21C and 22C Inlet
CO-V-71	4	7	FW Heaters 21A and 22A Inlet
CO-V-73	4	7	FW Heaters 21B and 22B Inlet
CO-V-75	4	7	FW Heaters 21 and 22 'A', 'B', and 'C' Bypass
CO-V-82	4	7	FW Heaters 21A and 22A Outlet
CO-V-84	4	7	FW Heaters 21B and 22B Outlet
CO-V-86	4	7	FW Heaters 21C and 22C Outlet
COP-V-7	4	7	COP Exhaust Throttle Valve (Fine Control)
COP-V-8	4	7	COP Exhaust Throttle Valve (Coarse Control)
CS-LCV-112B	1	5	Charging Pump Suction from VCT - Train 'A'
CS-LCV-112C	1	5	Charging Pump Suction from VCT - Train 'B'
CS-LCV-112D	1	5	Charging Pump Suction from RWST - Train 'A'
CS-LCV-112E	1	5	Charging Pump Suction from RWST - Train 'B'
CS-V-142	3	3	Train 'A' Charging System to Regen HX Isolation

TABLE 1
SSPSA LISTING FOR ALL SEABROOK MOVs

VALVE ID	1990 PRA Priority	1993 PRA Priority	FUNCTION
CS-V-143	3	3	Train 'B' Charging System to Regen HX Isolation
CS-V-149	3	3	Regen HX Outlet to Letdown HX
CS-V-154	3	6	'D' RCP Seal Injection Isolation
CS-V-158	3	6	'C' RCP Seal Injection Isolation
CS-V-162	3	6	'B' RCP Seal Injection Isolation
CS-V-166	3	6	'A' RCP Seal Injection Isolation
CS-V-167	1	5	RCP Seals to Seal Water HX
CS-V-168	1	5	RCP Seals to Seal Water HX
CS-HCV-189	4	7	Letdown Flow Control
CS-HCV-190	4	7	Letdown Flow Control
CS-V-196	3	4	Charging Pump 'A' Min Flow Isolation
CS-V-197	3	4	Charging Pump 'B' Min Flow Isolation
CS-V-205	4	7	PDP Min Flow Recirc
CS-V-426	3	5	Emergency Boration to Charging Pump Suction Header
CS-V-460	1	5	SI And Charging Pump Suction X-Connect from RH Pump Disch
CS-V-461	1	5	SI And Charging Pump Suction X-Connect from RH Pump Disch
CS-V-475	2	6	SI And Charging Pump Suction X-Connect from RH Pump Disch
CS-V-625	4	7	L/D System to PDT Iso from LCV-112A
CS-V-633	4	7	Letdown Degasifier Supply
CW-V-1	4	7	Intake Structure to Unit 1 Flume
CW-V-2	4	7	Intake Structure to Unit 1 Flume
CW-V-4	4	7	CW-P-39A Discharge
CW-V-8	4	7	CW-P-39B Discharge
CW-V-11	4	7	CW-P-39C Discharge
CW-V-15	4	7	CW-E-27C CW Inlet Isolation
CW-V-16	4	7	Condenser 'B' CW Inlet Isolation
CW-V-17	4	7	Condenser 'A' CW Inlet Isolation
CW-V-29	4	7	CW-E-27C CW Outlet Isolation
CW-V-31	4	7	Condenser 'B' CW Outlet Isolation
CW-V-33	4	7	Condenser 'A' CW Outlet Isolation
CW-V-38	4	7	Unit 1 CW Outlet to Discharge Structure
CW-V-39	4	7	Unit 1 CW Outlet to Intake Structure
CW-V-40	4	7	Flume Supply Valve for Heat Treatment
CW-V-66	4	7	Intake Structure to Unit 2 Flume
CW-V-67	4	7	Intake Structure to Unit 2 Flume
CW-V-68	4	7	Unit 2 CW Outlet to Discharge Structure
CW-V-69	4	7	Unit 2 CW Outlet to Intake Structure
CW-V-70	4	7	Flume Supply Valve for Heat Treatment
EX-V-1	4	7	FW-E-26A Hi/Hi Heater Isolation
EX-V-4	4	7	FW-E-26B Hi/Hi Heater Isolation
EX-V-13	4	7	24C Hi/Hi Heater Isolation
EX-V-16	4	7	23C Hi/Hi Heater Isolation
EX-V-19	4	7	24B Hi/Hi Heater Level Isolation
EX-V-22	4	7	23B Hi/Hi Heater Isolation
EX-V-25	4	7	24A Hi/Hi Heater Isolation

TABLE 1
SSPSA LISTING FOR ALL SEABROOK MOVs

VALVE ID	1990 PRA Priority	1993 PRA Priority	FUNCTION
EX-V-28	4	7	23A Hi/Hi Heater Isolation
FP-V-127	4	7	Fire Protection Tank 'B' Auto Fill
FP-V-132	4	7	Fire Protection Tank 'A' Auto Fill
FW-V-2	4	7	Feed Pump 'A' Discharge Isolation
FW-V-13	4	7	Feed Pump 'B' Discharge Isolation
FW-V-23	4	7	26A Heater Outlet Isolation
FW-V-25	4	7	26B Heater Outlet Isolation
FW-V-28	4	7	Feedwater Regulating Block Valve 'A'
FW-V-37	4	7	Feedwater Regulating Block Valve 'B'
FW-V-46	4	7	Feedwater Regulating Block Valve 'C'
FW-V-55	4	7	Feedwater Regulating Block Valve 'D'
FW-V-156	2	4	EFW X-Connect Isolation from SUFP
FW-V-163	2	1	SUFP X-Connect to EFW Header
FW-V-346	2	3	EFW Pump 37-A Min Flow Recirc to CST
FW-V-347	2	3	EFW Pump 37-B Min Flow Recirc to CST
FW-FV-4214A	2	5	S/G 'A' EFW Train 'A' Flow Control
FW-FV-4214B	2	5	S/G 'A' EFW Train 'B' Flow Control
FW-FV-4224A	2	5	S/G 'B' EFW Train 'A' Flow Control
FW-FV-4224B	2	5	S/G 'B' EFW Train 'B' Flow Control
FW-FV-4234A	2	5	S/G 'C' EFW Train 'A' Flow Control
FW-FV-4234B	2	5	S/G 'C' EFW Train 'B' Flow Control
FW-FV-4244A	2	5	S/G 'D' EFW Train 'A' Flow Control
FW-FV-4244B	2	5	S/G 'D' EFW Train 'B' Flow Control
HD-V-240	4	7	Heater Drain Tank Vent
MS-V-100	4	7	Reheater Steam Supply for MSR 'A'
MS-V-101	4	7	Reheater Steam Supply for MSR 'A'
MS-V-150	4	7	Reheater Steam Supply for MSR 'D'
MS-V-158	4	7	Reheater Steam Supply for MSR 'C'
MS-V-204	3	6	SG 'A' MSIV Bypass
MS-V-205	3	6	SG 'B' MSIV Bypass
MS-V-206	3	6	SG 'C' MSIV Bypass
MS-V-207	3	6	SG 'D' MSIV Bypass
MSD-V-1	4	7	Main Steam Drain Valve
MSD-V-2	4	7	Main Steam Drain Valve
MSD-V-3	4	7	Main Steam Drain Valve
MSD-V-4	4	7	Main Steam Drain Valve
MSD-V-5	4	7	Main Steam Drain Valve
MSD-V-6	4	7	Main Steam Drain Valve
MSD-V-7	4	7	Main Steam Drain Valve
MSD-V-8	4	7	Main Steam Drain Valve
MSD-V-9	4	7	Main Steam Drain Valve
MSD-V-10	4	7	Main Steam Drain Valve
MSD-V-12	4	7	Main Steam Drain Valve
MSD-V-14	4	7	Main Steam Drain Valve
MSD-V-15	4	7	MSR 'A' Reheat Steam Control Valve Drain

TABLE 1
SSPSA LISTING FOR ALL SEABROOK MOVs

VALVE ID	1990 PRA Priority	1993 PRA Priority	FUNCTION
MSD-V-16	4	7	Main Steam Drain Valve
MSD-V-17	4	7	MSR 'B' Reheat Steam Control Valve Drain
MSD-V-18	4	7	Main Steam Drain Valve
MSD-V-19	4	7	Main Steam Drain Valve
MSD-V-20	4	7	Main Steam Drain Valve
MSD-V-21	4	7	Main Steam Drain Valve
MSD-V-22	4	7	Main Steam Drain Valve
MSD-V-23	4	7	Main Steam Drain Valve
MSD-V-24	4	7	Main Steam Drain Valve
MSD-V-25	4	7	Main Steam Drain Valve
MSD-V-26	4	7	Main Steam Drain Valve
MSD-V-27	4	7	Main Steam Drain Valve
MSD-V-28	4	7	Main Steam Drain Valve
MSD-V-29	4	7	Main Steam Drain Valve
MSD-V-30	4	7	Main Steam Drain Valve
MSD-V-31	4	7	Main Steam Drain Valve
MSD-V-32	4	7	Main Steam Drain Valve
MSD-V-33	4	7	Main Steam Drain Valve
MSD-V-34	4	7	Main Steam Drain Valve
MSD-V-35	4	7	FW-E-26B Extraction Steam Supply Drain
MSD-V-36	4	7	MSR 'A' Drain Bypass
MSD-V-37	4	7	MSR 'A' Drain Bypass
MSD-V-38	4	7	MSR 'B' Drain Bypass
MSD-V-39	4	7	MSR 'B' Drain Bypass
MSD-V-40	4	7	MSR 'C' Drain Bypass
MSD-V-41	4	7	MSR 'C' Drain Bypass
MSD-V-42	4	7	MSR 'D' Drain Bypass
MSD-V-43	4	7	MSR 'D' Drain Bypass
MSD-V-44	3	3	MS Drain Isolation Valve Upstream of MS-V-86
MSD-V-45	3	3	MS Drain Isolation Valve Upstream of MS V-85
MSD-V-46	3	3	MS Drain Isolation Valve Upstream of MS-V-90
MSD-V-47	3	3	MS Drain Isolation Valve Upstream of MS-V-92
MSD-V-48	4	7	Main Steam Drain Valve
MSD-V-49	4	7	MSR 'C' Reheat Steam Control Valve Drain
MSD-V-50	4	7	Main Steam Drain Valve
MSD-V-51	4	7	MSR 'D' Reheat Steam Control Valve Drain
MSD-V-53	4	7	Main Steam Drain Valve
MSD-V-55	4	7	Main Steam Drain Valve
MSD-V-57	4	7	Main Steam Drain Valve
MSD-V-59	4	7	Main Steam Drain Valve
MSD-V-67	4	7	Main Steam Drain Valve
MSD-V-69	4	7	Main Steam Drain Valve
MSD-V-71	4	7	Main Steam Drain Valve
MSD-V-73	4	7	Main Steam Drain Valve
MSD-V-75	4	7	Main Steam Drain Valve

TABLE 1
SSPSA LISTING FOR ALL SEABROOK MOVs

VALVE ID	1990 PRA Priority	1993 PRA Priority	FUNCTION
MSD-V-77	4	7	Main Steam Drain Valve
MVD-V-142	4	7	Misc Vent and Drain Valve
MVD-V-143	4	7	Misc Vent and Drain Valve
MVD-V-144	4	7	Misc Vent and Drain Valve
MVD-V-145	4	7	Misc Vent and Drain Valve
MVD-V-146	4	7	Misc Vent and Drain Valve
MVD-V-147	4	7	Misc Vent and Drain Valve
MVD-V-148	4	7	Misc Vent and Drain Valve
MVD-V-149	4	7	Misc Vent and Drain Valve
MVD-V-150	4	7	Misc Vent and Drain Valve
MVD-V-151	4	7	Misc Vent and Drain Valve
RC-V-22	1	4	RHR Pump 'A' Suction Isolation from Loop 1 Hot Leg
RC-V-23	1	4	RHR Pump 'A' Suction Isolation from Loop 1 Hot Leg
RC-V-81	4	7	Regenerative Heat Exchanger Letdown Isolation from Loop 3
RC-V-87	1	4	RHR Pump 'B' Suction Isolation from Loop 4 Hot Leg
RC-V-88	1	4	RHR Pump 'B' Suction Isolation from Loop 4 Hot Leg
RC-V-122	1	2	PORV 456A Block
RC-V-124	1	2	PORV 456B Block
RC-V-323	2	3	Reactor Head Vent Isolation
RH-V-14	2	4	RHR Train 'A' to Cold Legs 1 And 2
RH-V-21	2	6	RHR Train 'B' Discharge X-Connect
RH-V-22	2	6	RHR Train 'A' Discharge X-Connect
RH-V-26	2	4	RHR Train 'B' to Cold Legs 3 And 4
RH-V-32	1	5	RHR Train 'B' Common Supply to Hot Leg Recirc
RH-V-35	1	5	RHR Pump 'A' Discharge Isolation to SI/Charging Pumps
RH-V-36	1	5	RHR Pump 'B' Discharge Isolation to SI/Charging Pumps
RH-V-70	1	5	RHR Train 'A' Common Supply to Hot Leg Recirc
RH-FCV-610	1	5	RHR Pump 'A' Min Flow Control
RH-FCV-611	1	5	RHR Pump 'B' Min Flow Control
SB-V-80	4	7	Blowdown Flashtank Steam Line Drain
SB-V-189	4	7	SG 'A' Blowdown Isolation
SB-V-191	4	7	SG 'B' Blowdown Isolation
SB-V-193	4	7	SG 'C' Blowdown Isolation
SB-V-195	4	7	SG 'D' Blowdown Isolation
SI-V-3	2	5	Accumulator 'A' Discharge Isolation
SI-V-17	2	5	Accumulator 'B' Discharge Isolation
SI-V-32	2	5	Accumulator 'C' Discharge Isolation
SI-V-47	2	5	Accumulator 'D' Discharge Isolation
SI-V-77	2	5	SI Train 'B' Discharge Isolation to Hot Legs 1/4
SI-V-89	1	1	SI Pump 'B' Min Flow Isolation to RWST
SI-V-90	1	1	SI Pump 'A' Min Flow Isolation to RWST
SI-V-93	1	1	SI Pumps 'A'/'B' Combined Min Flow Isolation
SI-V-102	2	5	SI Train 'A' Discharge Isolation to Hot Legs 1/4
SI-V-111	2	5	SI Train 'B' Discharge X-Connect
SI-V-112	2	5	SI Train 'A' Discharge X-Connect

TABLE 1
SSPSA LISTING FOR ALL SEABROOK MOVs

VALVE ID	1990 PRA Priority	1993 PRA Priority	FUNCTION
SI-V-114	2	6	SI Pumps Common Isolation to Cold Legs
SI-V-138	1	1	Charging Pumps Supply to RCS Cold Legs
SI-V-139	1	1	Charging Pumps Supply to RCS Cold Legs
SSS-V-18	4	7	Steam Seal Header Bypass to Condenser
SSS-V-19	4	7	Steam Seal Main Steam Supply Bypass
SSS-V-20	4	7	Steam Seal Feed Valve Isolation
SSS-V-22	4	7	Steam Seal Auxiliary Steam Isolation
SW-V-2	1	3	SW Pump 'A' Discharge Isolation
SW-V-4	1	3	SW Train 'A' Isolation to Secondary Loads
SW-V-5	1	3	SW Train 'B' Isolation to Secondary Loads
SW-V-15	2	6	PCCW HX 'A' SW Isolation
SW-V-17	2	6	PCCW HX 'B' SW Isolation
SW-V-19	1	4	SW Train 'B' to Discharge Structure
SW-V-20	1	4	SW Train 'A' Discharge Structure
SW-V-22	1	3	SW Pump 'C' Discharge Isolation
SW-V-23	1	4	SW Train 'B' Return to Cooling tower
SW-V-25	1	4	Cooling Tower Pump 'B' Discharge Isolation
SW-V-26	2	6	Cooling Tower Pump 'B' Recirc
SW-V-27	2	4	Cooling Tower Train 'B' Spray Header Bypass
SW-V-29	1	3	SW Pump 'B' Discharge Isolation
SW-V-31	1	3	SW Pump 'D' Discharge Isolation
SW-V-34	1	4	SW Train 'A' Return to Cooling tower
SW-V-44	2	6	SW Isolation from Intake Structure
SW-V-46	4	7	SW Isolation from Discharge Structure
SW-V-54	1	4	Cooling Tower Pump 'A' Discharge Isolation
SW-V-55	2	6	Cooling Tower Pump 'A' Recirc
SW-V-56	2	4	Cooling Tower Train 'A' Spray Header Bypass
SW-V-63	4	4	SW Isolation to Discharge Structure
SW-V-64	4	4	SW Isolation to Intake Structure
SW-V-74	2	6	Turbine Bldg SW X-Connect to PAB
SW-V-75	4	4	Turbine Bldg SW Discharge to CW System Discharge
SW-V-76	2	6	Turbine Bldg SW X-Connect to PAB
SW-V-139	1	6	SW Cooling Tower Train 'A' Spray Bypass Recirc
SW-V-140	1	6	SW Cooling Tower Train 'B' Spray Bypass Recirc
WL-V-222	4	7	Waste Distillate Discharge to Intake Structure
WL-V-223	4	7	Waste Distillate Discharge to Discharge Structure

Table 2 provides the listing of all generic letter motor-operated valves identifying the current (1993) SSPSA Evaluation valve grouping for each valve based on Engineering Evaluation 93-44 criteria. Each valve was assigned into one of the following valve groups based on its safety significance and based on operating requirements:

Group 1: MOVs whose risk significance is high and are required to operate under high differential pressure conditions. There are 6 valves in this group.

Group 2: MOVs whose risk significance is medium and are required to operate under high differential pressure conditions. There are 2 valves in this group.

Group 3: MOVs whose risk significance is low and are required to operate under high differential pressure conditions or whose risk significance is high and the valves are required to operate under low differential pressure conditions. There are 24 valves in this group.

Group 4: MOVs whose risk significance is medium and are required to operate under low differential pressure conditions. There are 19 valves in this group.

Group 5: MOVs whose risk significance is low and are required to operate under low differential pressure conditions. There are 41 valves in this group.

Group 6: MOVs that are only position changeable valves. These are valves that do not have to open/close to perform their safety function but may have to be operated if mispositioned. There are 30 MOVs in this group.

TABLE 2
SSPSA GL MOV GROUPING

VALVE ID	SSPSA RANK	VALVE FUNCTION
AS-V-175	5	Train 'A' HELB Isolation - Aux Steam Supply to PAB And WPB
AS-V-176	5	Train 'B' HELB Isolation - Aux Steam Supply to PAB And WPB
CBS-V-11	4	Containment Spray Header Train 'A' Isolation Valve
CBS-V-14	3	Isolation Valve for Containment Recirc Sump Tank 101B
CBS-V-17	4	Containment Spray Header Train 'B' Isolation Valve
CBS-V-2	5	RWST to Train 'A' RHR/CBS Pump Suction Isolation
CBS-V-38	5	SAT Supply to RWST Isolation Train 'A'
CBS-V-43	5	SAT Supply to RWST Isolation Train 'B'
CBS-V-47	5	RWST to SI Pump 'A' Suction Isolation
CBS-V-49	6	RWST to SI Pump 'A' Suction Isolation
CBS-V-5	5	RWST to 'B' Train RHR/CBS Pump Suction Isolation
CBS-V-51	5	RWST to SI Pump 'B' Suction Isolation
CBS-V-53	6	RWST to SI Pump 'B' Suction Isolation
CBS-V-8	3	Isolation Valve for Containment Recirc Sump Tank 101A
CC-V-1092	6	PCCW Loop 'B' Isolation to Thermal Barrier HX 'B'
CC-V-1095	6	PCCW Loop 'B' Isolation from Thermal Barrier HX 'B'
CC-V-1101	6	PCCW Loop 'A' Isolation to Thermal Barrier HX 'A'
CC-V-1109	6	PCCW Loop 'A' Isolation from Thermal Barrier HX 'A'
CC-V-137	5	PCCW Isolation to CBS HX 'A'
CC-V-145	3	PCCW Isolation to RHR HX 'A'

TABLE 2
SSPSA GL MOV GROUPING

VALVE ID	SSPSA RANK	VALVE FUNCTION
CC-V-266	5	PCCW Isolation to CBS HX 'B'
CC-V-272	3	PCCW Isolation to RHR HX 'B'
CC-V-395	3	PCCW Isolation from RCP 'B' Thermal Barrier
CC-V-428	3	PCCW Isolation from RCP 'A' Thermal Barrier
CC-V-434	6	PCCW Isolation from Excess Letdown HX
CC-V-438	3	PCCW Isolation from RCP 'C' Thermal Barrier
CC-V-439	3	PCCW Isolation from RCP 'D' Thermal Barrier
CGC-V-14	6	Containment Purge Exhaust Isolation IRC
CGC-V-28	6	Containment Purge Exhaust Isolation IRC
CS-LCV-112B	5	Charging Pump Suction from VCT - Train 'A'
CS-LCV-112C	5	Charging Pump Suction from VCT - Train 'B'
CS-LCV-112D	5	Charging Pump Suction from RWST - Train 'A'
CS-LCV-112E	5	Charging Pump Suction from RWST - Train 'B'
CS-V-142	3	Train 'A' Charging System to Regen HX Isolation
CS-V-143	3	Train 'B' Charging System to Regen HX Isolation
CS-V-149	3	Regen HX Outlet to Letdown HX
CS-V-154	6	'D' RCP Seal Injection Isolation
CS-V-158	6	'C' RCP Seal Injection Isolation
CS-V-162	6	'B' RCP Seal Injection Isolation
CS-V-166	6	'A' RCP Seal Injection Isolation
CS-V-167	5	RCP Seals to Seal Water HX
CS-V-168	5	RCP Seals to Seal Water HX
CS-V-196	4	Charging Pump 'A' Min Flow Isolation
CS-V-197	4	Charging Pump 'B' Min Flow Isolation
CS-V-426	5	Emergency Boration to Charging Pump Suction Header
CS-V-460	5	SI And Charging Pump Suction X-Connect from RH Pump Disch
CS-V-461	5	SI And Charging Pump Suction X-Connect from RH Pump Disch
CS-V-475	6	SI And Charging Pump Suction X-Connect from RH Pump Disch
FW-FV-4214A	5	S/G 'A' EFW Train 'A' Flow Control
FW-FV-4214B	5	S/G 'A' EFW Train 'B' Flow Control
FW-FV-4224A	5	S/G 'B' EFW Train 'A' Flow Control
FW-FV-4224B	5	S/G 'B' EFW Train 'B' Flow Control
FW-FV-4234A	5	S/G 'C' EFW Train 'A' Flow Control
FW-FV-4234B	5	S/G 'C' EFW Train 'B' Flow Control
FW-FV-4244A	5	S/G 'D' EFW Train 'A' Flow Control
FW-FV-4244B	5	S/G 'D' EFW Train 'B' Flow Control
FW-V-156	4	EFW X-Connect Isolation from SUFP
FW-V-163	1	SUFP X-Connect to EFW Header
FW-V-346	3	EFW Pump 37-A Min Flow Recirc to CST
FW-V-347	3	EFW Pump 37-B Min Flow Recirc to CST
MS-V-204	6	SG 'A' MSIV Bypass
MS-V-205	6	SG 'B' MSIV Bypass

TABLE 2
SSPSA GL MOV GROUPING

VALVE ID	SSPSA RANK	VALVE FUNCTION
MS-V-206	6	SG 'C' MSIV Bypass
MS-V-207	6	SG 'D' MSIV Bypass
MSD-V-44	3	MS Drain Isolation Valve Upstream of MS-V-86
MSD-V-45	3	MS Drain Isolation Valve Upstream of MS V-85
MSD-V-46	3	MS Drain Isolation Valve Upstream of MS-V-90
MSD-V-47	3	MS Drain Isolation Valve Upstream of MS-V-92
RC-V-122	2	PORV 456A Block
RC-V-124	2	PORV 456B Block
RC-V-22	4	RHR Pump 'A' Suction Isolation from Loop 1 Hot Leg
RC-V-23	4	RHR Pump 'A' Suction Isolation from Loop 1 Hot Leg
RC-V-323	3	Reactor Head Vent Isolation
RC-V-87	4	RHR Pump 'B' Suction Isolation from Loop 4 Hot Leg
RC-V-88	4	RHR Pump 'B' Suction Isolation from Loop 4 Hot Leg
RH-FCV-610	5	RHR Pump 'A' Min Flow Control
RH-FCV-611	5	RHR Pump 'B' Min Flow Control
RH-V-14	4	RHR Train 'A' to Cold Legs 1 And 2
RH-V-21	6	RHR Train 'B' Discharge X-Connect
RH-V-22	6	RHR Train 'A' Discharge X-Connect
RH-V-26	4	RHR Train 'B' to Cold Legs 3 And 4
RH-V-32	5	RHR Train 'B' Common Supply to Hot Leg Recirc
RH-V-35	5	RHR Pump A Discharge Isolation to SI/Charging Pumps
RH-V-36	5	RHR Pump B Discharge Isolation to SI/Charging Pumps
RH-V-70	5	RHR Train 'A' Common Supply to Hot Leg Recirc
SI-V-102	5	SI Train 'A' Discharge Isolation to Hot Legs 1/4
SI-V-111	5	SI Train 'B' Discharge X-Connect
SI-V-112	5	SI Train 'A' Discharge X-Connect
SI-V-114	6	SI Pumps Common Isolation to Cold Legs
SI-V-138	1	Charging Pumps Supply to RCS Cold Legs
SI-V-139	1	Charging Pumps Supply to RCS Cold Legs
SI-V-17	5	Accumulator 'B' Discharge Isolation
SI-V-3	5	Accumulator 'A' Discharge Isolation
SI-V-32	5	Accumulator 'C' Discharge Isolation
SI-V-47	5	Accumulator 'D' Discharge Isolation
SI-V-77	5	SI Train 'B' Discharge Isolation to Hot Legs 1/4
SI-V-89	1	SI Pump 'B' Min Flow Isolation to RWST
SI-V-90	1	SI Pump 'A' Min Flow Isolation to RWST
SI-V-93	1	SI Pumps A/B Combined Min Flow Isolation
SW-V-139	6	SW Cooling Tower Train 'A' Spray Bypass Recirc
SW-V-140	6	SW Cooling Tower Train 'B' Spray Bypass Recirc
SW-V-15	6	PCCW HX 'A' SW Isolation
SW-V-17	6	PCCW HX 'B' SW Isolation
SW-V-19	4	SW Train 'B' to Discharge Structure

TABLE 2
SSPSA GL MOV GROUPING

VALVE ID	SSPSA RANK	VALVE FUNCTION
SW-V-2	3	SW Pump A Discharge Isolation
SW-V-20	4	SW Train 'A' Discharge Structure
SW-V-22	3	SW Pump C Discharge Isolation
SW-V-23	4	SW Train 'B' Return to Cooling Tower
SW-V-25	4	Cooling Tower Pump B Discharge Isolation
SW-V-26	6	Cooling Tower Pump B Recirc
SW-V-27	4	Cooling Tower Train 'B' Spray Header Bypass
SW-V-29	3	SW Pump B Discharge Isolation
SW-V-31	3	SW Pump D Discharge Isolation
SW-V-34	4	SW Train 'A' Return to Cooling Tower
SW-V-4	3	SW Train 'A' Isolation to Secondary Loads
SW-V-5	3	SW Train 'B' Isolation to Secondary Loads
SW-V-54	4	Cooling Tower Pump A Discharge Isolation
SW-V-55	6	Cooling Tower Pump A Recirc
SW-V-56	4	Cooling Tower Train 'A' Spray Header Bypass
SW-V-74	6	Turbine Bldg SW X-Connect to PAB
SW-V-76	6	Turbine Bldg SW X-Connect to PAB

Table 3 identifies the safety-related valves as well as selected non-safety related MOVs that were evaluated as part of Seabrook's enhanced MOV Program. Valves that are included in the generic letter program are identified in Table 3. All MOVs are in the MOV Program. MOVs that meet the criteria of the generic letter are in the enhanced program which has additional testing and surveillance requirements. If an evaluated valve did not meet the generic letter criteria for inclusion in the enhanced program it was not included as part of the Generic Letter MOV Program. Originally there were 122 MOVs in Seabrook's Generic Letter MOV Program. After all valves were evaluated the following valves were found not to meet the generic letter inclusion criteria:

- CC-V-434
- SW-V-26
- SW-V-44
- SW-V-55

Currently, there are 118 MOVs in the enhanced MOV Program, twenty-six MOVs are included solely due to the mispositioning case described by the original Generic Letter. Section 11.0 of this report discusses the misposition issue with respect to the proposed 89-10 Supplement 7.

TABLE 3
MOVS EVALUATED FOR INCLUSION INTO SEABROOK'S GENERIC LETTER 89-10 MOV PROGRAM

VALVE ID	VALVE FUNCTION	IN GL MOV PROGRAM
AS-V-175	Train 'A' HELB Isolation - Aux Steam Supply to PAB And WPB	Yes
AS-V-176	Train 'B' HELB Isolation - Aux Steam Supply to PAB And WPB	Yes
CBS-V-11	Containment Spray Header Train 'A' Isolation Valve	Yes
CBS-V-14	Isolation Valve for Containment Recirc Sump Tank 101B	Yes
CBS-V-17	Containment Spray Header Train 'B' Isolation Valve	Yes
CBS-V-2	RWST to Train 'A' RHR/CBS Pump Suction Isolation	Yes
CBS-V-38	SAT Supply to RWST Isolation Train 'A'	Yes
CBS-V-43	SAT Supply to RWST Isolation Train 'B'	Yes
CBS-V-47	RWST to SI Pump 'A' Suction Isolation	Yes
CBS-V-49	RWST to SI Pump 'A' Suction Isolation	Yes
CBS-V-5	RWST to 'B' Train RHR/CBS Pump Suction Isolation	Yes
CBS-V-51	RWST to SI Pump 'B' Suction Isolation	Yes
CBS-V-53	RWST to SI Pump 'B' Suction Isolation	Yes
CBS-V-8	Isolation Valve for Containment Recirc Sump Tank 101A	Yes
CC-V-1092	PCCW Loop 'B' Isolation to Thermal Barrier HX 'B'	Yes
CC-V-1095	PCCW Loop 'B' Isolation from Thermal Barrier HX 'B'	Yes
CC-V-1101	PCCW Loop 'A' Isolation to Thermal Barrier HX 'A'	Yes
CC-V-1109	PCCW Loop 'A' Isolation from Thermal Barrier HX 'A'	Yes
CC-V-137	PCCW Isolation to CBS HX 'A'	Yes
CC-V-145	PCCW Isolation to RHR HX 'A'	Yes
CC-V-266	PCCW Isolation to CBS HX 'B'	Yes
CC-V-272	PCCW Isolation to RHR HX 'B'	Yes
CC-V-395	PCCW Isolation from RCP 'B' Thermal Barrier	Yes
CC-V-428	PCCW Isolation from RCP 'A' Thermal Barrier	Yes
CC-V-434	PCCW Isolation from Excess Letdown HX	No

TABLE 3
MOVS EVALUATED FOR INCLUSION INTO SEABROOK'S GENERIC LETTER 89-10 MOV PROGRAM

VALVE ID	VALVE FUNCTION	IN GL MOV PROGRAM
CC-V-438	PCCW Isolation from RCP 'C' Thermal Barrier	Yes
CC-V-439	PCCW Isolation from RCP 'D' Thermal Barrier	Yes
CGC-V-14	Containment Purge Exhaust Isolation IRC	Yes
CGC-V-28	Containment Purge Exhaust Isolation IRC	Yes
CS-LCV-112B	Charging Pump Suction from VCT - Train 'A'	Yes
CS-LCV-112C	Charging Pump Suction from VCT - Train 'B'	Yes
CS-LCV-112D	Charging Pump Suction from RWST - Train 'A'	Yes
CS-LCV-112E	Charging Pump Suction from RWST - Train 'B'	Yes
CS-V-142	Train 'A' Charging System to Regen HX Isolation	Yes
CS-V-143	Train 'B' Charging System to Regen HX Isolation	Yes
CS-V-149	Regen HX Outlet to Letdown HX	Yes
CS-V-154	'D' RCP Seal Injection Isolation	Yes
CS-V-158	'C' RCP Seal Injection Isolation	Yes
CS-V-162	'B' RCP Seal Injection Isolation	Yes
CS-V-166	'A' RCP Seal Injection Isolation	Yes
CS-V-167	RCP Seals to Seal Water HX	Yes
CS-V-168	RCP Seals to Seal Water HX	Yes
CS-HCV189	Letdown Flow Control	No
CS-HCV190	Letdown Flow Control	No
CS-V-196	Charging Pump 'A' Min Flow Isolation	Yes
CS-V-197	Charging Pump 'B' Min Flow Isolation	Yes
CS-V-426	Emergency Boration to Charging Pump Suction Header	Yes
CS-V-460	SI And Charging Pump Suction X-Connect from RH Pump Disch	Yes
CS-V-461	SI And Charging Pump Suction X-Connect from RH Pump Disch	Yes
CS-V-475	SI And Charging Pump Suction X-Connect from RH Pump Disch	Yes
FW-FV-4214A	S/G 'A' EFW Train 'A' Flow Control	Yes
FW-FV-4214B	S/G 'A' EFW Train 'B' Flow Control	Yes
FW-FV-4224A	S/G 'B' EFW Train 'A' Flow Control	Yes
FW-FV-4224B	S/G 'B' EFW Train 'B' Flow Control	Yes
FW-FV-4234A	S/G 'C' EFW Train 'A' Flow Control	Yes
FW-FV-4234B	S/G 'C' EFW Train 'B' Flow Control	Yes
FW-FV-4244A	S/G 'D' EFW Train 'A' Flow Control	Yes
FW-FV-4244B	S/G 'D' EFW Train 'B' Flow Control	Yes
FW-V-156	EFW X-Connect Isolation from SUFP	Yes
FW-V-163	SUFP X-Connect to EFW Header	Yes
FW-V-346	EFW Pump 37-A Min Flow Recirc to CST	Yes
FW-V-347	EFW Pump 37-B Min Flow Recirc to CST	Yes
MS-V-204	SG 'A' MSIV Bypass	Yes
MS-V-205	SG 'B' MSIV Bypass	Yes
MS-V-206	SG 'C' MSIV Bypass	Yes
MS-V-207	SG 'D' MSIV Bypass	Yes

TABLE 3
MOVS EVALUATED FOR INCLUSION INTO SEABROOK'S GENERIC LETTER 89-10 MOV PROGRAM

VALVE ID	VALVE FUNCTION	IN GL MOV PROGRAM
MSD-V-44	MS Drain Isolation Valve Upstream OF MS-V-86	Yes
MSD-V-45	MS Drain Isolation Valve Upstream OF MS V-85	Yes
MSD-V-46	MS Drain Isolation Valve Upstream OF MS-V-90	Yes
MSD-V-47	MS Drain Isolation Valve Upstream OF MS-V-92	Yes
RC-V-122	PORV 456A Block	Yes
RC-V-124	PORV 456B Block	Yes
RC-V-22	RHR Pump 'A' Suction Isolation from Loop 1 Hot Leg	Yes
RC-V-23	RHR Pump 'A' Suction Isolation from Loop 1 Hot Leg	Yes
RC-V-323	Reactor Head Vent Isolation	Yes
RC-V81	Regenerative Heat Exchanger Letdown Isolation from Loop 3	No
RC-V-87	RHR Pump 'B' Suction Isolation from Loop 4 Hot Leg	Yes
RC-V-88	RHR Pump 'B' Suction Isolation from Loop 4 Hot Leg	Yes
RH-FCV-610	RHR Pump 'A' Min Flow Control	Yes
RH-FCV-611	RHR Pump 'B' Min Flow Control	Yes
RH-V-14	RHR Train 'A' to Cold Legs 1 And 2	Yes
RH-V-21	RHR Train 'B' Discharge X-Connect	Yes
RH-V-22	RHR Train 'A' Discharge X-Connect	Yes
RH-V-26	RHR Train 'B' to Cold Legs 3 And 4	Yes
RH-V-32	RHR Train 'B' Common Supply to Hot Leg Recirc	Yes
RH-V-35	RHR Pump A Discharge Isolation to SI/Charging Pumps	Yes
RH-V-36	RHR Pump B Discharge Isolation to SI/Charging Pumps	Yes
RH-V-70	RHR Train 'A' Common Supply to Hot Leg Recirc	Yes
SI-V-102	SI Train 'A' Discharge Isolation to Hot Legs 1/4	Yes
SI-V-111	SI Train 'B' Discharge X-Connect	Yes
SI-V-112	SI Train 'A' Discharge X-Connect	Yes
SI-V-114	SI Pumps Common Isolation to Cold Legs	Yes
SI-V-138	Charging Pumps Supply to RCS Cold Legs	Yes
SI-V-139	Charging Pumps Supply to RCS Cold Legs	Yes
SI-V-17	Accumulator 'B' Discharge Isolation	Yes
SI-V-3	Accumulator 'A' Discharge Isolation	Yes
SI-V-32	Accumulator 'C' Discharge Isolation	Yes
SI-V-47	Accumulator 'D' Discharge Isolation	Yes
SI-V-77	SI Train 'B' Discharge Isolation to Hot Legs 1/4	Yes
SI-V-89	SI Pump 'B' Min Flow Isolation to RWST	Yes
SI-V-90	SI Pump 'A' Min Flow Isolation to RWST	Yes
SI-V-93	SI Pumps A/B Combined Min Flow Isolation	Yes
SW-V-139	SW Cooling Tower Train 'A' Spray Bypass Recirc	Yes
SW-V-140	SW Cooling Tower Train 'B' Spray Bypass Recirc	Yes
SW-V-15	PCCW HX 'A' SW Isolation	Yes
SW-V-17	PCCW HX 'B' SW Isolation	Yes
SW-V-19	SW Train 'B' to Discharge Structure	Yes

TABLE 3
MOVS EVALUATED FOR INCLUSION INTO SEABROOK'S GENERIC LETTER 89-10 MOV PROGRAM

VALVE ID	VALVE FUNCTION	IN GL MOV PROGRAM
SW-V-2	SW Pump A Discharge Isolation	Yes
SW-V-20	SW Train 'A' Discharge Structure	Yes
SW-V-22	SW Pump C Discharge Isolation	Yes
SW-V-23	SW Train 'B' Return to Cooling Tower	Yes
SW-V-25	Cooling Tower Pump B Discharge Isolation	Yes
SW-V-26	Cooling Tower Pump B Recirc	No
SW-V-27	Cooling Tower Train 'B' Spray Header Bypass	Yes
SW-V-29	SW Pump B Discharge Isolation	Yes
SW-V-31	SW Pump D Discharge Isolation	Yes
SW-V-34	SW Train 'A' Return to Cooling Tower	Yes
SW-V-4	SW Train 'A' Isolation to Secondary Loads	Yes
SW-V44	Service Water Isolation from Intake Structure	No
SW-V-5	SW Train 'B' Isolation to Secondary Loads	Yes
SW-V-54	Cooling Tower Pump A Discharge Isolation	Yes
SW-V-55	Cooling Tower Pump A Recirc	No
SW-V-56	Cooling Tower Train 'A' Spray Header Bypass	Yes
SW-V-74	Turbine Bldg SW X-Connect to PAB	Yes
SW-V-76	Turbine Bldg SW X-Connect to PAB	Yes

7.0 DESIGN BASIS REVIEW

Generic Letter 89-10, recommendation (a) requested that licensees review and document the design basis of each MOV that meets the scope of the generic letter. The Design Basis Review consisted of the following:

7.1 Valve Design Information

Valve design information was reviewed to document specific valve design parameters for each individual valve. Valve specifications, Piping and Instrument Drawings (P&IDs), shop order data sheets, foreign prints (vendor drawings), the Valve List, vendor instruction manuals, and valve data cards were reviewed as necessary to obtain valve design information. Change documents that affect MOVs were also reviewed. The valve vendors were contracted to provide additional design information and to provide weak link information for each MOV. The design differential pressure of each valve was identified as part of this review.

7.2 Motor-Operator Design Information

Motor-operator design information was reviewed for each valve. Foreign prints, Actuator Manufacturer shop order data sheets, valve specifications, engineering change documents and valve data cards were reviewed as necessary to obtain the desired information. This portion of the review identified and documented motor-operator parameters such as operator size, type, overall gear ratios, stem diameter, pitch, lead, torque switch setpoints, spring pack part number, motor size, design minimum voltage and motor service factor.

7.3 Electrical Review

In response to Generic Letter 89-10, the following actions were taken by Electrical Engineering:

7.3.1 TOL Sizing

Motor Control Circuit Protection Calculation (Calc. No. 9763-3-ED-00-28-F) sizes the protective devices for MOV motor circuits. The sizing criteria was revised to use the larger of 110% of nameplate current or 110% of actual measured current in the selection of the circuit protective devices. This criteria ensures that the maximum running current is conservatively used in the sizing of the protective devices. This maximum running current value was subsequently labeled "TOL Basis Value" and added to Drawing 1-NHY-250000. The Seabrook MOV testing program compares actual measured currents with the TOL Basis Value to ensure that the selected protective devices are acceptable.

7.3.2 MOV Reduced Voltage

Generic Letter 89-10 recommendation (e) requests that the design basis review include pertinent design and installation criteria including the effects of reduced voltage on the actuator capability. The Voltage Regulation Study (Calc. No. 9763-3-ED-00-02-F) uses a computer program to calculate the various bus and motor terminal voltages. Starting motors are modeled as a constant impedance within the program. MOV locked rotor current, starting power factor, cable impedance, and TOL heater coil impedance are considered in the program to calculate the voltage drop from the supply bus to the MOV motor terminals.

The Voltage Regulation Study was revised to determine the voltage available at the MOV motor terminals for all safety-related MOVs during motor starting. Plant bus loading and supply bus voltages were determined based on the conditions during which the MOVs are required to operate. These conditions include operation during sequencing of loads on emergency diesel generators, during simultaneous start of safeguards loads via offsite power at minimum anticipated grid voltage, and during full load running via offsite power.

The Voltage Regulation Study was revised to consider the impedance of the MOV thermal overload (TOL) relay heater coils when calculating MOV terminal voltages. This results in increased voltage drop at the MOV motor terminals.

The Voltage Regulation Study was also revised to consider the effects of high ambient temperatures on cable impedances for MOVs located in harsh environments (containment). The MOV feeder cable impedances for selected MOVs were adjusted based on the higher ambient temperature. This results in increased voltage drop at the MOV motor terminals.

The reduced voltage values obtained from the voltage regulation study were factored into the calculations to determine motor-operator capability. Also the effects of high ambient environmental temperatures were evaluated to assure that adequate motor capability exists, see Sections 8.9 and 19 of this report for additional information.

7.4 Valve Operation

Each MOV that is in a safety related flow path has been evaluated for incorporation into the generic letter MOV program. The safety function for each valve was reviewed and identified for each of the UFSAR Chapter 15 accidents using the Safety Class Equipment List. Applicable Technical Specifications, UFSAR Sections, IST records, system descriptions, training manuals and Station Operations Procedures including normal, abnormal, emergency and surveillance procedures were reviewed as necessary to determine maximum operating conditions for each MOV. The flow paths for each valve were reviewed using the applicable Piping and Instrument Drawings. A determination of the effect of valve mispositioning has been completed for all normal and emergency operating conditions for valves that are capable of being mispositioned from the main control room. Mispositioning was not considered for valves that are normally de-energized or that have automatic interlocks that prevent valve mispositioning. Maximum flow and fluid process temperatures have been determined for each valve using the UFSAR, procedures and/or training manuals. A determination as to whether each individual valve is required to operate during the loading sequence of the emergency diesel generator has been made. Applicable normal, abnormal and emergency operating procedures as well as surveillance procedures, Technical Specifications and UFSAR sections have been identified. A preliminary test configuration and mode of operation to support testing have been identified.

7.5 Valve Configuration

Applicable P&IDs have been reviewed to identify the installation isometric drawings for each program valve. The T/P (Temperature/Pressure) sheets for each line were identified using the Line List. The T/P sheets identify the maximum pressures and temperatures expected during normal, upset, emergency, and faulted operating conditions. The isometric drawings have been reviewed to determine valve elevation and the existence of upstream and downstream disturbances.

7.6 Generic Letter Applicability Conclusion

Following completion of the applicable component and system reviews, a determination is made to ascertain if the individual valves should be included in the Generic Letter program. Non-safety related MOVs that are in portions of safety related systems were also evaluated to assure that they were not required to be included in the generic letter portion of the MOV Program. Presently, there are one hundred and eighteen (118) motor-operated valves included in the Seabrook Station Generic Letter MOV Program scope. Table 3 identifies the valves that were evaluated for inclusion into the Generic Letter MOV Program and identifies whether they were or were not included in the program. Table 4 identifies some of the physical characteristics of the valve and actuator for the generic letter MOVs.

TABLE 4
PHYSICAL CHARACTERISTICS OF GL 89-10 MOVs

Valve ID	Description
AS-V-175	12" Velan Gate SB-1 Limitorque Light Spring Pack - 40 ftlb
AS-V-176	12" Velan Gate SB-1 Limitorque Light Spring Pack - 40 ftlb
CBS-V-2	12" West Gate SB-1 Limitorque Heavy Spring Pack - 60 ftlb Motor
CBS-V-5	12" West Gate SB-1 Limitorque Heavy Spring Pack - 60 ftlb Motor
CBS-V-8	16" Velan Gate SMB-0 Limitorque Heavy Spring Pack - 15 ftlb
CBS-V-11	8" Aloyco Gate SB-0 Limitorque Light Spring Pack - 25 ftlb Motor
CBS-V-14	16" Velan Gate SMB-0 Limitorque Heavy Spring Pack - 15 ftlb
CBS-V-17	8" Aloyco Gate SB-0 Limitorque Light Spring Pack - 25 ftlb Motor
CBS-V-38	6" Aloyco Gate SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CBS-V-43	6" Aloyco Gate SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CBS-V-47	8" West Gate SMB-00 Limitorque Light Spring Pack - 15 ftlb Motor
CBS-V-49	6" West Gate SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CBS-V-51	8" West Gate SMB-00 Limitorque Light Spring Pack - 15 ftlb Motor
CBS-V-53	6" West Gate SMB-000 Limitorque Extra Heavy Spring Pack - 10 ftlb Motor
CC-V-137	14" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CC-V-145	16" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CC-V-266	14" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CC-V-272	16" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CC-V-395	3" Velan Gate SMB-0 Limitorque Light Spring Pack - 15 ftlb
CC-V-428	3" Velan Gate SMB-0 Limitorque Light Spring Pack - 15 ftlb
CC-V-438	3" Velan Gate SMB-0 Limitorque Light Spring Pack - 15 ftlb
CC-V-439	3" Velan Gate SMB-0 Limitorque Light Spring Pack - 15 ftlb
CC-V-1092	6" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 2 ftlb Motor
CC-V-1095	6" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 2 ftlb Motor
CC-V-1101	6" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 2 ftlb Motor
CC-V-1109	6" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack - 2 ftlb Motor

TABLE 4
PHYSICAL CHARACTERISTICS OF GL 89-10 MOVs

Valve ID	Description
CGC-V-14	2" Velan Globe SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CGC-V-28	2" Velan Globe SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CS-LCV-112B	4" West Gate SB-00 Limitorque Light Spring Pack - 15 ftlb Motor
CS-LCV-112C	4" West Gate SB-00 Limitorque Light Spring Pack - 15 ftlb Motor
CS-LCV-112D	8" West Gate SMB-00 Limitorque Light Spring Pack - 15 ftlb Motor
CS-LCV-112E	8" West Gate SMB-00 Limitorque Light Spring Pack - 15 ftlb Motor
CS-V-142	3" West Gate SB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
CS-V-143	3" West Gate SB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
CS-V-149	3" West Gate SMB-000 Limitorque Extra Heavy Spring Pack - 10 ftlb Motor
CS-V-154	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-158	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-162	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-166	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-167	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-168	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-196	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-197	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-426	2" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
CS-V-460	6" West Gate SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CS-V-461	6" West Gate SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
CS-V-475	6" West Gate SMB-000 Limitorque Light Spring Pack - 5 ftlb Motor
FW-V-156	6" Velan Gate SMB-0 Limitorque Heavy Spring Pack - 25 ftlb Motor
FW-V-163	6" Velan Gate SMB-0 Limitorque Heavy Spring Pack - 25 ftlb Motor
FW-V-346	4" Velan Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
FW-V-347	4" Velan Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
FW-FV-4214A	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4214B	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4224A	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4224A	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4234A	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4234B	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4244A	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
FW-FV-4244B	4" Masoneilon Globe NA1 Rotork 11 Spring Pack - 50 ftlb Motor
MS-V-204	4" Rockwell Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
MS-V-205	4" Rockwell Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
MS-V-206	4" Rockwell Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
MS-V-207	4" Rockwell Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
MSD-V-44	1" Yarway Globe SMB-000 Limitorque Extra Heavy Spring Pack - 5 ftlb Motor
MSD-V-45	1" Yarway Globe SMB-000 Limitorque Extra Heavy Spring Pack - 5 ftlb Motor
MSD-V-46	1" Yarway Globe SMB-000 Limitorque Heavy Spring Pack - 5 ftlb Motor
MSD-V-47	1" Yarway Globe SMB-000 Limitorque Heavy Spring Pack - 5 ftlb Motor
RC-V-22	12" West Gate SMB-1 Limitorque Heavy Spring Pack - 40 ftlb Motor
RC-V-23	12" West Gate SMB-1 Limitorque Heavy Spring Pack - 40 ftlb Motor

TABLE 4
PHYSICAL CHARACTERISTICS OF GL 89-10 MOVs

Valve ID	Description
RC-V-87	12" West Gate SMB-1 Limitorque Heavy Spring Pack - 40 ftlb Motor
RC-V-88	12" West Gate SMB-1 Limitorque Heavy Spring Pack - 40 ftlb Motor
RC-V-122	3" West Gate SB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
RC-V-124	3" West Gate SB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
RC-V-323	3/4" Velan Globe SMB-000 Limitorque Extra Light Spring Pack - 2 ftlb Motor
RH-V-14	8" West Gate SB-1 Limitorque Heavy Spring Pack - 60 ftlb Motor
RH-V-21	8" West Gate SMB-00 Limitorque Medium Spring Pack - 25 ftlb Motor
RH-V-22	8" West Gate SMB-00 Limitorque Medium Spring Pack - 25 ftlb Motor
RH-V-26	8" West Gate SB-1 Limitorque Heavy Spring Pack - 60 ftlb Motor
RH-V-32	8" West Gate SMB-0 Limitorque Heavy Spring Pack - 25 ftlb Motor
RH-V-35	8" West Gate SMB-00 Limitorque Medium Spring Pack - 25 ftlb Motor
RH-V-36	8" West Gate SMB-00 Limitorque Medium Spring Pack - 25 ftlb Motor
RH-V-70	8" West Gate SMB-0 Limitorque Heavy Spring Pack - 25 ftlb Motor
RH-FCV-610	3" Velan Globe SMB-00 Limitorque Extra Light Spring Pack - 10 ftlb Motor
RH-FCV-611	3" Velan Globe SMB-00 Limitorque Extra Light Spring Pack - 10 ftlb Motor
SI-V-3	10" West Gate SBD-3 Limitorque Light/Heavy Spring Pack - 150 ftlb Motor
SI-V-17	10" West Gate SBD-3 Limitorque Light/Heavy Spring Pack - 150 ftlb Motor
SI-V-32	10" West Gate SBD-3 Limitorque Light/Heavy Spring Pack - 150 ftlb Motor
SI-V-47	10" West Gate SBD-3 Limitorque Light/Heavy Spring Pack - 150 ftlb Motor
SI-V-77	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SI-V-89	1.5" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
SI-V-90	1.5" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
SI-V-93	1.5" Velan/West Globe SMB-00 Limitorque Heavy Spring Pack - 10 ftlb Motor
SI-V-102	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SI-V-111	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SI-V-112	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SI-V-114	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SI-V-138	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SI-V-139	4" West Gate SB/SMB-00 Limitorque Heavy Spring Pack - 15 ftlb Motor
SW-V-2	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-4	12" Fisher Butterfly SMB-00 Limitorque Extra Light Spring Pack - 5 ftlb Motor
SW-V-5	12" Fisher Butterfly SMB-00 Limitorque Extra Light Spring Pack - 5 ftlb Motor
SW-V-15	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-17	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-19	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-20	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-22	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-23	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-25	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-27	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-29	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-31	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-34	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor

TABLE 4
PHYSICAL CHARACTERISTICS OF GL 89-10 MOVs

Valve ID	Description
SW-V-54	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-56	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-74	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-76	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-139	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor
SW-V-140	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack - 15 ftlb Motor

8.0 MOV SIZING AND SWITCH SETTINGS

Generic Letter 89-10 recommendation (b) states that the correct motor-operator switch settings should be established based on the design basis review. Seabrook performed the following to establish correct switch settings:

8.1 Maximum Differential Pressure Determination

The maximum differential pressure for each generic letter 89-10 valve was calculated using the guidance provided in the Motor-Operated Valve Program Maximum Differential Pressure Guideline which is included in the differential pressure calculations. Design basis accident conditions and both normal and abnormal operating conditions were considered in determining the maximum differential pressure and line pressure conditions. The potential for valve mispositioning and recovery from valve mispositioning were also factored into the calculations. The intent of the differential pressure calculations was to obtain a conservative maximum differential pressure for valve operation.

8.2 Gate and Globe Valve Required Thrust

The required thrust for gate and globe valves was calculated in accordance with the Motor-Operated Valve Sizing and Calculation Guideline. The approach taken was to calculate the maximum thrust required for valve operation. In most cases, the required thrust was calculated using the differential pressure (DP) that the valve was originally designed to operate under. In some cases, where the design differential pressure was substantially greater than the calculated DP value, a less conservative value was used in the calculation. Generally the value selected was greater than the calculated maximum differential pressure value calculated using the approach described above. If the calculated differential pressure was greater than the design differential pressure value, then the calculated DP value was used to determine the required valve thrust for operation. Valve vendors were contacted to obtain valve sizing equations. Valve required thrust for operation was calculated using the vendor supplied calculations.

8.3 Equivalent Valve Factor

An equivalent valve factor was calculated using the calculated required thrust value for open and close operation and the maximum calculated differential pressure for open and close operation. Using these values an equivalent valve factor is calculated. It should be noted that the minimum required thrust value for open operation was used to calculate the equivalent valve factor even though the torque switch is bypassed for a minimum of 25% of the open stroke. The results of this calculation show that the equivalent valve factor is a minimum of 0.5 with the exception of five valves which have open equivalent valve factors greater or equal to 0.398. If the derated output capability of the actuator is used instead of the minimum required thrust all valve factors are greater than 0.5.

8.4 Stem/Stem Nut Friction Coefficient

Seabrook calculations use a stem factor based on a friction coefficient of 0.15. The stem factor is determined by stem geometry and the coefficient of friction between the stem and the stem-nut. Since the geometry of a given stem is fixed, any change in coefficient of friction will change the stem factor. The 0.15 friction coefficient has been justified as appropriate, based on vendor data, and submitted to the NRC in NYN-92058 (Reference 17) in response to an NRC Phase 1 MOV Inspection 91-81 (Reference 14), request for additional information. The 0.15 assumption is based on information and experience from the following sources:

- Industry experience
- Vendor experience
- Testing performed at Seabrook
- Limitorque sizing procedures
- EPRI Stem/Stem-Nut Lubrication Test Report, TR-102135
- NMAC Application Guide for Motor Operated Valves in Nuclear Power Plants, NP-6660-D
- NHY Letter NYN-92058
- EPRI PPP test data at flow cutoff

8.5 Coefficient of Friction Based on Test Data

Seabrook has installed stem mounted strain gauges on selected valves to measure the stem torque and thrust during valve testing. Seabrook performed both dynamic and static testing to quantify the stem/stem nut friction coefficient under both operating conditions. Currently, there is test data available for sixteen different valves. The friction coefficient was determined during the highly loaded portions of the valve stroke. The calculated friction coefficients for the required design basis strokes are presented in Table 5. The majority of the friction coefficients are less than 0.15, however, some of the testing showed friction coefficients greater than this value. The test data that reflected stem/stem nut coefficients of friction higher than 0.15 was reviewed to assure that the valve is setup so that the higher than assumed friction coefficient can be accommodated. Valve control switch trip thrusts were reviewed for valves that have similar stem geometries to assure that a higher stem factor would not affect valve operation. The dynamic test results were reviewed to assure that adequate margin is available for valves that have been dynamically tested. It should be noted that FW-V-163 is installed horizontally and that fact could have played a role in obtaining higher than assumed friction coefficient. The remaining valves in the dynamic test group, that have not been monitored to obtain a friction coefficient, were reviewed to assure that they could accommodate a higher friction coefficient and perform their design basis function. The following summarizes the review of the higher than assumed friction coefficients for each of the affected valves.

FW-V-156/V-163: These valves must open to perform their safety function. FW-V-163 was tested under dynamic conditions. Test results show that significant margin is available to open these valve. FW-V-156 was set up based on the same differential pressure conditions as FW-V-163. However, FW-V-156 is required to open under low differential pressure conditions. In both cases, the actuator reduced voltage capability is sufficient to open these valves under design basis conditions. There were no other safety related MOVs that have this same stem geometry.

RC-V-122/V-124: These valves are required to close to isolate a stuck open PORV. These valves close under limit switch control. Accordingly, the full output capability of the actuator is available to close these valves. These valves are identical to CS-V-142 and CS-V-143 which were dynamically tested at nearly 100% of maximum differential pressure. Both valves had substantial margin. For both valves, the actuator reduced voltage capability is sufficient to close these valves under design basis conditions. RH-FCV-610/611 were the only other safety related MOVs that have this same stem geometry. Both of these valves were tested under dynamic conditions and exhibited significant margin.

RH-V-14/V-26: These valves are normally open to perform their safety function. These valves must be capable of closure during the switchover sequence to ECCS Recirculation. Both valves were tested under dynamic conditions at nearly 100% DP and have sufficient margin for valve operation. For both valves, the actuator reduced voltage capability is sufficient to close these valves under design basis conditions. Other safety related valves that have the same stem geometry as these valves are: AS-V-175/V-176, CBS-V-2/V-5, and RH-V-32/V-70. All of these additional valves are in separate test groups. Valve set up for these valves has been shown to be acceptable based on dynamic testing.

Seabrook plans to continue monitoring stem/stem nut friction coefficients during subsequent valve testing. Table 5 identifies the stem/stem nut coefficients of friction based on diagnostic testing data.

TABLE 5
STEM/STEM NUT FRICTION COEFFICIENT
BASED ON DIAGNOSTIC TESTING

VALVE ID	UNSEATING TIME (SEC) RAW	CST TIME(SEC) RAW	STEM FACTOR AT THE UNSEATING	STEM FRICTION AT THE UNSEATING	STEM FACTOR AT CST	STEM FRICTION AT CST	ASSUMED STEM FACTOR	PITCH	LEAD
CBS-V-5 (static)	15.729	42.149	0.0089	0.027	0.012	0.067	0.019	0.25	0.5
CBS-V-5 (dp)	0.77	12.88	0.0038	-0.0346	0.0053	-0.01668	0.019	0.25	0.5
CS-V-460 (static)	10.584	8.71	(1)	(1)	0.014	0.1	0.0163	0.333	0.666
CS-V-475 (static)	0.853	19.829	0.0146	0.116	0.0156	0.137	0.0163	0.333	0.666
FW-V-163 (static)	39.982	36.349	0.017	0.183	(2)	(2)	0.014	0.25	0.25
FW-V-163 (50% dp)	2.194	69.11	0.015	0.167	(2)	(2)	0.014	0.25	0.25
FW-V-163 (dp)	21.877	N/A	0.015	0.165	(2)	(2)	0.014	0.25	0.25
FW-V-347 (static)	40.341	28.66	<<.012	<<.15	0.01	0.128	0.012	0.25	0.25
FW-V-347 (dp)	43.236	23.975	0.011	0.15	0.011	0.138	0.012	0.25	0.25
RC-V-88 (static)	2.282	118.743	<<.0242	<<.15	0.017	0.08	0.0242	0.333	0.666
RC-V-122 (static)	13.04	9.476	0.0116	0.138	0.0127	0.164	0.0122	0.2	0.4
RC-V-124 (static)	9.855	8.1	<<.0122	<<.15	0.0132	0.172	0.0122	0.2	0.4
RH-V-26 (static)	1.155	16.395	0.008	0.017	0.011	0.051	0.019	0.25	0.5
RH-V-26 (dp)	3.523	25.575	0.012	0.071	0.022	0.185	0.019	0.25	0.5
RH-V-36 (static)	0.972	N/A	0.013	0.089	(1)	(1)	0.0163	0.333	0.666
RH-FCV-610 (dp)	31.732	12.94	0.007	0.052	0.0096	0.091	0.0122	0.2	0.4
SI-V-77 (dp)	4.322	N/A	<<.0163	<<.15	(1)	(1)	0.0163	0.333	0.666
SI-V-102 (dp)	3.804	32.348	<<.0163	<<.15	(2)	(2)	0.0163	0.333	0.666
SI-V-111 (static)	21.236	18.262	0.009	0.003	0.0118	0.061	0.0163	0.333	0.666
SI-V-111 (dp)	4.065	31.962	<<.0163	<<.15	0.013	0.093	0.0163	0.333	0.666
SI-V-114 (dp)	5.704	32.665	<<.0163	<<.15	0.0119	0.061	0.0163	0.333	0.666
SI-V-138 (static)	23.396	18.864	0.0126	0.077	0.0143	0.108	0.0163	0.333	0.666
SI-V-138 (dp)	18.359	35.045	0.011	0.047	0.0121	0.0653	0.0163	0.333	0.666

(1) Measurement could not be determined.

(2) Not required to close under DP condition.

8.6 Gate and Globe Valve Required Torque

The required thrust for valve operation was converted to required torque using a stem factor based on a 0.15 friction coefficient. The 0.15 friction coefficient has been found to be appropriate based on various industry test data. Seabrook has been monitoring stem/stem nut friction over the past two cycles and has found that the majority of valves monitored have stem/stem nut friction coefficients less than 0.15. Further discussion of friction coefficients can be found in Section 8.5 of this document.

8.7 Butterfly Valve Required and Maximum Torque

The safety related butterfly valves were manufactured by Posi-Seal, (currently a subsidiary of Fisher Controls), and Fisher Controls. Valve required torque was determined based on maximum differential pressure values.

The safety related Service Water butterfly valves were procured from Fisher Controls. During system and plant startup problems were experienced with the rubber seat liners. Multiple design modifications were performed on the Service Water butterfly valves. The seat liners were replaced with a Belzona D&A material in accordance with Engineering Change Authorization (ECA) 19/112007B. The liner was further modified in accordance with Design Coordination Report (DCR) 87-249 to preclude the chaffing of the liner material in the valve stem area. Minor Design Modification (MMOD) 89-517 provided guidance for close limit switch settings based on seating and unseating loads. Valve torque requirements were determined based on an extensive testing program. The maximum torque values for these valves was based on the weak link of the valve and motor-operator combination.

8.8 Valve Weak Link Analysis

Valve weak link analysis were provided by the individual valve manufacturers. The weak link analyses have determined the thrust or torque structural capacity of each component involved in supporting the MOV opening and closing strokes. These analyses evaluated the structural components of each MOV which typically included the valve body, bonnet, yoke, stem, disk and appropriate flanges including bolted interfaces as appropriate. The allowable thrust or torque capacity of each MOV was developed using the valve vendor's weak link analysis which have been independently reviewed by site Mechanical Engineering. The weak link values are used in the torque switch setting calculations and are identified as a maximum thrust value in NHY Drawing 250000, as appropriate. In many cases the maximum allowable thrust or torque is based on the allowable limits of the motor-operator. Identifying the weak link provides controls to assure that the valve torque or thrust does not exceed the weak link of the valve or motor operator.

Seabrook participated in the Limitorque Phase I and II Overload Testing Program conducted by Kalsi Engineering, Inc. The Phase I portion of this program provided the necessary testing and analysis that was the basis for increasing the published thrust ratings for Limitorque operator sizes SMB-000 through 1. As a result of this work, Limitorque Corporation issued Limitorque Technical Update 92-01 which allowed for the use of 140% of nominal thrust rating. Seabrook uses the information provided in Limitorque Technical Update 92-01 on a case basis to justify over-thrust conditions. Seabrook does not routinely use the increased ratings to set up the actuators.

Table 6 identifies the design thrust values for rising stem valves that were used to set up the generic letter valves.

TABLE 6:
DESIGN THRUST TABLE
RISING STEM VALVES

Valve ID	Design Min Open (lbf)	Design Max Open (lbf)	Design Min Close (lbf)	Design Max Close (lbf)
AS-V-175	6550	45000	12050	45000
AS-V-176	6400	45000	11950	45000
CBS-V-11	8512	15000	6000	26400
CBS-V-14	9593	26400	10504	26400
CBS-V-17	8512	15000	6000	26400
CBS-V-2	22200	45000	12000	45000
CBS-V-38	1590	8800	1615	8800
CBS-V-43	1590	8800	1615	8800
CBS-V-47	6310	16000	7300	16000
CBS-V-49	4020	8800	3900	8800
CBS-V-5	22200	45000	12000	45000
CBS-V-51	6310	16000	7300	16000
CBS-V-53	4020	8800	3900	8800
CBS-V-8	9593	26400	10504	26400
CC-V-395	3000	11779	10900	14560
CC-V-428	3000	11779	10900	14560
CC-V-438	3000	11779	10900	14560
CC-V-439	3000	11779	10900	14560
CGC-V-14	2769	8800	2779	8800
CGC-V-28	2769	8800	2779	8800
CS-LCV-112B	3900	16000	3800	16000
CS-LCV-112C	3900	16000	3800	16000
CS-LCV-112D	6310	16000	7450	16000
CS-LCV-112E	6300	16000	7450	16000
CS-V-142	8400	16000	8000	16000
CS-V-143	8400	16000	8000	16000
CS-V-149	4300	8800	5900	8800
CS-V-154	10900	15400	10900	15400
CS-V-158	10900	15400	10900	15400
CS-V-162	10900	15400	10900	15400
CS-V-166	10900	15400	10900	15400
CS-V-167	3500	15400	3500	15400
CS-V-168	3500	15400	3500	15400
CS-V-196	10900	15400	10900	15400
CS-V-197	10900	15400	10900	15400
CS-V-426	3500	15400	3500	15400
CS-V-460	3850	8800	2250	8800
CS-V-461	3850	8800	2250	8800
CS-V-475	3850	8800	2250	8800
FW-FV-4214A	4730	10000	4730	10000

TABLE 6:
DESIGN THRUST TABLE
RISING STEM VALVES

Valve ID	Design Min Open (lbf)	Design Max Open (lbf)	Design Min Close (lbf)	Design Max Close (lbf)
FW-FV-4214B	4730	10000	4730	10000
FW-FV-4224A	4730	10000	4730	10000
FW-FV-4224B	4730	10000	4730	10000
FW-FV-4234A	4730	10000	4730	10000
FW-FV-4234B	4730	10000	4730	10000
FW-FV-4244A	4730	10000	4730	10000
FW-FV-4244B	4730	10000	4730	10000
FW-V-156	14950	26400	14550	26400
FW-V-163	14250	26400	13900	26400
FW-V-346	11250	15400	12150	15400
FW-V-347	11250	15400	12150	15400
MS-V-204	8723	33900	11100	21000
MS-V-205	8723	33900	11100	21000
MS-V-206	8723	33900	11100	21000
MS-V-207	8723	33900	11100	21000
MSD-V-44	3800	8800	6810	8800
MSD-V-45	3800	8800	6810	8800
MSD-V-46	3800	8800	6810	8800
MSD-V-47	3800	8800	6810	8800
RC-V-122	8650	16000	8000	16000
RC-V-124	8650	16000	8000	16000
RC-V-22	26850	45000	27950	45000
RC-V-23	26850	45000	27950	45000
RC-V-323	1525	5000	1604	5000
RC-V-87	26850	45000	27950	45000
RC-V-88	26850	45000	27950	45000
RH-FCV-610	4150	10572	4750	12737
RH-FCV-611	4150	10572	4750	12737
RH-V-14	13000	45000	10500	45000
RH-V-21	9050	16000	9850	16000
RH-V-22	9050	16000	9850	16000
RH-V-26	13000	45000	10500	45000
RH-V-32	8850	26400	10650	26400
RH-V-35	8000	16000	8800	16000
RH-V-36	8000	16000	8800	16000
RH-V-70	8850	26400	10650	26400
SI-V-102	10200	16000	6100	16000
SI-V-111	9820	16000	7820	16000
SI-V-112	9820	16000	7820	16000
SI-V-114	4750	16000	6600	16000
SI-V-138	12550	16000	8000	16000

TABLE 6:
DESIGN THRUST TABLE
RISING STEM VALVES

Valve ID	Design Min Open (lbf)	Design Max Open (lbf)	Design Min Close (lbf)	Design Max Close (lbf)
SI-V-139	12550	16000	8000	16000
SI-V-17	56700	112000	17300	116900
SI-V-3	56700	112000	17300	116900
SI-V-32	56700	112000	17300	116900
SI-V-47	56700	112000	17300	116900
SI-V-77	10200	16000	6100	16000
SI-V-89	8050	15400	8050	15400
SI-V-90	8050	15400	8050	15400
SI-V-93	8050	15400	8050	15400

Table 7 identifies the design torque values for butterfly valves. The values included in Table 7 were used to set up the butterfly valves. All of the butterfly valves at Seabrook Station open close operation are controlled by limit switch.

TABLE 7:
DESIGN TORQUE TABLE
BUTTERFLY VALVES

TAG ID	MAXIMUM PEAK SEATING TORQUE (ft-lb)	MAXIMUM PEAK UNSEATING TORQUE (ft-lb)	MAXIMUM SHAFT TORQUE (ft-lb)
CC-V-137	N/A	N/A	1075
CC-V-145	N/A	N/A	1300
CC-V-266	N/A	N/A	1075
CC-V-272	N/A	N/A	1300
CC-V-1092	N/A	N/A	447
CC-V-1095	N/A	N/A	447
CC-V-1101	N/A	N/A	447
CC-V-1109	N/A	N/A	447
SW-V-2	1800 to 2400	< 2400	4681
SW-V-4	300 to 750	N/A	1011
SW-V-5	300 to 750	N/A	1011
SW-V-15	1800 to 2400	< 2400	4681
SW-V-17	1800 to 2400	< 2400	4681
SW-V-19	1800 to 2400	< 2400	4681
SW-V-20	1800 to 2400	< 2400	4681
SW-V-22	1800 to 2400	< 2400	4681
SW-V-23	1800 to 2400	< 2400	4681
SW-V-25	1800 to 2400	< 2400	4681
SW-V-27	1800 to 2400	< 2400	4681
SW-V-29	1800 to 2400	< 2400	4681
SW-V-31	1800 to 2400	< 2400	4681
SW-V-34	1800 to 2400	< 2400	4681

TABLE 7:
DESIGN TORQUE TABLE
BUTTERFLY VALVES

TAG ID	MAXIMUM PEAK SEATING TORQUE (ft-lb)	MAXIMUM PEAK UNSEATING TORQUE (ft-lb)	MAXIMUM SHAFT TORQUE (ft-lb)
SW-V-46	1800 to 2400	< 2400	4681
SW-V-54	1800 to 2400	< 2400	4681
SW-V-56	1800 to 2400	< 2400	4681
SW-V-63	1800 to 2400	< 2400	4681
SW-V-64	1800 to 2400	< 2400	4681
SW-V-74	1800 to 2400	< 2400	4681
SW-V-75	1800 to 2400	< 2400	4681
SW-V-76	1800 to 2400	< 2400	4681
SW-V-139	1800 to 2400	< 2400	4681
SW-V-140	1800 to 2400	< 2400	4681

8.9 Selection of MOV Switch Settings

MOV torque switch setting calculations determine the minimum and maximum torque switch setpoints. Minimum torque switch setpoints were calculated using the calculated required thrusts and torques for open and close operation. Torque switch settings for rising stem gate and globe valves were determined in accordance with the Motor-Operated Valve Sizing and Calculation Guideline. Torque switch setpoints were determined using the Limitorque methodology. Appropriate factors were included in the calculation for reduced voltage at the motor. Either a generic 80% reduced voltage factor was used or a valve specific reduced voltage factor based on the Voltage Regulation Study was used in the calculations. Motor nameplate rated torque, an appropriate application factor and the pullout efficiency were used to determine the minimum and maximum torque switch setpoints. The maximum torque switch settings are based on the minimum of the actuator nominal torque rating, the maximum range of the applicable spring pack, the motor pullout torque at reduced voltage conditions and the valve weak link. The motor-operator capability is based on the motor pullout torque which is calculated using the motor rated torque, appropriate application factor and the pullout efficiency.

Butterfly valves, at Seabrook Station, close and open under limit switch control. The torque switch setpoints are determined for component protection. The open and close torque switches are in the control circuitry to provide backup component protection.

In July of 1987, the service water butterfly valve seat/lining was redesigned, and all critical SW valves were reworked using an improved seat design. Seabrook performed a major study as a result of periodic failures of Service Water butterfly valves. The study is documented in NHY Report entitled "Report on Service Water System Motor Operated Valves". The failures were attributed to torque switch trip of the butterfly valves and necessitated the development of a program to investigate and correct the problems. Among the conclusions reached in the report were:

- that tests conducted on SW-V29 have demonstrated that actual valve seating torque can be reduced significantly by resetting the closed limit switch while maintaining a leak tight seat.

The test results of this report were used to establish new close position limit switch setpoints which maintain reasonable margin between actual torque values and torque switch setpoints. The new limit switch position is set using diagnostic test equipment to set the seating torque in an acceptable torque range.

Minimum and maximum allowable torque switch setpoints are controlled in NHY Drawing 250000. This drawing also provides the minimum and maximum thrust and torque values as appropriate to support valve testing. Station Procedure ES1850.003 provides guidance for the control of torque and limit switch settings.

Thrust requirements for setting of actuator torque switches are adjusted to account for diagnostic equipment inaccuracy and torque switch repeatability. Further discussion of diagnostic test equipment inaccuracy and torque switch repeatability will be discussed later in this report.

Four-rotor limit switches are installed on all actuators in the Seabrook Station Generic Letter 89-10 MOV Program. Actual limit switch settings are depicted on the applicable MOV schematic drawings. ES1850.003 provides guidance for setting the limit switches. Limit Switch settings are performed in accordance with the applicable electrical schematics using approved procedures. For the open limit switch for rising stem valves Seabrook has a policy not to backseat the valve. Accordingly, the open limit switch is set so that the valve is not routinely backseated. Intermediate limits are set in accordance with the electrical schematics to provide the required control functions as appropriate.

Control of motor-operated gate and globe valves in the closing direction is normally by the torque switch. However, certain Motor Operated gate valves, which are equipped with compensated spring packs, have their close stroke operation controlled by the close limit switch. There are 6 gate valves that have SB-00 actuators that use this limit closure logic. NHY Drawing 250000 and applicable station procedures provide the controls for limit closure of the gate valves.

Open and close operation of all generic letter butterfly valves is controlled by the open and close limit switches. The torque switch is in the circuit for these valves to provide component protection. Station procedures provide instructions for adequately setting the open and close limit switches.

Table 8 identifies the torque switch setpoints.

TABLE 8:
TORQUE SWITCH SETTINGS

Valve ID	Min TS Open	TS Open	Max TS Open	Min TS Close	TS Close	Max TS Close
AS-V-175	1.50	3.25	3.25	2.25	3.25	3.25
AS-V-176	1.50	3.00	3.25	2.25	2.50	3.25
CBS-V-11	3.00	3.25	4.00	2.25	3.25	4.00
CBS-V-14	2.75	2.75	3.00	3.00	2.50 *	3.00
CBS-V-17	3.00	4.00	4.00	2.25	4.00	4.00
CBS-V-2	2.25	1.75 *	2.25	1.50	1.50	2.25
CBS-V-38	1.50	2.00	2.25	1.50	2.00	2.25
CBS-V-43	1.50	2.00	2.25	1.50	2.00	2.25
CBS-V-47	2.25	2.50	2.50	2.50	2.50	2.50
CBS-V-49	1.75	1.50 *	2.00	1.75	2.50	2.00
CBS-V-5	2.25	2.00 *	2.25	1.50	1.75	2.25
CBS-V-51	2.25	2.50	2.50	2.50	2.50	2.50
CBS-V-53	1.50	1.50	2.00	1.50	1.50	2.00
CBS-V-8	2.00	2.25	2.25	2.00	2.25	2.25
CC-V-1092	1.00	2.75	2.75	1.00	2.75	2.75

TABLE 8:
TORQUE SWITCH SETTINGS

Valve ID	Min TS Open	TS Open	Max TS Open	Min TS Close	TS Close	Max TS Close
CC-V-1095	1.00	2.75	2.75	1.00	2.75	2.75
CC-V-1101	1.00	1.50	2.75	1.00	1.50	2.75
CC-V-1109	1.00	1.50	2.75	1.00	1.50	2.75
CC-V-137	1.50	2.50	2.75	1.00	2.50	2.75
CC-V-145	3.00	3.00	3.00	1.75	3.00	3.00
CC-V-266	1.50	2.50	2.75	1.00	2.50	2.75
CC-V-272	2.25	3.00	3.00	1.50	3.00	3.00
CC-V-395	1.00	1.75	1.75	1.75	1.75	2.00
CC-V-428	1.00	1.50	1.75	1.75	1.75	2.00
CC-V-434	1.00	1.50	2.75	1.00	1.50	2.75
CC-V-438	1.00	1.50	1.75	1.75	2.00	2.00
CC-V-439	1.00	1.75	1.75	1.75	1.75	2.00
CGC-V-14	1.25	1.25	3.50	1.25	1.25	3.50
CGC-V-28	1.25	1.25	3.50	1.25	2.00	3.50
CS-LCV-112B	1.75	1.75	2.25	1.75	2.00	2.25
CS-LCV-112C	1.75	2.00	2.25	1.75	1.25 *	2.25
CS-LCV-112D	1.00	1.75	3.00	1.50	2.00	3.00
CS-LCV-112E	1.00	1.50	3.00	1.50	2.0C	3.00
CS-V-142	1.00	1.00	1.00	LIMIT	LIMIT	LIMIT
CS-V-143	1.00	1.00	1.00	LIMIT	LIMIT	LIMIT
CS-V-149	1.50	2.00	2.00	2.00	1.25 *	2.00
CS-V-154	2.25	2.00 *	2.75	2.25	1.50 *	2.75
CS-V-158	2.25	2.00 *	2.75	2.25	1.75 *	2.75
CS-V-162	2.25	1.50 *	2.75	2.25	1.50 *	2.75
CS-V-166	2.25	1.75 *	2.75	2.25	1.50 *	2.75
CS-V-167	1.00	1.50	2.75	1.00	1.50	2.75
CS-V-168	1.00	1.00	2.75	1.00	1.00	2.75
CS-V-196	2.25	2.00 *	3.00	2.25	1.50 *	3.00
CS-V-197	2.25	2.00 *	3.00	2.25	1.50 *	3.00
CS-V-426	1.00	1.75	2.75	1.00	1.50	2.75
CS-V-460	1.00	1.00	*	1.50	1.50	1.50
CS-V-461	2.00	2.00	*	1.50	1.50	1.50
CS-V-475	2.00	2.00	*	1.50	1.50	1.50
FW-FV-4214A	4.00	4.00	5.00	4.00	4.00	5.00
FW-FV-4214B	4.00	4.50	5.00	4.00	4.50	5.00
FW-FV-4224A	4.00	3.00 *	5.00	4.00	4.00	5.00
FW-FV-4224B	4.00	4.00	5.00	4.00	4.00	5.00
FW-FV-4234A	4.00	4.50	5.00	4.00	5.00	5.00
FW-FV-4234B	4.00	4.00	5.00	4.00	4.00	5.00
FW-FV-4244A	4.00	3.00 *	5.00	4.00	3.50 *	5.00
FW-FV-4244B	4.00	4.00	5.00	4.00	3.50 *	5.00
FW-V-156	2.00	2.50	2.50	1.75	2.50	2.50

TABLE 8:
TORQUE SWITCH SETTINGS

Valve ID	Min TS Open	TS Open	Max TS Open	Min TS Close	TS Close	Max TS Close
FW-V-163	1.50	2.25	2.50	1.50	2.50	2.50
FW-V-346	2.00	3.00	3.00	2.50	2.75	3.00
FW-V-347	2.00	2.75	3.00	2.50	2.50	3.00
MS-V-204	1.00	1.75	2.50	1.00	1.50	2.50
MS-V-205	1.00	2.00	2.50	1.00	1.50	2.50
MS-V-206	1.00	2.00	2.50	1.00	1.50	2.50
MS-V-207	1.00	2.00	2.50	1.00	2.00	2.50
MSD-V-44	2.50	2.50	2.50	2.50	2.50	2.50
MSD-V-45	2.50	2.50	2.50	2.50	2.50	2.50
MSD-V-46	1.50	2.00	2.00	1.50	2.00	2.00
MSD-V-47	1.50	1.50	2.00	1.50	2.00	2.00
RC-V-122	1.00	1.25	1.25	LIMIT	LIMIT	LIMIT
RC-V-124	1.00	1.00	1.25	LIMIT	LIMIT	LIMIT
RC-V-22	3.00	2.50 *	3.75	3.25	2.75 *	3.75
RC-V-23	3.00	2.75 *	3.75	3.25	2.75 *	3.75
RC-V-323	1.00	2.00	2.75	1.00	2.00	2.75
RC-V-87	3.00	3.00	4.00	3.25	3.00 *	4.00
RC-V-88	3.00	3.00	3.50	3.25	3.00 *	3.50
RH-FCV-610	2.50	3.00	3.00	2.75	3.00	3.00
RH-FCV-611	2.50	3.00	3.00	2.75	3.00	3.00
RH-V-14	1.50	1.50	2.50	1.50	1.50	2.50
RH-V-21	2.00	3.00	3.00	2.50	3.00	3.00
RH-V-22	2.00	2.75	3.00	2.50	2.75	3.00
RH-V-26	1.75	1.50 *	2.25	1.50	1.50	2.25
RH-V-32	2.00	2.50	2.50	2.25	2.50	2.50
RH-V-35	1.75	3.00	3.00	2.00	3.00	3.00
RH-V-36	1.75	2.50	3.00	2.00	2.50	3.00
RH-V-70	2.00	2.25	2.50	2.25	1.50 *	2.50
SI-V-102	1.00	1.00	1.50	1.00	1.00	1.50
SI-V-111	1.00	1.50	1.50	1.00	1.25	1.50
SI-V-112	1.00	1.25	1.25	1.00	1.25	1.25
SI-V-114	1.00	1.00	1.25	1.00	1.00	1.25
SI-V-138	1.50	1.75	1.75	LIMIT	LIMIT	LIMIT
SI-V-139	1.50	1.50	1.75	LIMIT	LIMIT	LIMIT
SI-V-17	1.75	1.75	2.25	1.00	1.75	2.25
SI-V-3	3.00	2.00 *	4.00	1.50	2.00	4.00
SI-V-32	3.00	1.75 *	4.00	1.50	1.50	4.00
SI-V-47	1.75	1.75	2.25	1.00	1.75	2.25
SI-V-77	1.00	1.25	1.50	1.00	1.25	1.50
SI-V-89	1.75	2.00	2.75	1.75	1.75	2.75
SI-V-90	1.75	1.75	2.50	1.75	1.75	2.50
SI-V-93	1.75	1.75	3.00	1.75	1.75	3.00

TABLE 8:
TORQUE SWITCH SETTINGS

Valve ID	Min TS Open	TS Open	Max TS Open	Min TS Close	TS Close	Max TS Close
SW-V-139	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-140	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-15	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-17	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-19	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-2	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-20	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-22	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-23	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-25	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-27	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-29	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-31	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-34	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-4	LIMIT	2.25	2.25	LIMIT	2.25	2.25
SW-V-5	LIMIT	2.25	2.25	LIMIT	2.25	2.25
SW-V-54	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-56	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-74	LIMIT	4.00	4.00	LIMIT	4.00	4.00
SW-V-76	LIMIT	4.00	4.00	LIMIT	4.00	4.00

* PER DIAGNOSTIC TEST RESULTS

8.10 Torque Switch Bypass Methodology

The open torque switch bypass is set between 25% and 80% of the open stroke. In-situ testing has shown that the 25% minimum value is acceptable because peak unseating loads occurs prior to 25% of the open stroke. This allows for up to the full actuator output capability to be available to unseat the valve. Diagnostic testing provides assurance that the torque bypass switch is set within this range. The acceptable bypass switch settings are included in station procedure ES1850.003, "Motor-Operated Valve Performance Monitoring".

The Open-to-Close Torque Switch Bypass setting is set consistent with the operation of the green indicating light. The limit switch rotor for this indicating light is set in accordance with Station Maintenance Procedures. Typically this light illuminates within the first 10 % of the close stroke operation; the Open-to-Close Bypass switch actuates at the same time. Accordingly, the close torque switch is in the close circuit for nearly the complete stroke.

8.11 Maintenance of Correct Switch Settings

Recommendation (d) of Generic Letter 89-10 requires licensees to prepare or revise procedures to ensure that correct switch settings are determined and maintained throughout the life of the plant. ES1850.003 in conjunction with NHY Drawing 250000 provide the controls for selecting and maintaining correct switch settings for the life of the plant. Correct switch settings have been calculated in response to Generic Letter 89-10 recommendation (b) and have been set based on static and dynamic testing in response to recommendation (c). Periodic testing will verify that acceptable switch settings are maintained.

9.0 MOV DESIGN CHANGES/ENHANCEMENTS

A number of motor-operated valve design changes have been completed to increase the reliability for valve operation or to increase the motor-operator capability. A number of design changes have been made to motor-operated valves since the issuance of I.E. Bulletin 85-03. An over view of some of the changes follows:

9.1 DCR 86-403:

This DCR revised the control circuits for MOVs to 1) provide Control Room indication for motor thermal overload actuation and 2) rewire operator limit switches as necessary to dedicate a rotor for proper open torque switch bypass. This DCR addressed MOVs in the Service Water, Chemical and Volume Control, Safety Injection, Residual Heat Removal Systems and some of the valves in the Circulating Water System. United Engineers and Constructors DCN 63-0082A dedicated a limit switch rotor for open torque bypass switch setting for the Westinghouse valves during plant construction.

9.2 DCR 87-071:

This DCR revised the control circuits for MOVs to rewire operator limit switches as necessary to dedicate a rotor for proper open torque switch bypass. The MOVs addressed in this DCR were the balance of the I. E. Bulletin 85-03 valves that did not already have a dedicated rotor for torque switch bypass control.

9.3 MMOD 89-517:

This MMOD determined an acceptable methodology to set the close limit switch for butterfly valves. This change corrected a negative trend in the performance of Service Water System motor-operated valves. A method of valve closure control was instituted that based the close limit switch setpoint on strain gauge torque values.

9.4 DCR 89-024:

This DCR implemented the four rotor limit switch design for the remaining plant MOVs that had not been modified previously. This provided a separate rotor for the open torque switch bypass switch. This design change also provided control room indication for identifying MOVs which are inoperable due to tripped TOLs, Thermal Overload Devices.

9.5 MMOD 91-569:

This MMOD was issued to address the Generic Letter 89-10 concerns for the valves that were scheduled to be tested during the first Refueling Outage. This MMOD did the following:

- Provided the thrust and torque values and minimum and maximum torque switch setpoints for the OR01 valve scope.
- Replaced the torque switch limiter plates for CBS-V8/V14, Containment Recirculation Sump Isolation Valves.
- Increased the torque switch limiter plate setting for CBS-V11/V17, Containment Spray Discharge Isolation Valves.
- Allowed for a reduction of the torque switch settings for the Main Steam Isolation Valve Bypass Valves.
- Approved use of a stronger motor pinion key material AISI 4140 for Limitorque valves.
- Increased the overall gear ratio for RH-V35/V36, the RHR Recirculation Discharge Cross Connect Valves to CS and SI.
- Provided additional guidance to support MOV diagnostic testing.

9.6 MMOD 92-521:

This MMOD was issued to address the Generic Letter 89-10 concerns for the valves that were scheduled to be tested during the second Refueling Outage. This MMOD did the following:

- Provided the thrust and torque values and minimum and maximum torque switch setpoints for the OR02 valve scope.
- Increased the overall gear ratio for CBS-V47/V49/V51, RWST to SI Pump Suction Isolation Valves.
- Increased the overall gear ratio for SI-V111/V112, SI Pump Discharge Cross Connect Valves.
- Increased the overall gear ratio for SI-V114, SI Pump Cold Leg Isolation Valve.
- Increased the overall gear ratio for SI-V138/V139, High Head Injection Isolation Valves.
- Increased the overall gear ratio for MSD-V46/V47, Main Steam Drain Valves.
- Provided additional guidance to support MOV diagnostic testing.

9.7 DCR 93-029:

This DCR was issued to address the Generic Letter 89-10 concerns for the valves that were scheduled to be tested during the third Refueling Outage. This DCR did the following:

- Provided the thrust and torque values and minimum and maximum torque switch setpoints for the OR03 valve scope.
- Replaced the motor operators for CS-LCV-112D/112E, RWST to CS Pump Suction Isolation Valves.
- Increased the overall gear ratio for CS-V460/V461/V475, CS to SI Pump Suction Cross Connect Isolation Valves.
- Provided additional guidance to support MOV diagnostic testing.

9.8 DRR 93-086:

Replaced the ductile iron packing followers for the Service Water Butterfly Valves with stainless steel followers. This change was the result of an evaluation of the failure to fully stroke of SW-V54 reference LER 93-006, SIR 93-021 and 93-025. The root cause of the failure to stroke was found to be corrosion product buildup between the valve shaft and the gland follower. A contributing secondary cause was found to be excessive packing gland loading during installation. Diagnostic testing was used to troubleshoot, trend and evaluate the cause of this failure mechanism. The gland followers on all safety related service water butterfly valves were replaced during OR03. Follow-up testing was conducted on SW-V54, during Fuel Cycle Four, the test results confirmed that this action adequately addressed the root cause.

9.9 MMOD 94-561:

This MMOD was issued to support Generic Letter 89-10 MOV testing during the fourth refueling outage. This MMOD did the following:

- Increased the overall gear ratio for RC-V122/V124, PORV Block Isolation Valves.
- Allowed for higher torque switch setpoints for SI-V77/V102, SI Hot Leg Discharge Isolation Valves.

10.0 <u>STATUS OF GENERIC LETTER 89-10 PROGRAM MOV's</u>

As of August 1994, all design basis reviews, valve set-up and static tests of the 118 valves in the Seabrook Station Generic Letter 89-10 MOV Program were completed. Of the 118 MOV's in the program, all MOVs were set up under static conditions using diagnostic test equipment. Additionally, 51 valves were tested under dynamic conditions. This testing met the commitments based on Seabrook Station Grouping Methodology which was submitted to the NRC in NAESCO Letter NYN-92024. As a result of the NRC MOV Inspection 94-11 performed in May 1994, which questioned Seabrook Station's testing of valve groups, an additional 9 valves were committed to be tested under dynamic conditions from the end of OR03 to the end of OR04 (see Reference 37, NYN 94106). Additionally approximately 1/3 of the program valves were tested using diagnostics as part of Seabrook's periodic MOV testing program.

11.0 <u>VALVE MISPOSITIONING</u>

Seabrook has evaluated each Generic Letter MOV for inadvertent valve mispositioning. The conditions that the valve must be capable of operating under to recover from mispositioning have been calculated. Supplement 7 to Generic Letter 89-10, to be issued, will address valve mispositioning for PWR units. It is anticipated that Supplement 7 will provide guidance for the removal of valves that have been incorporated into the program based solely on valve mispositioning . Following issuance of Supplement 7, Seabrook plans to remove MOVs from the enhanced MOV Program that have been included in the Program solely based on inadvertent mispositioning. Table 9 identifies the valves that are in the Seabrook Generic Letter 89-10 Program solely based on mispositioning.

TABLE 9
MISPOSITION VALVES

VALVE ID	FUNCTION
CBS-V-49	RWST to SI Pump 'A' Suction Isolation
CBS-V-53	RWST to SI Pump 'B' Suction Isolation
CC-V-1092	PCCW Loop 'B' Isolation to Thermal Barrier HX 'B'
CC-V-1095	PCCW Loop 'B' Isolation from Thermal Barrier HX 'B'
CC-V-1101	PCCW Loop 'A' Isolation to Thermal Barrier HX 'A'
CC-V-1109	PCCW Loop 'A' Isolation from Thermal Barrier HX 'A'
CGC-V-14	Containment Purge Exhaust Isolation IRC
CGC-V-28	Containment Purge Exhaust Isolation IRC
CS-V-154	'D' RCP Seal Injection Isolation
CS-V-158	'C' RCP Seal Injection Isolation
CS-V-162	'B' RCP Seal Injection Isolation
CS-V-166	'A' RCP Seal Injection Isolation
CS-V-475	SI And Charging Pump Suction X-Connect from RH Pump Discharge
MS-V-204	SG 'A' MSIV Bypass
MS-V-205	SG 'B' MSIV Bypass
MS-V-206	SG 'C' MSIV Bypass
MS-V-207	SG 'D' MSIV Bypass
RH-V-21	RHR Train 'B' Discharge X-Connect
RH-V-22	RHR Train 'A' Discharge X-Connect
SI-V-114	SI Pumps Common Isolation to Cold Legs
SW-V-15	PCCW HX 'A' SW Isolation
SW-V-17	PCCW HX 'B' SW Isolation
SW-V-74	Turbine Bldg SW X-Connect to PAB
SW-V-76	Turbine Bldg SW X-Connect to PAB
SW-V-139	SW Cooling Tower Train 'A' Spray Bypass Recirc
SW-V-140	SW Cooling Tower Train 'B' Spray Bypass Recirc

12.0 DIAGNOSTIC TEST EQUIPMENT AND ACCURACY VALIDATION

12.1 Diagnostic Test Equipment

Seabrook developed its own Motor-Operated Valve Diagnostic Test System to be used to address the recommendations provided in Generic Letter 89-10. The MOV Test System, INSTEAD, was designed to diagnose the performance of MOVs either on a preventive basis or to support corrective maintenance. INSTEAD uses a variety of MOV actuator sensors to monitor the conditions and state changes associated with an MOV actuation. The system has a great deal of flexibility in that it can be adapted to a wide variety of valve styles, manufacturers, and environmental conditions. INSTEAD employs strain gauge methods to determine valve stem/shaft torque and/or thrust, along with other traditional diagnostic sensors. Data acquisition hardware interfaces with a personal computer and is capable of monitoring up to 12 parameters with high sample rates during a single valve stroke. The computer based portion of the diagnostic test system has been independently verified and validated by Yankee Atomic Electric Corporation.

12.2 Validation of INSTEAD System Accuracy

The INSTEAD diagnostic test system underwent a rigorous accuracy validation program performed at Idaho National Engineering Laboratories, INEL, in December of 1990. This validation testing took place prior to Seabrook's first refueling outage. The validation testing consisted of simultaneous measurements and comparisons between INEL's load cell system and Seabrook's strain gauge system on MOV test stands. INSTEAD system inaccuracies are based on the INEL test data.

12.3 Overall Accuracy of Control Switch Setpoints

NHY Letter NYN 92058 (Reference 17) transmitted NHY's response for additional information pertaining to MOV control switch setpoint error analysis as a result of the Phase 1 NRC Inspection of the Seabrook MOV Program (Reference 14). Technical Support Group Calculation, 92-CALC-000[illegible] was developed to determine the combined accuracy associated with torque switch repeatability, data acquisition and data processing accuracy's. The combined accuracy value is then used to reduce the design range specified in NHY Drawing 250000 to a more restrictive set of values called the "target range". The accuracy factor for torque switch repeatability is based on the actuator vendor recommendations. The data acquisition and data processing accuracies take into account the accuracies associated with:

- measuring and test equipment (M&TE)
- physical constants for conversion of strain measurement to thrust or torque and/or
- comparison techniques that associate load cell measurements on the valve open stroke to spring pack displacement on the close stroke.

12.4 Generic Letter 89-10 Supplement 5, Diagnostic Test System Accuracy

The NRC issued Supplement 5 to inform licensees of a generic concern regarding the accuracy of MOV diagnostic test equipment. The Supplement requested that the licensee evaluate this new information and any other information reasonably available to them and provide a written response to two requests for additional information. Seabrook responded to Supplement 5 in NAESCO Letter NYN-93139 (Reference 30). Seabrook's response was based on the aforementioned validation testing of the INSTEAD diagnostic test system performed at INEL and on a previous response to an NRC request for additional information that was submitted in NYN-92058.

13.0 <u>DIAGNOSTIC TESTING TO VERIFY DESIGN BASIS CAPABILITY</u>

13.1 Diagnostic Testing

Generic Letter 89-10, Recommendation (c) requires that each MOV be tested in-situ at design-basis conditions, if practicable, to demonstrate that it is capable of performing its intended function. In addition, Recommendation (c) requires that each MOV be stroke tested at no-pressure or no-flow conditions (static testing) to verify that the MOV is operable even if testing with a differential pressure or flow cannot be performed. Seabrook set up the generic letter MOVs using a combination of static diagnostic testing and dynamic diagnostic testing. As a minimum, all of the Seabrook Generic Letter MOVs were subjected to static diagnostic testing. Seabrook developed a dynamic testing grouping methodology and submitted it to the NRC in NYN-92024 in response to a request for additional information as a result of the Phase 1 NRC Inspection of the MOV Program (Inspection 91-81). The 118 valves were broken down into 32 different test groups. There are a total of 33 test groups, however, test group #27 consist of one of the valves that was excluded from Seabrook's enhanced MOV Program. The grouping was based on the physical attributes of the valve, motor-operator and system operating conditions. NYN-92024 identified the individual valve groups, the planned dynamic testing to be performed to validate the acceptability of a group and the valves that were excluded from testing based on non-testability. A reason for valve exclusion was also provided. Station Procedure ES1850.003 identifies the attributes used to develop the valve groups and provides a table of the individual valve groups. Seabrook developed a test plan to meet the commitments for valve testing identified in NYN-92024. Table 10 identifies the valve grouping used at Seabrook.

TABLE 10
DIFFERENTIAL PRESSURE TEST GROUP STATUS

DP TEST GROUP	DESCRIPTION	NO TESTED/ NO IN GROUP	PER-CENT	STATUS	TAG IDs
1	3" Westinghouse Gate SMB-000 Limitorque Extra Heavy Spring Pack 10 ft-lb Motor	1/1	100%	COMPLETE	CS-V-149
2	3" Westinghouse Gate SB-00 Limitorque Heavy Spring Pack 15 ft-lb Motor	2/4	50%	COMPLETE	CS-V-143 CS-V-142 RC-V-124 RC-V-122
3	3" Velan Gate SMB-0 Limitorque Light Spring Pack 15 ft-lb Motor	0/4	0%	EXCLUDED	CC-V-395 CC-V-428 CC-V-438 CC-V-439
4	4" Westinghouse Gate SB-00 Limitorque Light Spring Pack 15 ft-lb Motor	0/2	0%	EXCLUDED	CS-LCV-112B CS-LCV-112C
5	4" Westinghouse Gate SB/SMB-00 Limitorque Heavy Spring Pack 15 ft-lb Motor	6/7	85.7%	COMPLETE	SI-V-77 SI-V-102 SI-V-111 SI-V-112 SI-V-114 SI-V-138 SI-V-139
6	6" Westinghouse Gate SMB-000 Limitorque Light Spring Pack 5 ft-lb Motor	0/4	0%	EXCLUDED	CBS-V-49 CS-V-461 CS-V-460 CS-V-475
7	6" Velan Gate SMB-0 Limitorque Heavy Spring Pack 25 ft-lb Motor	1/2	50%	COMPLETE	FW-V-156 FW-V-163
8	6" Westinghouse Gate SMB-000 Limitorque Extra Heavy Spring Pack 10 ft-lb Motor	1/1	100%	COMPLETE	CBS-V-53
9	8" Westinghouse Gate SMB-00 Limitorque Medium Spring Pack 25 ft-lb Motor	3/4	75%	COMPLETE	RH-V-21 RH-V-22 RH-V-35 RH-V-36
10	8" Westinghouse Gate SMB-00 Limitorque Light Spring Pack 15 ft-lb Motor	0/4	0%	EXCLUDED	CBS-V-51 CBS-V-47 CS-LCV-112D CS-LCV-112E
11	8" Westinghouse Gate SMB-0 Limitorque Heavy Spring Pack 25 ft-lb Motor	2/2	100%	COMPLETE	RH-V-32 RH-V-70
12	8" Westinghouse Gate SB-1 Limitorque Heavy Spring Pack 60 ft-lb Motor	2/2	100%	COMPLETE	RH-V-14 RH-V-26

TABLE 10
DIFFERENTIAL PRESSURE TEST GROUP STATUS

DP TEST GROUP	DESCRIPTION	NO TESTED/ NO IN GROUP	PER-CENT	STATUS	TAG IDs
13	8" Aloyco Gate SB-0 Limitorque Light Spring Pack 25 ft-lb Motor	0/2	0%	EXCLUDED	CBS-V-11 CBS-V-17
14	10" Westinghouse Gate SBD-3 Limitorque Light/Heavy Spring Pack 150 ft-lb Motor	0/4	0%	EXCLUDED	SI-V-3 SI-V-17 SI-V-32 SI-V-47
15	12" Westinghouse Gate SB-1 Limitorque Heavy Spring Pack 60 ft-lb Motor	2/2	100%	COMPLETE	CBS-V-2 CBS-V-5
16	12" Westinghouse Gate SMB-1 Limitorque Heavy Spring Pack 40 ft-lb Motor	0/4	0%	EXCLUDED	RC-V-22 RC-V-23 RC-V-87 RC-V-88
17	12" Velan Gate SB-1 Limitorque Light Spring Pack 40 ft-lb	1/2	50%	COMPLETE	AS-V-175 AS-V-176
18	16" Velan Gate SMB-0 Limitorque Heavy Spring Pack 15 ft-lb	0/2	0%	EXCLUDED	CBS-V-8 CBS-V-14
19	3/4" Velan Globe SMB-000 Limitorque Extra Light Spring Pack 2 ft-lb Motor	1/1	100%	COMPLETE	RC-V-323
20	1" Yarway Angled Globe SMB-000 Limitorque Heavy/Extra Heavy Spring Pack 5 ft-lb Motor	3/4	75%	COMPLETE	MSD-V-44 MSD-V-45 MSD-V-46 MSD-V-47
21	2" Velan Globe SMB-000 Limitorque Light Spring Pack 5 ft-lb Motor	0/2	0%	EXCLUDED	CGC-V-14 CGC-V-28
22	1.5" & 2" Velan/ Westinghouse Globe SMB-00 Limitorque Heavy Spring Pack 10 ft-lb Motor	4/5	80%	COMPLETE	CS-V-196 CS-V-197 SI-V-89 SI-V-90 SI-V-93
23	2" Velan/Westinghouse Globe SMB-00 Limitorque Heavy Spring Pack 10 ft-lb Motor	0/7	0%	EXCLUDED	CS-V-154 CS-V-158 CS-V-162 CS-V-166 CS-V-167 CS-V-168 CS-V-426
24	3" Velan Globe SMB-00 Limitorque Extra Light Spring Pack 10 ft-lb Motor	2/2	100%	COMPLETE	RH-FCV-610 RH-FCV-611

TABLE 10
DIFFERENTIAL PRESSURE TEST GROUP STATUS

DP TEST GROUP	DESCRIPTION	NO TESTED/ NO IN GROUP	PER-CENT	STATUS	TAG IDs
25	4" Rockwell Globe SMB-00 Limitorque Heavy Spring Pack 10 ft-lb Motor	2/4	50%	COMPLETE	MS-V-204 MS-V-205 MS-V-206 MS-V-207
26	4" Masoneilon Globe NA1 Rotork 11 Spring Pack 50 ft-lb Motor	3/8	37.5%	COMPLETE	FW-FV-4214A FW-FV-4214B FW-FV-4224A FW-FV-4224B FW-FV-4234A FW-FV-4234B FW-FV-4244A FW-FV-4244B
27	4" Velan Globe SMB-00 Limitorque Extra Light Spring Pack 10 ft-lb Motor	0/1	0%	EXCLUDED	CC-V-434
28	4" Velan Globe SMB-00 Limitorque Heavy Spring Pack 10 ft-lb Motor	2/2	100%	COMPLETE	FW-V-346 FW-V-347
29	6" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack 2 ft-lb Motor	4/4	100%	COMPLETE	CC-V-1092 CC-V-1095 CC-V-1101 CC-V-1109
30	12" Fisher Butterfly SMB-00 Limitorque Extra Light Spring Pack 5 ft-lb Motor	2/2	100%	COMPLETE	SW-V-4 SW-V-5
31	14" &16" Posi Seal Butterfly SMB-000 Limitorque Light Spring Pack 5 ft-lb Motor	3/4	75%	COMPLETE	CC-V-137 CC-V-145 CC-V-266 CC-V-272
32	24" Fisher Butterfly SMB-0 Limitorque Light Spring Pack 15 ft-lb Motor	13/20	65%	COMPLETE	SW-V-2 SW-V-15 SW-V-17 SW-V-19 SW-V-20 SW-V-22 SW-V-23 SW-V-25 SW-V-27 SW-V-29 SW-V-31 SW-V-34 SW-V-54 SW-V-56 SW-V-74 SW-V-76SW-V-139 SW-V-140
33	6" Aloyco Gate SMB-000 Limitorque Light Spring Pack 5 ft-lb Motor	0/2	0%	EXCLUDED	CBS-V-38 CBS-V-43

The Seabrook grouping methodology's objective was to create numerous succinct test groups based on stringent valve and motor-operator physical attributes. Accordingly, many discrete groups were established so that each group, for the most part, consisted of valves and motor-operators that had identical characteristics. This approach has been beneficial when evaluating the dynamic testing data and when extrapolating that data to design basis conditions. Many discrete groups of valves have also been beneficial in evaluating the effects of load sensitive behavior.

As stated previously, based on the results of the subsequent NRC Motor-Operated Inspection 94-11 a concern was raised by the NRC that the Seabrook dynamic testing in accordance with the Seabrook grouping philosophy did not meet the intent of Generic Letter Supplement 6 criteria. Following subsequent discussions with the NRC, Seabrook committed to dynamically test additional valves to meet the intent of Generic Letter 89-10 Supplement 6. The additional testing was planned to be completed by the end of Seabrook's fourth refueling outage. The commitment to perform additional MOV testing was identified to the NRC in NAESCO letter NYN-94106. At the completion of Refueling Outage 04 dynamic testing had been performed on at least two MOV's from each group or 30% of the group (round up to the next high number of valves when taking percentages), whichever is greater with the exception of Groups 7 and 17 which are discussed below. Dynamic testing need not be performed on the remaining MOV's in the group for GL 89-10 closure. Exceptions were taken to the criteria if low differential pressure existed and meaningful test data would not be obtained from dynamic testing. Exceptions were also taken if the valves in the group could not be tested under dynamic conditions due to the plant configuration. Justifications for excluding valves from testing are included in the MOV Data Base.

Seabrook performed dynamic testing on 60 valves. Table 11 identifies the MOVs that were dynamically tested. Following OR01, as the result of an NRC inspection comment, all dynamic testing was performed in accordance with site approved dynamic testing procedures with the exception of one test. The one exception was tested in accordance with a work request. Table 12 identifies the valves that were dynamically tested, the maximum calculated differential pressure for valve operation, the as tested differential pressure, the minimum calculated thrust, the extrapolated as tested thrust and the amount of margin for open/close operation. As can be seen the calculated required thrust exceeded the as tested thrust in all cases and adequate margin exists to provide reliable operation of the MOVs. The test data was reviewed and evaluated to assure that each tested valve was set up adequately and to assure that the remaining valves in the test group, that were not dynamically tested, were also set up acceptably.

AS-V-175 and AS-V-176 (Test Group 17) have a safety function to close to isolate an auxiliary steam line break in the Primary Auxiliary Building. It should be noted that for dynamic testing of AS-V-175, a test configuration was produced to simulate the line break condition. During the line break simulation the auxiliary steam flow from the auxiliary boiler exceeded the predicted flow for the line break. Valve differential pressure during the isolation stroke was negligible due to the large volume in the 12 inch auxiliary steam line compared to the size of the simulated line break (~3 inch). The valve was closed before any appreciable decrease in downstream pressure was experienced. Close thrust for the as tested condition were low and no meaningful test data with the exception that there was no appreciable DP during the closure stroke was obtained. For this reason the isolation valve in series, AS-V-176, was not tested under dynamic conditions.

FW-V-156 (Test Group 7) was not tested under dynamic conditions since the differential pressure for valve opening and closing is 0 psig. For open operation FW-V-156 is opened following start up of the start up feedwater pump and prior to opening the upstream gate valve (FW-V-163).

Static and dynamic testing records are maintained in the individual test files for each specific MOV. This meets the intent of recommendation (f) of the Generic Letter.

TABLE 11
VALVES DYNAMICALLY TESTED

Valve ID	Name	Type
AS-V-175	Train 'A' HELB Isolation - AUX Stm Supply to PAB/WPB	Dynamic Baseline
CBS-V-2	RWST to Train 'A' RHR/CBS Pump Suction Isolation	Dynamic Baseline
CBS-V-5	RWST to Train 'A' RHR/CBS Pump Suction Isolation	Dynamic Baseline
CBS-V-53	RWST to SI Pump 'B' Suction Isolation	Dynamic Baseline
CC-V-137	PCCW Isolation to CBS HX 'A'	Dynamic Baseline
CC-V-145	PCCW Isolation to RHR HX 'A'	Dynamic Baseline
CC-V-272	PCCW Isolation to RHR HX 'B'	Dynamic Baseline
CC-V-1092	PCCW Loop 'B' Isol to Thermal Barrier HX 'B'	Dynamic Baseline
CC-V-1095	PCCW Loop 'B' Isol from Thermal Barrier HX 'B'	Dynamic Baseline
CC-V-1101	PCCW Loop 'A' Isol to Thermal Barrier HX 'A'	Dynamic Baseline
CC-V-1109	PCCW Loop 'A' Isol from Thermal Barrier HX 'A'	Dynamic Baseline
CS-V-142	Train 'A' Charging System to Regen HX Isolation	Dynamic Baseline
CS-V-143	Train 'B' Charging System to Regen HX Isolation	Dynamic Baseline
CS-V-149	Regen HX Outlet to Letdown HX	Dynamic Baseline
CS-V-196	Charging Pump 'A' Min Flow Isolation	Dynamic Baseline
CS-V-197	Charging Pump 'B' Min Flow Isolation	Dynamic Baseline
FW-V-163	SUFP X-Connect to EFW Header	Dynamic Baseline
FW-V-346	EFW Pump 37A Min Flow Recirc to CST	Dynamic Baseline
FW-V-347	EFW Pump 37B Min Flow Recirc to CST	Dynamic Baseline
FW-FV-4224A	S/G 'B' EFW Train 'A' Flow Control	Dynamic Baseline
FW-FV-4234B	S/G 'C' EFW Train 'B' Flow Control	Dynamic Baseline
FW-FV-4244B	S/G 'D' EFW Train 'B' Flow Control	Dynamic Baseline
MS-V-205	SG 'B' MSIV Bypass	Dynamic Baseline
MS-V-206	SG 'C' MSIV Bypass	Dynamic Baseline
MSD-V-44	MS Drain Isolation Valve Upstream OF MS-V-86	Dynamic Baseline
MSD-V-45	MS Drain Isolation Valve Upstream OF MS V-85	Dynamic Baseline
MSD-V-46	MS Drain Isolation Valve Upstream OF MS-V-90	Dynamic Baseline
RC-V-323	Reactor Head Vent Isolation	Dynamic Baseline
RH-V-14	RHR Train 'A' to Cold Legs 1 And 2	Dynamic Baseline
RH-V-21	RHR Train 'B' Discharge X-Connect	Dynamic Baseline
RH-V-22	RHR Train 'A' Discharge X-Connect	Dynamic Baseline
RH-V-26	RHR Train 'B' to Cold Legs 3 And 4	Dynamic Baseline
RH-V-32	RHR Train 'B' Common Supply to Hot Leg Recirc	Dynamic Baseline
RH-V-36	RHR Pump B Disch Isolation to SI/Charging Pumps	Dynamic Baseline
RH-V-70	RHR Train 'A' Common Supply to Hot Leg Recirc	Dynamic Baseline
RH-FCV-610	RHR Pump 'A' Min Flow Control	Dynamic Baseline
RH-FCV-611	RHR Pump 'B' Min Flow Control	Dynamic Baseline
SI-V-77	SI Train 'B' Discharge Isolation to Hot Legs 1/4	Dynamic Baseline
SI-V-89	SI Pump 'B' Min Flow Isolation to RWST	Dynamic Baseline
SI-V-93	SI Pumps A/B Combined Min Flow Isolation	Dynamic Baseline
SI-V-102	SI Train 'A' Discharge Isolation to Hot Legs 1/4	Dynamic Baseline

TABLE 11
VALVES DYNAMICALLY TESTED

Valve ID	Name	Type
SI-V-111	SI Train 'B' Discharge X-Connect	Dynamic Baseline
SI-V-112	SI Train 'A' Discharge X-Connect	Dynamic Baseline
SI-V-114	SI Pumps Common Isolation to Cold Legs	Dynamic Baseline
SI-V-138	Charging Pumps Supply to RCS Cold Legs	Dynamic Baseline
SW-V-2	SW Pump A Discharge Isolation	Dynamic Baseline
SW-V-4	SW Train 'A' Isolation to Secondary Loads	Dynamic Baseline
SW-V-5	SW Train 'B' Isolation to Secondary Loads	Dynamic Baseline
SW-V-19	SW Train 'B' to Discharge Structure	Dynamic Baseline
SW-V-20	SW Train 'A' Discharge Structure	Dynamic Baseline
SW-V-22	SW Pump C Discharge Isolation	Dynamic Baseline
SW-V-23	SW Train 'B' Return to Cooling Tower	Dynamic Baseline
SW-V-25	Cooling Tower Pump B Discharge Isolation	Dynamic Baseline
SW-V-27	Cooling Tower Train 'B' Spray Header Bypass	Dynamic Baseline
SW-V-29	SW Pump B Discharge Isolation	Dynamic Baseline
SW-V-31	SW Pump D Discharge Isolation	Dynamic Baseline
SW-V-34	SW Train 'A' Return to Cooling Tower	Dynamic Baseline
SW-V-54	Cooling Tower Pump A Discharge Isolation	Dynamic Baseline
SW-V-56	Cooling Tower Train 'A' Spray Header Bypass	Dynamic Baseline
SW-V-139	SW Cooling Tower Train 'A' Spray Bypass Recirc	Dynamic Baseline
SI-V-77	SI Train 'B' Discharge Isolation to Hot Legs 1/4	Periodic Verif
SI-V-102	SI Train 'A' Discharge Isolation to Hot Legs 1/4	Periodic Verif

13.2 Extrapolation of Partial DP Thrust Measurements

Seabrook attempted to dynamically test the generic letter valves at as high as practicable differential pressure conditions. Table 12 identifies when the valve was dynamically tested, the design differential pressure for close and open operation, the as tested close and open differential pressure and the as tested percent of maximum differential pressure for both close and open. In some cases the tested DP was greater than the differential pressure that the valve would be required to operate against. Linear extrapolation has been used to determine the thrust at maximum calculated differential pressure based on the as-tested differential pressure. The EPRI test results for gate and globe valves has validated linear extrapolation. Published EPRI PPP results demonstrate that the friction coefficient for stellite-on-stellite decreases with increasing disc-to-seat contact pressure, i.e., increasing d/p. Thus, extrapolation from low d/p has been demonstrated to be conservative.

TABLE 12
DYNAMIC TEST CONDITIONS

VALVE ID	DATE	DSGN DP CLOSE	TEST DP CLOSE	% DSGN DP	DSGN DP OPEN	TEST DP OPEN	% DSGN DP
AS-V-175	10/27/92	125	Note 1		Note 1		
CBS-V-2	10/9/92	40	22.34	55.85	310	22.34	7.21 Note 2
CBS-V-5	10/9/92	40	22.54	55.85	310	22.54	7.27 Note 2
CBS-V-53	10/9/92	Note 3			65	125.9	125.9
CC-V-1092	4/14/94	140	85.6	61.14	140	85.6	61.14
CC-V-1095	4/15/94	140	86.2	61.57	140	86.2	61.57
CC-V-1101	4/17/94	135	85.7	63.48	135	85.7	63.48
CC-V-1109	4/17/94	135	85.9	63.62	135	85.9	63.62
CC-V-137	6/30/94	129	92.2	71.47	129	92.2	71.47
CC-V-145	6/30/94	131	93.1	71.07	131	93.1	71.07
CC-V-272	9/9/91	131	92.7	70.76	131	92.7	70.76
CS-V-142	10/31/92	2731	2686	98.35	2731	2686	98.35
CS-V-143	10/31/92	2731	2686	98.35	2731	2686	98.35
CS-V-149	12/6/95	600	529.7	88.28	600	529.7	88.28
CS-V-196	12/3/95	2670	2492.9	90.8	2745	2572.9	96.4
CS-V-197	12/3/95	2670	2559.9	93.2	2745	2589.9	97.0
FW-FV-4224A	11/2/93	1550	1510	97.42	1550	1510	97.42
FW-FV-4234B	11/2/92	1550	1510	97.42	1550	1510	97.42
FW-FV-4244B	7/28/94	1550	435	28.06	1550	435	28.06
FW-V-163	7/22/94	Note 4			1560	1429	91.60
FW-V-346	6/11/89	1500	1360	90.67	1500	1460	97.33
FW-V-347	7/22/94	1500	1514.5	101.0	1500	1514.5	101.0
MS-V-205	10/9/91	1236	1015	82.12	1236	Note 5	
MS-V-206	6/23/95	1236	1030	83.33	1236	Note 5	
MSD-V-44	10/5/93	1125	1052	93.51	1106	1052	95.12
MSD-V-45	10/5/93	1125	1052	93.51	1106	1052	95.12
MSD-V-46	7/26/94	1125	1050	93.33	1106	1050	94.94
RC-V-323	12/4/95	350	313.5	89.57	2595	313.5	12.08 Note 6
RH-FCV-610	11/21/95	183.3	193.4	105.5	202.7	193.4	95.41
RH-FCV-611	6/10/94	183.3	108.3	59.10	202.7	108.25	53.40
RH-V-14	10/9/92	190	175	92.11	625	175	28.00
RH-V-21	6/10/94	253.4	185.3	73.13	360.3	185.3	51.43
RH-V-22	11/21/95	253.4	193.4	76.32	360.3	193.4	53.68
RH-V-26	11/21/95	190	193.4	101.8	625	193.4	30.94
RH-V-32	9/4/91	194	188.0	96.91	221	188.0	85.07
RH-V-36	11/21/95	207	193.4	93.43	254	193.4	76.14
RH-V-70	9/4/91	194	188.0	96.91	221	188.0	85.07

TABLE 12
DYNAMIC TEST CONDITIONS

VALVE ID	DATE	DSGN DP CLOSE	TEST DP CLOSE	% DSGN DP	DSGN DP OPEN	TEST DP OPEN	% DSGN DP
SI-V-102	11/20/95	Note 7			1731	1558.1	88.50
SI-V-111	11/20/95	Note 7			1705	1643.4	96.39
SI-V-112	10/9/92	Note 7			1705	1549	90.85
SI-V-114	11/20/95	70	1632.6	326.5	70	1632.6	326.5
SI-V-138	10/9/92	Note 8			2731	2733.8	100.1
SI-V-77	11/20/95	Note 7			1731	1539	88.90
SI-V-89	11/20/95	1415	1480.6	104.6	1560	1480.6	94.90
SI-V-93	11/20/95	1415	1480.6	104.6	0	1480.6	Note 6
SW-V-139	4/28/89	145.4	52.5	36.11	145.4	52.5	36.11
SW-V-19	1/7/90	148.7	54.0	36.31	148.7	54.0	36.31
SW-V-2	7/7/94	60	Note 9		106	85.1	80.30
SW-V-20	1/4/90	148.7	53.5	35.98	148.7	Note 10	
SW-V-22	7/7/94	60	Note 9		106	84.1	79.30
SW-V-23	1/4/90	149.5	53.5	35.98	149.5	Note 11	
SW-V-25	7/1/94	140.8	29.55	21.0	140.8	29.55	21.0
SW-V-27	7/1/94	140.8	145.43	103.28	140.8	145.43	103.28
SW-V-29	6/14/94	60	Note 9		106	82.8	78.1
SW-V-31	7/2/94	60	Note 9		106	78.9	74.4
SW-V-34	1/4/90	149.5	53.5	35.98	149.5	Note 11	
SW-V-4	7/8/94	132.6	57.3	43.20	132.6	57.3	43.2
SW-V-5	11/28/95	132.6	48.1	36.27	132.6	48.1	36.27
SW-V-54	7/7/94	140.8	137.92	97.9	140.8	137.92	97.9
SW-V-56	7/7/94	140.8	144.16	102.4	140.8	144.16	102.4

NOTES FOR TABLE 12:

1. The closing stroke for AS-V-175 was performed with 2 auxiliary boilers on-line supplying steam. The valve was stroked with steam flow at approximately 60,000 lbm/hr. With a warm steam header and no heating loads, virtually all of the steam mass was flowing through AS-V-175 and out to atmosphere by way of the simulated line break, (orifice), installed downstream. The measured dP based on the local pressure gauge located near the release point indicated very little pressure drop due to the expansion of the steam in the AS header downstrem of V-175. Subsequent analysis indicated that the dP was approximately 26 psid. Although the dP was lower than expected and only a fraction of the conservative design dP, the valve successfully stopped approximately 60,000 lbm/hr. Analysis of the open stroke and the close stroke indicates that there is large margin in the thrust capability for this valve. AS-V-175 is never fully opened with design differential pressure. For the test, the valve was cracked off the open seat to warm the downstream header. The signature captured the unseating force and flow initiation against 150 psid.

2 The open maximum DP for CBS-V-2 and CBS-V-5 is based on back leakage through 2 check valves. These valves were tested using the static head of the refueling water storage tank, RWST, as the upstream pressure source. The RWST gravity drained to the refueling cavity when the valve was opened. Fuel was removed from the reactor vessel and water level was slightly above the vessel flange. It was not feasible to test these valves by simulating check valve leakage or relief valve lifting. These are unlikely events and would require highly abnormal system lineups that would involve risk to other equipment.

3. CBS-V-53 is not required to close under differential pressure conditions.

4. FW-V-163 closes after the startup feed pump is shutdown. This valve was not dynamically tested in the close direction.

5. MS-V-205 and MS-V-206, MSIV bypass valves, were not tested in the open direction. These valves are throttled open during main steam header warmup in hot standby, Mode 3, conditions. The safety function of these valves is to be capable of closure.

6. RC-V-323 is a globe valve with pressure under the seat. The valve was tested in cold shutdown, Mode 5, with approximatly 325 psig in the pressurizer. Since pressure assists the open stroke, it is not considered necessary to challenge the downstream piping at full DP conditions since that would require normal operating temperatures in the reactor coolant system.

7. SI-V-111/V-112 and SI-V-77/V-102 are not required to close under differential pressure conditions.

8. SI-V-138 is not required to close under differential pressure conditions.

9. SW-V-2, SW-V-22, SW-V-29, and SW-V-31, ocean service water pump discharge valves, are interlocked with the pumps and automatically open with pump start and automatically close on pump shut down. A check valve downstream of each of these valves prevents dynamic testing in the close direction.

10. SW-V-20 safety function is to automatically close on receipt of a tower actuation, TA, signal. This valve is normally open. It was not tested in the open direction under dynamic conditions.

11. SW-V-23 and SW-V-34 were not dynamically tested in the open direction.

13.3 Margin

The available margin for valve operation is determined for each valve that has been dynamically tested. The close margin for gate and globe valves is the difference between the extrapolated hard seat contact thrust and the dynamic thrust at either the torque switch or limit switch trip point. For gate valves that close on limit, the close thrust at hard seat contact is extrapolated to design bases condition and compared to the minimum required thrust value. Close margin is determined by taking the difference between these two values. The open margin is determined using the thrust at flow initiation and using linear extrapolation to determine the thrust at design basis conditions. The extrapolated flow initiation thrust is then compared to the thrust at torque switch trip under static conditions. The difference between the two identified values is the open margin. On an as needed basis, the extrapolated thrust value based on flow initiation is compared to the actuator derated output capability and open margin is calculated as the difference between the two values. For valves that have been tested under dynamic conditions Table 13 identifies the adjusted margin for close and open operation and the percent of margin available. Seabrook routinely performs a detailed case basis review of the available margin for each dynamic test prior to determining that the valve is operable.

Available margin for butterfly valves is determined by taking the peak dynamic torque and subtracting that value from the accuracy compensated maximum torque value.

TABLE 13
MARGIN BASED ON DYNAMIC TESTING

VALVE ID	MARGIN CLOSE	CLOSE MARGIN %	MARGIN OPEN	OPEN MARGIN %
AS-V-175	Note 1		Note 1	
CBS-V-2	7426 lbf	96.08	Note 2	
CBS-V-5	26170 lbf	338.6	Note 2	
CBS-V-53	Note 3		4233 lbf	105.3
CC-V-1092	309.1 ft-lb	77.86	357.3 ft-lb	89.98
CC-V-1095	332.4 ft-lb	83.74	349.5 ft-lb	88.04
CC-V-1101	324.0 ft-lb	81.61	329.9 ft-lb	83.10
CC-V-1109	312.1 ft-lb	78.60	340.4 ft-lb	85.74
CC-V-137	425.0 ft-lb	44.18	451.2 ft-lb	46.90
CC-V-145	297.4 ft-lb	25.70	307.4 ft-lb	26.57
CC-V-272	95 ft-lb	8.21	404.7 ft-lb	34.98
CS-V-142	6622 lbf	45.92	1921 lbf	22.99
CS-V-143	7172 lbf	49.74	4255 lbf	50.93
CS-V-149	1828 lbf	31.13	3363 lbf	78.83
CS-V-196	4041 lbf	37.13	12553 lbf	117.8
CS-V-197	3365 lbf	30.92	10942 lbf	102.7
FW-FV-4224A	1568 lbf	42.14	Note 4	
FW-FV-4234B	1079 lbf	30.00	Note 4	
FW-FV-4244B	1630 lbf	43.81	Note 4	
FW-V-163	Note 5		3635 lbf	25.52
FW-V-346	2175 lbf	17.90	2626 lbf	23.34
FW-V-347	2374 lbf	19.58	11020 lbf	98.11
MS-V-205	2971 lbf	34.06	Note 6	
MS-V-206	5039 lbf	57.77	Note 6	

TABLE 13
MARGIN BASED ON DYNAMIC TESTING

VALVE ID	MARGIN CLOSE	CLOSE MARGIN %	MARGIN OPEN	OPEN MARGIN %
MSD-V-44	Note 7		Note 7	
MSD-V-45	Note 7		Note 7	
MSD-V-46	Note 7		Note 7	
RC-V-323	Note 8		Note 8	
RH-FCV-610	3302 lbf	69.77	4035 lbf	96.83
RH-FCV-611	4017 lbf	84.87	5415 lbf	129.9
RH-V-14	22760 lbf	248.8	24670 lbf	190.5
RH-V-21	2589 lbf	29.30	2250 lbf	28.47
RH-V-22	2106 lbf	21.40	2293 lbf	25.60
RH-V-26	9222 lbf	101.2	4742 lbf	36.61
RH-V-32	11872 lbf	113.0	13065 lbf	167.2
RH-V-36	5536 lbf	74.59	6461 lbf	89.72
RH-V-70	18173 lbf	172.9	13085 lbf	167.4
SI-V-102	Note 9		3507 lbf	35.41
SI-V-111	Note 9		3060 lbf	31.22
SI-V-112	Note 9		3180 lbf	32.44
SI-V-114	6318 lbf	95.73	8807 lbf	185.4
SI-V-138	Note 10		2651 lbf	21.24
SI-V-77	Note 9		6122 lbf	61.81
SI-V-89	6944 lbf	101.5	11913 lbf	163.6
SI-V-93	6033 lbf	88.16	12477 lbf	171.3
SW-V-139	1514 ft-lb	34.76	1810 ft-lb	41.55
SW-V-19	2199 ft-lb	50.48	2568 ft-lb	58.95
SW-V-2	Note 11		797 ft-lb	18.30
SW-V-20	2275 ft-lb	52.23	Note 12	
SW-V-22	Note 11		799 ft-lb	18.34
SW-V-23	2020 ft-lb	46.37	Note 13	
SW-V-25	985 ft-lb	22.61	1532 ft-lb	35.17
SW-V-27	2035 ft-lb	46.72	1559 ft-lb	35.79
SW-V-29	Note 11		1441 ft-lb	33.08
SW-V-31	Note 11		1491 ft-lb	34.23
SW-V-34	1632 ft-lb	37.47	Note 13	
SW-V-4	347 ft-lb	36.72	380 ft-lb	40.21
SW-V-5	533 ft-lb	56.40	180 ft-lb	19.05
SW-V-54	1349 ft-lb	30.97	1488 ft-lb	34.16
SW-V-56	1784 ft-lb	40.96	1603 ft-lb	36.80

NOTES FOR TABLE 13:

1. See Table 12, Dynamic Test Conditions, Note 1. The test DP was lower than expected and only a fraction of the conservative design dP. However, the valve successfully stopped approximately 60,000 lbm/hr steam flow. Analysis of the open stroke and the close stroke indicates that there is large margin in the thrust capability for this valve and a case basis evaluation was performed.

2. See Table 12, Dynamic Test Conditions, Note 2. The low test DP compared to the conservatively high design DP did not permit extrapolation to design conditions.

3. CBS-V-53 is not required to close under differential pressure conditions.

4. FW-FV-4224A, 4234B, and 4244B were tested in the open direction. These valves are globe valves with pressure under the seat. This results in a very large margin and it is not meaningful to extrapolate to design conditions.

5. FW-V-163 closes after the startup feed pump is shutdown. This valve was not dynamically tested in the close direction.

6. MS-V-205 and MS-V-206, MSIV bypass valves, were not tested in the open direction. These valves are throttled open during main steam header warmup in hot standby, Mode 3, conditions. The safety function of these valves is to be capable of closure.

7. MSD-V-44, 45, and 46 are rotating rising stem valves. The valves were tested in the open and closed directions at hot standby, Mode 3, conditions at near design DP conditions. A special case basis evaluation was performed to demonstrate that these valves have adequate margin to perform their design function.

8. RC-V-323 is a globe valve with pressure under the seat. The valve was tested in cold shutdown, Mode 5, with approximatly 325 psig in the pressurizer. Since pressure assists the open stroke, it is not considered necessary to challenge the downstream piping at full DP conditions since that would require normal operating temperatures in the reactor coolant system.

9. SI-V-111/V-112 and SI-V-77/V-102 are not required to close under differential pressure conditions.

10. SI-V-138 is not required to close under differential pressure conditions.

11. SW-V-2, SW-V-22, SW-V-29, and SW-V-31, ocean service water pump discharge valves, are interlocked with the pumps and automatically open with pump start and automatically close on pump shut down. A check valve downstream of each of these valves prevents dynamic testing in the close direction.

12. SW-V-20 safety function is to automatically close on receipt of a tower actuation, TA, signal. This valve is normally open. It was not tested in the open direction under dynamic conditions.

13. SW-V-23 and SW-V-34 were not dynamically tested in the open direction.

13.4 Load Sensitive Behavior

Load-sensitive behavior is the condition where the delivered thrust at torque switch trip differs under dynamic conditions as compared to static conditions for the same torque switch setting. Seabrook testing has shown that load sensitive behavior is not experienced on every valve. Some valves have shown not to be affected by load sensitive behavior, whereas, on other valves load sensitive behavior has been shown to exist. The output dynamic thrust at the same torque switch setpoint may either be greater or less than the thrust determined under static conditions. Seabrook does not incorporate a generic load sensitive behavior factor in the required thrust calculations. Seabrook reviews the applicable dynamic test results and quantifies load sensitive behavior. By using the dynamic control switch trip in the margin analysis, ROL is inherently accounted for. In addition, on a case basis, additional corrections are made to the margin calculation to account for ROL uncertainty. Seabrook uses this approach since there is no industry acceptable rate of loading factor that applies to every valve and since the overall approach used at Seabrook is based on conservative differential pressure values. Table 14 shows load sensitive behavior test results. As discussed in Section 13.1, the dynamic testing grouping methodology created a significant number of groups. This allowed load sensitive behavior to be factored into the test group more easily since fewer valves would be required to be evaluated for specific rate of loading cases.

Current setup practices are sufficient to provide assurance of the ability of the Seabrook valves to operate under all design basis conditions and would bound the thrust requirements based on load sensitive behavior. Conservatisms are already included in the calculation of minimum required thrusts. These include conservative diagnostic system inaccuracy, torque switch repeatability values, worst case differential pressure, derated motor torque, theoretical packing loads, actuator application factors, worst case undervoltage factors, and stem-to-stem nut coefficient of friction.

TABLE 14
LOAD SENSITIVE BEHAVIOR

Tag ID	Valve Type	Group #	Close TS Setting	Thrust Static CST	LVDT Static CST	Thrust Dynamic CST	LVDT Dynami CST	Thrust Difference	LVDT Difference	Number MOV's Group	% of Group Tested
GATE VALVES											
CS-V-149	gate	1	1.25	7,464	0.098	5,777	N/R	**1,687.00**		1	100
CS-LCV-112C	gate	4	1.50	11,635	0.159	9,540	0.146	**2,095.00**	0.013	2	50
SI-V-102	gate	5	1.00	11,012	0.029	7,210	0.030	**3,802.00**	-0.000	7	71
SI-V-111	gate	5	1.25	11,927	0.113	9,684	0.100	**2,243.00**	0.013	7	71
SI-V-112	gate	5	1.25	11,193	0.104	11,528	0.160	**-335.00**	-0.056	7	71
SI-V-114	gate	5	1.00	14,716	0.072	11,379	0.072	**3,337.00**	0.000	7	71
SI-V-138	gate	5	lim	9,579	0.05	18,570	0.231	**-8,991.00**	-0.181	7	71
SI-V-77	gate	5	1.25	12,301	0.086	13,963	0.094	**-1,662.00**	-0.008	7	71
FW-V-163	gate	7	2.50	16,102	-0.220	22,118	-0.216	**-6,016.00**	-0.004	2	50
CBS-V-53	gate	8	2.00	8,798	0.193	8,960	0.183	**-162.00**	0.010	1	100
RH-V-21	gate	9	3.00	11022	0.314	12,579	0.347	**-1,557.00**	-0.033	4	75
RH-V-22	gate	9	2.75	11,748	0.251	10,232	0.288	**1,516.00**	-0.037	4	75
RH-V-36	gate	9	2.25	11,194	0.329	10,908	0.342	**286.00**	-0.013	4	75
RH-V-32	gate	11	2.50	21,177	0.245	21,258	N/R	**-81.00**		2	100
RH-V-70	gate	11	2.25	22,997	0.259	26,710	N/R	**-3,713.00**		2	100
RH-V-14	gate	12	1.75	38,615	0.135	44,623	0.137	**-6,008.00**	-0.002	2	100
RH-V-26	gate	12	1.50	24,828	0.100	18,158	0.105	**6,670.00**	-0.005	2	100
CBS-V-2	gate	15	1.50	19,522	0.100	16,267	0.107	**3,255.00**	-0.007	2	100
CBS-V-5	gate	15	1.75	36,943	0.132	32,824	0.137	**4,119.00**	-0.005	2	100
AS-V-175	gate	17	3.25	14,498	0.338	16,358	0.344	**-1,860.00**	-0.006	2	50
CS-V-142	globe	2	lim	9,386	0.029	9,363	0.035	**23.00**	-0.006	4	50
CS-V-143	globe	2	lim	9,743	0.024	9,557	0.030	**186.00**	-0.006	4	50
GLOBE VALVES											
FW-V-346	gate	28	2.75	13,618	0.261	13,115	0.188	**503.00**	0.073	2	100
FW-V-347	gate	28	2.50	14,007	0.284	14,149	0.287	**-142.00**	-0.003	2	100
RC-V-323	globe	19	2.00	2,905	0.138	2,710	0.140	**195.00**	-0.002	1	100
MSD-V-44	globe	20	2.50							4	75
MSD-V-45	globe	20	2.50							4	75
MSD-V-46	globe	20	1.50	7,659	0.136	7,777	0.139	**-118.00**	-0.003	4	75
CS-V-196	globe	22	1.50	13,334	0.159	13,650	0.172	**-316.00**	-0.013	5	80
CS-V-197	globe	22	1.25	12,785	0.169	12,811	N/R	**-26.00**		5	80
SI-V-89	globe	22	1.75	13,057	0.114	13,461	0.127	**-404.00**	-0.013	5	80
SI-V-93	globe	22	1.75	12,172	0.126	12,077	0.127	**95.00**	-0.001	5	80
RH-FCV-610	globe	24	3.00	8,469	0.299	7,184	0.294	**1,285.00**	0.005	2	100
RH-FCV-611	globe	24	3.00	8,561	0.298	7,873	0.307	**688.00**	-0.009	2	100
MS-V-205	globe	25	1.50	11,206	0.116					4	50
MS-V-206	globe	25	1.50	15015	0.165	15,116	0.145	**-101.00**	0.020	4	50
FW-FV-4224A	globe	26	4.00	5636	0.102	5,959	0.095	**-323.00**	0.007	8	37.5
FW-FV-4234B	globe	26	4.00	7409	0.086	5,422	0.079	**1,987.00**	0.007	8	37.5
FW-FV-4244B	globe	26	3.50	7,558	0.090	6,127	0.085	**1,431.00**	0.005	8	37.5

14.0 DEMONSTRATE ADEQUACY OF VALVE SET UP

Each of the Generic Letter 89-10 motor-operated valve control switch settings were based on diagnostic test results. The adequacy of the switch settings for valves that are capable of being dynamically tested has been demonstrated by dynamic testing in accordance with the Seabrook Station valve grouping methodology. For valves that can not be dynamically tested the adequacy of valve set up is accomplished by evaluation. As part of the evaluation, if valves are made from the same valve manufacturer and are similar to valves that have been dynamically tested, although they may be in a different dynamic test group, the static test results of the valve not tested dynamically is compared to the dynamic test results of similar valves. EPRI Performance Prediction Program test results may also be used as part of the evaluation as appropriate. Some of the basis for acceptable valve set up used in the evaluation are:

- Valve not required to operate
- Globe valve that must open and flow is under the seat
- Excessive margin
- For valves required to open or are required to close, and closure is controlled by limit switch, excessive actuator capability
- Actuator capability at design basis conditions

The adequacy of each Generic Letter 89-10 valve set up is summarized in the following Table 15.

TABLE 15
ADEQUACY of VALVE SET UP

VALVE ID	BASIS FOR ACCEPTANCE
AS-V-175	Dynamically Tested
AS-V-176	Based on Dynamic Test Results of AS-V175, Excessive Margin
CBS-V-11	Actuator Capability
CBS-V-14	Actuator Capability
CBS-V-17	Actuator Capability
CBS-V-2	Dynamically Tested
CBS-V-38	Low DP - Actuator Capability
CBS-V-43	Low DP - Actuator Capability
CBS-V-47	Actuator Capability
CBS-V-49	Actuator Capability
CBS-V-5	Dynamically Tested
CBS-V-51	Actuator Capability
CBS-V-53	Actuator Capability
CBS-V-8	Actuator Capability
CC-V-1092	Dynamically Tested
CC-V-1095	Dynamically Tested
CC-V-1101	Dynamically Tested

TABLE 15
ADEQUACY of VALVE SET UP

VALVE ID	BASIS FOR ACCEPTANCE
CC-V-1109	Dynamically Tested
CC-V-137	Dynamically Tested
CC-V-145	Dynamically Tested
CC-V-266	Based on Dynamic Testing of Similar Valves
CC-V-272	Dynamically Tested
CC-V-395	Actuator Capability
CC-V-428	Actuator Capability
CC-V-438	Actuator Capability
CC-V-439	Actuator Capability
CGC-V-14	Actuator Capability - Flow Under Seat, Low DP
CGC-V-28	Actuator Capability - Flow Under Seat, Low DP
CS-LCV-112B	Actuator Capability - Excessive Margin
CS-LCV-112C	Actuator Capability - Excessive Margin
CS-LCV-112D	Actuator Capability - Excessive Margin
CS-LCV-112E	Actuator Capability - Excessive Margin
CS-V-142	Dynamically Tested
CS-V-143	Dynamically Tested
CS-V-149	Dynamically Tested
CS-V-154	Excessive Margin - Flow is Under Seat
CS-V-158	Excessive Margin - Flow is Under Seat
CS-V-162	Excessive Margin - Flow is Under Seat
CS-V-166	Excessive Margin - Flow is Under Seat
CS-V-167	Excessive Margin
CS-V-168	Excessive Margin
CS-V-196	Dynamically Tested
CS-V-197	Dynamically Tested
CS-V-426	Excessive Margin
CS-V-460	Actuator Capability
CS-V-461	Actuator Capability
CS-V-475	Actuator Capability
FW-FV-4214A	Based on Dynamic Testing of Similar Valve
FW-FV-4214B	Based on Dynamic Testing of Similar Valve
FW-FV-4224A	Dynamically Tested
FW-FV-4224B	Based on Dynamic Testing of Similar Valve
FW-FV-4234A	Based on Dynamic Testing of Similar Valve
FW-FV-4234B	Dynamically Tested
FW-FV-4244A	Based on Dynamic Testing of Similar Valve
FW-FV-4244B	Dynamically Tested
FW-V-156	Based on Dynamic Testing of Similar Valve
FW-V-163	Dynamically Tested
FW-V-346	Dynamically Tested
FW-V-347	Dynamically Tested

TABLE 15
ADEQUACY of VALVE SET UP

VALVE ID	BASIS FOR ACCEPTANCE
MS-V-204	Based on Dynamic Testing of Similar Valve
MS-V-205	Dynamically Tested
MS-V-206	Dynamically Tested
MS-V-207	Based on Dynamic Testing of Similar Valve
MSD-V-44	Dynamically Tested
MSD-V-45	Dynamically Tested
MSD-V-46	Dynamically Tested
MSD-V-47	Based on Dynamic Testing of Similar Valve
RC-V-122	Based on Dynamic Testing of Similar Valve
RC-V-124	Based on Dynamic Testing of Similar Valve
RC-V-22	Actuator Capability
RC-V-23	Actuator Capability
RC-V-323	Dynamically Tested
RC-V-87	Actuator Capability
RC-V-88	Actuator Capability
RH-FCV-610	Dynamically Tested
RH-FCV-611	Dynamically Tested
RH-V-14	Dynamically Tested
RH-V-21	Dynamically Tested
RH-V-22	Dynamically Tested
RH-V-26	Dynamically Tested
RH-V-32	Dynamically Tested
RH-V-35	Based on Dynamic Testing of Similar Valve
RH-V-36	Dynamically Tested
RH-V-70	Dynamically Tested
SI-V-102	Dynamically Tested
SI-V-111	Dynamically Tested
SI-V-112	Dynamically Tested
SI-V-114	Dynamically Tested
SI-V-138	Dynamically Tested
SI-V-139	Based on Dynamic Testing of Similar Valve
SI-V-17	Actuator Capability
SI-V-3	Actuator Capability
SI-V-32	Actuator Capability
SI-V-47	Actuator Capability
SI-V-77	Dynamically Tested
SI-V-89	Dynamically Tested
SI-V-90	Based on Dynamic Testing of Similar Valve
SI-V-93	Dynamically Tested
SW-V-139	Dynamically Tested
SW-V-140	Based on Dynamic Testing of Similar Valve
SW-V-15	Based on Dynamic Testing of Similar Valve

TABLE 15
ADEQUACY of VALVE SET UP

VALVE ID	BASIS FOR ACCEPTANCE
SW-V-17	Based on Dynamic Testing of Similar Valve
SW-V-19	Dynamically Tested
SW-V-2	Dynamically Tested
SW-V-20	Dynamically Tested
SW-V-22	Dynamically Tested
SW-V-23	Dynamically Tested
SW-V-25	Dynamically Tested
SW-V-27	Dynamically Tested
SW-V-29	Dynamically Tested
SW-V-31	Dynamically Tested
SW-V-34	Dynamically Tested
SW-V-4	Dynamically Tested
SW-V-5	Dynamically Tested
SW-V-54	Dynamically Tested
SW-V-56	Dynamically Tested
SW-V-74	Based on Dynamic Testing of Similar Valve
SW-V-76	Based on Dynamic Testing of Similar Valve

15.0 <u>MOV MAINTENANCE</u>

15.1 Routine Maintenance

Routine MOV preventive maintenance is performed in accordance with either a Work Request or a Repetitive Task Sheet. Corrective Maintenance is performed in accordance with a Work Request. Station Procedure ES1850.003 defines the required preventive maintenance activities and PM frequencies for each motor-operated valve. ES1850.003 describes how the following is performed:

- MOV motor overload protection devices are tested and verified and identifies the applicable maintenance procedure for doing same,
- describes the MOV preventive maintenance activities and frequencies,
- specifies the required MOV electrical inspections and identifies the applicable inspection procedure,
- specifies the MOV actuator inspections and identifies the applicable maintenance procedures how corrective maintenance is performed and identifies the applicable procedures

The MOV Program assumes little or no degradation of stem lubricant will occur between maintenance intervals. This is based on an effective preventive maintenance program which includes valve stem cleaning and re-lubrication at regular intervals. To validate the effectiveness of this maintenance attribute, "as-found" MOV diagnostic tests have been performed as a means of monitoring stem lubrication deterioration . As found diagnostic testing indicates that there has been minimal lubrication degradation. Seabrook will continue to monitor the acceptability of MOV stem lubrication.

15.2 Post-Maintenance Testing

Generic Letter 89-10 recommendation (j) requires that Post Maintenance Test Guidelines be established to ensure MOV operability following maintenance. Station Procedure ES1850.003 Figure 10.3 provides guidelines for post maintenance MOV testing activities. Post maintenance testing is performed in accordance with Station Procedure MA 3.5, "Seabrook Station Maintenance Manual (SSMA), Chapter 3, Work Control". Table 16 of this report shows ES1850.003 Figure 10.3. This table identifies whether the performed maintenance is considered routine minor maintenance or is considered major maintenance. Major maintenance that impacts on the ability of an MOV to perform its design-basis function is followed by a new baseline static test in accordance with Generic Letter 89-10 requirements. Procedure MA3.5 identifies the required testing necessary for minor and major maintenance classifications. The MOV Program Manager may revise the testing requirements provided that adequate justification is available to demonstrate the activity does not affect the ability of the MOV to perform it's design basis function. The justification would be documented on the applicable work control document.

TABLE 16
POST MAINTENANCE TEST GUIDELINES

	MAINTENANCE ACTIVITY	MAINTENANCE CATEGORY		EXAMPLE FOLLOW UP REQUIREMENTS
		MINOR	MAJOR	
1	actuator preventive maintenance	X		Per SSMA 3.5, Figure 5.4, Activities 1, 3, 4 and 5.
2	actuator electrical power circuit disconnect/reconnect	X		Per SSMA 3.5, Figure 5.4, Activities 1, 3, 4 and 5.
3	MOV control circuit maintenance	X		Per SSMA 3.5, Figure 5.4, Activities 1, 3, 4 and 5.
4	actuator limit switch relacement or adjustment	X		Per SSMA 3.5, Figure 5.4, Activities 1, 3, 4 and 5. * See Note 1.
5	manual operation of MOV	X		Per SSMA 3.5, Figure 5.4, Activities 1 and 5.
6	valve stem packing adjustment or replacement	X		Per SSMA 3.5, Figure 5.4, activities as applicable plus quantify packing load using motor current or strain measurements. * See Note 2.
7	actuator removal and installation	X		Per SSMA 3.5, Figure 5.4, activities as applicable plus motor current or strain measurement.
8	actuator rebuild		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
9	torque switch replacement		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus verify torque switch set point (diagnostics or *P test).
10	valve disassembly		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
11	stem or stem nut replacement		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
12	actuator spring pack replacement or adjustment		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
13	Limitorque upper housing cover bolt tightening or gasket replacement		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
14	loosening or tightening Limitorque size 000 torque switch terminal connectors		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus verify torque switch set point (diagnostics or *P test).

TABLE 16
POST MAINTENANCE TEST GUIDELINES

	MAINTENANCE ACTIVITY	MAINTENANCE CATEGORY		EXAMPLE FOLLOW UP REQUIREMENTS
		MINOR	MAJOR	
15	replacement of gaskets and seals	X		Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
16	miscellaneous replacement and adjustment (handwheel, tripper fingers, engagement lever, etc.)	X		Per SSMA 3.5, Figure 5.4, activities as applicable.
17	motor replacement (Rotork)		X	Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic base line test.
18	motor replacement (Limitorque)	X		Per SSMA 3.5, Figure 5.4, activities as applicable plus new diagnostic baseline test.
19	adjustment gear box stops	X		Per SSMA 3.5, Figure 5.4, activities as applicable plus new electrical trending baseline.

NOTE 1: For MOVs which utilize limit switch settings for the control of valve closure, diagnostic verification of the seating thrust or torque shall be performed, after limit switch replacements or adjustments, which affect valve closure, are made.

NOTE 2: Post maintenance testing after valve packing adjustments should verify valve stem thrust or torque whenever practical. If these measurements can not be acquired (example: technical specification limitations, seismic or EQ concerns) then motor current diagnostics should be acquired at the MCC.

16.0 <u>MOV TRAINING</u>

Seabrook Station provides training to its employees in order to develop in-house expertise in the area of MOV Maintenance and Testing. Training for MOV technicians is delivered in steps, with each step building on the previous ones. From initial training on preventive maintenance of operators and their controllers, the training program continues on through overhauls of several types of valve operators, culminating in diagnostics and analysis. A fully trained MOV tech will have received over two hundred hours of initial training. In addition to the initial programs, technicians are regularly scheduled for practice sessions, refresher training, and events update training, in order to keep their knowledge and skills current.

The following lesson plans are part of the MOV training program:

Initial Training consists of:

EL4101I	Limitorque PM
EL4102I	Overhaul of Limitorque SMB 000
EL4103I	Overhaul of Limitorque SB 00
EL4104I	Overhaul of Limitorque SMB 0-4
EL4105I	Maintenance of HBC Units
EL4106I	Rotork Inspection & PM
EL4107I	Rotork Overhaul
EL2200I	EIM Operators
EL4320I	Strain Gauge Installation
EL4310I	Introduction to INSTEAD MOV Testing
EL4311I	Data Acquisition Using INSTEAD
EL4312I	MOV Diagnostic Analysis
EL4315I	Rotork MOV Testing

Nine Job Performance Measures are used to evaluate trainees skill levels on these initial training topics.

Continuing Training (in addition to quarterly Industry Events training) consists of:

EL4941C	MOV Refresher Training
EL4312C	INSTEAD Signature Analysis

Information sources used to enhance and update both initial and continuing training lesson plans include, but are not limited to the following:

Feedback from technicians, supervisors, and Technical Support personnel
NRC Generic Letters, I.E. Notices, Bulletins, etc
INPO notices and reports
EPRI guidelines
Vendor notices, maintenance updates, Part 21 notifications
Industry events and experiences, as applicable

17.0 **PERIODIC VERIFICATION**

Recommendation (j) of Generic Letter 89-10 requires that a program be established to verify that correct switch settings as well as other tests or surveillances that are used to identify potential MOV degradations or misadjustments should be implemented after maintenance or packing adjustment of each MOV and periodically thereafter. The surveillance interval should be based on the licensee's evaluation of the safety importance of each MOV as well as the maintenance and performance history. The surveillance interval should not exceed 5 years or three refueling outages, whichever is longer unless a longer interval can be justified.

Seabrook has performed periodic verification testing of the safety-related MOVs on a three refueling cycle frequency. However, Seabrook plans to modify the periodic verification frequency using a deterministic approach factoring in specific valve setup or valve operating parameters and including the results of the PRA analysis of the valve's safety significance, as discussed in Section 6 of this report. NAESCO Procedure ES1850.003 describes the criteria that will be used to determine the new periodic testing frequency of each valve. The Post Maintenance testing requirements recommended in Item j are discussed in the above section on Post Maintenance Testing, (Section 15.2).

Diagnostic testing frequencies are currently scheduled to be performed on a three refueling cycle frequency as specified in the work control database. This is consistent with the recommendations of the NRC Generic Letter 89-10. As provided by recommendation (j) of the generic letter, "The surveillance interval should not exceed five years or three refueling outages, whichever is longer, unless a longer interval can be justified (see item h.) for any particular MOV." It is anticipated that the periodic diagnostic testing surveillance frequencies will change as the results of the baseline diagnostic test program are realized. Changes which extend existing test frequencies will be done on a case basis which will be documented and approved by the MOV System Engineer prior to extending the frequency. Evaluations for the frequency extensions will utilize a deterministic methodology which includes the following considerations:

- The revised SSPSA performed by Reference 2.69 of ES1850.003, "Engineering Evaluation 93-44, Evaluation of the Seabrook Station Response to Generic Letter 89-10".
- Frequency requirements of the station equipment qualification program.
- Recommendations made by the results of the MOV design basis review process.
- Station operating experience.
- Industry guidelines.
- Changes in NRC requirements.
- ALARA considerations.

NAESCO is evaluating the need to perform periodic dynamic verifications on its MOV's. Industry and NRC guidence is insufficient, at this time, for NAESCO to make a firm committment regarding this issue. While NAESCO realizes that specific situations will require that a Post Maintenance Dynamic Test be performed, NAESCO is concerned that the long term effects of scheduled, repeated Dynamic Testing have not been sufficiently explored in the industry. NAESCO plans to evaluate industry data and will reassess its position on this issue after the NRC guidance on periodic verification is available.

Changes which decrease the diagnostic testing surveillance interval can be made whenever the MOV system engineer determines that it is necessary. A recent example where this was done was Service Water System valve SW-V-54. In 1993, this MOV had high running loads which were eventually tied to packing follower corrosion and dimensional tolerances affecting clearances between the follower, the valve shaft and packing gland. When the problem was first discovered, the surveillance interval was decreased to quarterly to monitor the running load trend. The quarterly frequency was continued with successful results until the third refueling outage when a new design packing follower was installed.

18.0 **TRENDING**

Generic Letter 89-10, recommendation (h) requires that each MOV failure and corrective action taken including repair, alteration, analysis, test and surveillance should be analyzed or justified and documented. The documentation should include the results and history of each as found deteriorated condition, malfunction, test, inspection, analysis, repair or alteration. The Seabrook trending program is described in Station Procedure ES1850.003.

18.1 MOV Failure Analysis Trending

MOV failures which result in declaring the component inoperable are evaluated and documented in accordance with the Station Operating Experience Manual (SSOE). The provisions of Procedure OE 4.2 documentation contains the following information associated with the failure:

- As found deteriorated condition.
- Cause and Failure Analysis of the failure
- Repair and/or modifications performed
- Retest performed to demonstrate restored operability

Failures are trended on an annual basis by the System Support Department and the results are published in the MOV annual performance report.

Minor degradations which have no impact on MOV operability are documented in accordance with the Seabrook Station Maintenance Manual (SSMA) Work Control Program. These degradations are reviewed by the system engineers during the close out process of completed SSMA 3.1 Work Requests. Significant trends are reported in the system annual performance reports.

18.2 MOV Performance Trending

MOV performance trending is performed in accordance with Station Procedure ES1850.003. Performance trending is based on MOV diagnostic testing. Both static and dynamic testing may be utilized to ascertain and trend MOV performance. For example MOV trending was used to evaluate the degradation associated with SW-V54. As discussed above, MOV Performance Trending found that the root cause of the failure of SW-V54 to stroke was found to be corrosion product buildup between the valve shaft and the gland follower. A contributing secondary cause was found to be excessive packing gland loading during installation. As a result of this adverse trend, DRR 93-086 was issued which replaced the ductile iron packing followers for the service water butterfly valves with stainless steel followers. The gland followers on all safety related service water butterfly valves were replaced during OR03. Follow-up testing was conducted on SW-V54, during fuel cycle four. The test results confirmed that this action adequately addressed the root cause.

19.0 LIMITORQUE 10CFR PART 21, "HIGH TEMPERATURE EFFECTS ON AC MOTORS"

Limitorque identified a potential 10 CFR Part 21 condition related to high ambient temperature effects on the AC motor output torque capability. The Limitorque potential Part 21 condition was evaluated and it was concluded that all safety-related Limitorque motor-operators are sized adequately so that each safety related MOV can perform its required function under derated motor torque conditions as a result of high ambient environmental temperatures. Station Information Report 93-046 documents the evaluation of this 10 CFR Part 21 Condition.

20.0 PRESSURE LOCKING AND THERMAL BINDING

Supplement 6 to Generic Letter 89-10 provided information on the consideration of pressure locking and thermal binding of safety related motor-operated gate valves. Seabrook had performed previous evaluations for pressure locking and thermal binding of gate valves. ISEG Memo 8801-004, "Pressure Locking and Thermal Binding of Gate Valves" was performed to address INPO SOER 84-7. Additionally, Engineering Evaluation 93-33, "Thermal Binding and Pressure Locking of Safety Related Gate Valves" was prepared to address NRC I.E. Notice 92-26, "Pressure Locking of Motor Operated Flexible Wedge Gate Valves". Subsequently, Seabrook re-evaluated the conclusions reached in Engineering Evaluation 93-33. This re-evaluation was documented in Engineering Evaluation 95-07, "Pressure Locking and Thermal Binding of Gate Valves". The reevaluation was warranted based on questions regarding the potential for liquid entrapment pressure locking that have been raised at other plants. This engineering evaluation documents the screening evaluation and operability determination requirements for NRC Generic Letter 95-07, Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves.

The safety-related motor operated gate valves in the NRC Generic Letter 89-10 program were reviewed to determine their susceptibility to pressure locking and/or thermal binding. The results of the evaluation was that 10 motor-operated gate valves were determined to be potentially susceptible to pressure locking. The basis for operability for the 10 potentially susceptible valves was determined in Engineering Evaluation 95-07 Revision 1 and the conclusions are included in ACR-95-34. Design changes were prepared and implemented in OR04 to eliminate the potential for pressure locking of the 10 valves. The following changes were implemented:

- DCR 95-023, modified the packing configuration and rerouted the packing leakoff connection to the RCS side of the valves. The following valves were modified:
  - RC-V22/V23/V87/V88 : RHR Hot Leg Suction Isolation Valves
  - RH-V32/V70: Low Head Hot Leg Recirculation Valves
  - SI-V77/V102: Intermediate Head Hot Leg Recirculation Valves
- MMOD 95-509 modified the Containment Sump Isolation Valves, CBS-V8/V14 by adding a bypass from the between seat drain valve and the upstream piping (containment sump side).

21.0 INDUSTRY INFORMATION

NRC information notices, industry technical and maintenance updates, and 10 CFR Part 21 notices are entered into the Seabrook Station commitment tracking program. The information is assigned to a cognizant engineer for review and evaluation to determine if the information is applicable to Seabrook. The assignments, due dates, required response, and resultant action can be reviewed by any individual with access to a computer.

22.0 PROGRAM SCHEDULE

Generic Letter 89-10 Recommendation (i) provided information for the generic letter schedule. Recommendation (i) specified that all design basis reviews, analyses, verifications, tests and inspections that have been implemented should be completed within 5 years or three refueling outages whichever is later. Seabrook committed to the generic letter recommendations in NYN-90003 and committed to the initial periodic verification testing frequency in the Phase 1 MOV Inspection. Seabrook was working on a schedule to complete the generic letter at the end of OR03. Seabrook's schedule was predicated on the MOV dynamic testing grouping that was submitted to the NRC in the Spring of 1992. As a result of the NRC MOV Inspection 94-11 performed in May 1994, discrepancies between the Seabrook grouping methodology and NRC Supplement 6 were identified. to resolve the discrepancy Seabrook committed to meeting the NRC grouping methodology presented in Supplement 6 and to complete the recommendations of the generic letter by the end of OR04. This commitment was made in NAESCO Memo NYN-94106. Seabrook's fourth refueling outage ended on December 11, 1995. By the end of OR04, Seabrook had completed the required additional dynamic testing to meet Supplement 6 recommendations and completed the periodic testing of approximately one-third of the Generic Letter MOV scope.

23.0 NRC MOV INSPECTIONS/MOV SELF ASSESSMENT AUDIT

23.1 NRC MOV Inspections

The USNRC performed a team inspection of the Seabrook Motor-Operated Valve Program on December 2 through December 6, 1991. The inspection reviewed Seabrook programs that were developed in response to NRC Generic Letter 89-10. USNRC Inspection Report 50-443/91-81 documents the results of this Inspection. Seabrook responded to the NRC requests for additional information made in the inspection in the following letters:

- NYN-92024 provided additional information on MOV Grouping, Group Selection, and Exclusion Criteria for Differential Pressure Testing.
- NYN-92058 provided additional information related to switch setpoint error analysis and stem friction coefficients.

The NRC performed a second team inspection of the Seabrook Motor-Operated Valve Program on May 23 through May 27, 1994 during Seabrook's third refueling outage. USNRC Inspection Report 94-11 documents the results of this inspection. This inspection identified that approximately 15 of the 25 items identified in the first inspection were satisfactorily resolved. This inspection identified the differences in the Seabrook grouping methodology and the Supplement 6 grouping criteria. Seabrook has since committed to Supplement 6 criteria in NYN-94106. A listing of the items that were not resolved is presented in Attachment 1 to this report.

23.2 MOV Self Assessment

An internal self assessment of Seabrook's MOV Program was conducted between June 12 through June 16, 1995. The team was composed of NAESCO, Yankee Atomic, Vermont Yankee personnel and a Contractor from Vectra Technologies. The MOV Self Assessment Report documents the results of the assessment. Ten recommendations for program enhancements were made as a result of this self assessment. The recommendations made in the self assessment have been reviewed and are being implemented as appropriate.

REFERENCES

1) USNRC Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance" dated June 28, 1989.

2) USNRC Supplement 1 to Generic Letter 89-10: "Results of the Public Workshops", dated June 13, 1990.

3) USNRC Supplement 2 to Generic Letter 89-10: "Availability of Program Descriptions", dated August 3, 1990.

4) USNRC Supplement 3 to Generic Letter 89-10, "Consideration of the Results of NRC-Sponsored Tests of Motor-Operated Valves", dated October 25, 1990.

5) USNRC Supplement 4 to Generic Letter 89-10, "Consideration of Valve Mispositioning in Boiling Water Reactors," dated February 12, 1992.

6) USNRC Supplement 5 to Generic Letter 89- 10, "Inaccuracy of Motor-Operated Valve Diagnostic Equipment," dated June 28, 1993.

7) Supplement 6 to Generic Letter 89-10, "Information on Schedule and Grouping, and Staff Responses to Additional Public Questions", dated March 8, 1994.

8) NHY Memo SS# 49944, M. E. Kenney to Distribution, "NRC Generic Letter 89-10, Valve Diagnostic Test Program Meeting Minutes for September 1, 1989".

9) NHY Letter NYN-90003 to USNRC, "Response to Generic Letter 89-10", dated January 2, 1990.

10) Yankee Atomic Memo, SA-90-79, from J. F. Bretti/P. J. O'Regan to P. E. Brown, "MOV Prioritization to Support Generic Letter 89-10 Response", dated May 10, 1990.

11) USNRC I. E. Bulletin 85-03, "Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings", dated November 15, 1985.

12) USNRC letter Docket 50-443, E. J. Leeds to E. A. Brown, "Response to Generic Letter 89-10, Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance" (TAC NO. 75715) dated August 10, 1990.

13) NHY Letter NYN-92024 to NRC, ""Motor-Operated Valve Grouping, Selection and Exclusion Criteria for Differential Pressure Testing" dated March 2, 1992.

14) USNRC Inspection Report 50-443/91-81, "Motor-Operated Valve Inspection at Seabrook Station Inspection Report", January 29, 1992.

15) NRC Inspection Manual Temporary Instruction 2515/109

16) J. E. Richardson to NRC Regional Directors memo, "Guidance for Inspections of Programs in Response to Generic Letter 89-10," April 30, 1993.

17) NHY Letter NYN-92058, to NRC, "Response to a Request for Additional Information", April 30, 1992.

18) NRC Inspection Manual Temporary Instruction 2515/109

19) NRC Information Notice 93-88, "Status of Motor-Operated Valve Performance Prediction Program by the Electric Power Research Institute," November 30, 1993.

20) DCR 86-403.

21) DCR 87-071.

22) MMOD 89-517.

23) DCR 89-024.

24) MMOD 91-569.

25) MMOD 92-521.

26) DCR 93-029.

27) DRR 93-086.

28) MMOD 94-561.

29) Technical Support Group Calculation No 92-CALC-0003.

30) NAESCO Letter NYN-93139 to NRC, Response to Generic Letter 89-10, Supplement 5 dated October 15,1993.

31) Engineering Evaluation 93-44, "SSPSA Evaluation of Seabrook's Response to Generic Letter 89-10."

32) Calc 9763-3-ED-00-28-F, "Motor Control Circuit Protection Calculation."

33) Calc No. 9763-3-ED-00-02-F, "Voltage Regulation Study".

34) NHY Report on Service Water System Motor-Operated Valves.

35) Station Procedure ES1850.003, "Motor-Operated Valve Performance Monitoring".

36) NHY Drawing 250000, "Data Sheets for Motor and Air Operated Valves and Dampers".

37) NAESCO Letter NYN-94106 to NRC, "Motor-Operated Valve Testing During Cycle 4 and ORO4".

38) Engineering Evaluation 95-07, "Pressure Locking and Thermal Binding".

39) Station Procedure MA3.5, "Seabrook Station Maintenance Manual"

40) Station Information Report 93-046.

41) DCR 95-023

42) MMOD 95-509

43) I. E. Notice 92-26, "Pressure Locking of Motor-Operated Flexible Wedge Gate Valves"

44) Engineering Evaluation 93-33, "Thermal Binding and Pressure Locking of Safety Related Gate Valves".

45) INPO SOER 84-7, "Pressure Locking and Thermal Binding of Gate Valves".

46) ACR 95-034.

47) USNRC Inspection Report 94-11

48) Assessment of the North Atlantic NRC GL 89-10 MOV Program Assessment Report.

49) EPRI MOV Performance Prediction Program, "Performance Prediction Methodology Implementation Guide," November 1994.

50) EPRI Letter, "EPRI MOV PPP Update of Results and Specifications and Drawings for Flow Loop Test Valves," December 14, 1993.

51) Brian W. Sheron to NRC Regional Directors memo, "Guidance on Closure of Staff Review of Generic Letter 89-10 Programs," July 12, 1994.

52) Engineering Evaluation 91-07, "Motor-Operated Valve Design Basis Review" (ORO1 Generic Letter Valves)

53) Engineering Evaluation 92-41, "Refueling Outage 02 Motor-Operated Valve Design Basis Review"

54) Engineering Evaluation 94-26, "Motor-Operated Valve Design Basis Review for RFO3 Valves"

55) Calculation SBC-428, "Maximum Differential Pressure Calc for Motor-Operated Valves" (ORO1 Valves)

56) Calculation SBC-432, "Motor-Operated Valve Thrust Calculation" (ORO1 Valves)

57) Calculation SBC-472, "RFO1 MOV Equivalent Valve Factor and Thrust Margin Calc"

58) Calculation SBC-477, "Refueling Outage 1 MOV Min/Max Torque Switch Settings"

59) Calculation SBC-499, "Maximum Differential Pressure Calculation for Motor-Operated Valves for Refueling Outage 02"

60) Calculation SBC-500, "Maximum MOV Differential Pressure"

61) Calculation SBC-501, "Motor-Operated Valve Thrust Calc - RF02 Valves"

62) Calculation SBC-511, "Refueling Outage 2 MOV Min/Max Torque Switch Settings"

63) Calculation SBC-542, "Equivalent Valve Factor for Refueling Outage 02 Motor-Operated Valves"

64) Calculation SBC-590, "Maximum Differential Pressure Calculation for Motor-Operated Valves for Refueling Outage 03"

65) Calculation SBC-610, "Motor-Operated Valve Thrust Calc -RF03 Valves"

66) Calculation SBC-611, "RF03 Motor-Operated Valve Min/Max Torque Switch Settings"

ATTACHMENT 1

INSPECTION REPORT OPEN ITEMS

USNRC MOV Inspection Report 94-11 identified the items from the Phase 1 Inspection Report that have been closed and are left unresolved. Additionally an open item for pressure locking and thermal binding has been added as a result of the 1994 MOV Inspection. A listing of the unresolved/open items to the NRC Inspection Report 94-11 with a NAESCO response to each item follows:

Item:	Continue seismic analysis of GL 89-10 MOVs
Response:	This item was completed following a review of Westinghouse calculations in Monroeville during September 1994.
Item:	Validate the assumed friction coefficients using the design basis test results and justify use of 0.15 as the assumed friction coefficient.
Response:	Refer to section 8.5 "Coefficient of Friction Based on Test Data".
Item:	Ensure that the design basis test results are applied to MOVs that cannot be tested at the design basis differential pressure or flow conditions.
Response:	See section 14.0 "Demonstrate Adequacy of Valve Set Up".
Item:	Identify the commitment regarding full differential pressure testing.
Response:	Refer to NAESCO Letter NYN-94-106 and section 13.0 "Diagnostic Testing to Verify Design Basis Capability" of this report.
Item:	Develop clear guidance and acceptance criteria for evaluating MOV capability using diagnostic data to ensure operability under all conditions including degraded voltage.
Response:	The applicable dynamic testing procedures have incorporated well defined acceptance criteria to address this concern. See the discussion in Section 13.0, "Diagnostic Testing to Verify Design Basis Capability" for a description on how Seabrook performs dynamic testing extrapolation.
Item:	Review the priority 2 and 3 MOVs to justify frequency of periodic verification testing.
Response:	As discussed above, Seabrook plans to extend the periodic testing frequencies. See the section 17.0 "Periodic Verification" and 6.2, "1993 SSPSA Evaluation of Seabrook Response to Generic Letter 89-10".
Item:	Revise the MOV Program and periodic justification for extension of the preventive maintenance and Inspection period beyond vendor recommendations.
Response:	This requirement has been documented in ES1850.003.
Item:	Revise the procedure for adjustment of Rotork operators and the training module as appropriate to caution against inadvertently changing limit switch setpoints.
Response:	Station Procedure LS0569.27, "Inspection/PM of Rotork Valve Actuators" and the training module, "Rotork MOV Testing", have been revised to address this concern.
Item:	Review and Resolve Concerns Identified in Limitorque Maintenance Updates 88-2 and 90-1.

INSPECTION REPORT OPEN ITEMS

Response: This item is documented in Technical Support Engineering Evaluation 94 TSEV 0003. Report which addresses these items has been issued.

Item: Review Maintenance and Operation Procedures to ensure adequate control for switch positioning to preclude short stroking.

Response: This item has been completed and the appropriate Operations and Maintenance Procedures or OPS Instructions been revised to address this concern.

Item: Pressure Locking and Thermal Binding

Response: Engineering Evaluation 95-07 documents the Seabrook Station evaluation for Pressure Locking and Thermal Binding. DCR 95-023 and MMOD 95-509 modified the Generic Letter 89-10 valves that were identified to be potentially susceptible to pressure locking.

January ~~11~~ 15, 1996

NYN-

GENERIC LETTER 89-10, DESIGN BASIS CLOSURE REPORT

w/o	Cuoco, L.	NU Main, E200
	Garfield, G.	DB&H
	Kacich, R. M.	MP Bldg. 475, 5th Floor
	Executive Offices	cc:Mail
	Licensing Offices	cc:Mail
w/	File 0001	01-48
	RMD	02-06