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IPN-94-060

U.S. Nuclear Regulatory Commission
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SUBJECT: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
Motor Operated Valve Program Status

Dear Sir:

This letter provides information (Attachment 1) on the status of the Indian Point 3 motor operated valve (MOV) program. During a teleconference held on April 20, 1994, staff of the New York Power Authority and NRC discussed open items from NRC Inspection Report 92-80 and other issues related to the status of the MOV program at Indian Point 3. During that teleconference the Authority committed to submit the following information:

(1) a program plan summarizing MOV testing planned to be completed prior to restart from the current outage,

(2) revised position statements with regards to "valve mispositioning" and "practicable and meaningful" differential pressure testing,

(3) an update of the open items contained in NRC Inspection Report 92-80,

(4) a description of the decision logic to be used to prioritize differential pressure testing of MOVs which are not scheduled to be tested prior to restart, and

(5) a schedule for full program implementation.

As mentioned during the April 20 teleconference, it is the Authority's goal to complete the analyses and testing recommended in Supplement 6 to Generic Letter 89-10 prior to restart. In the event that differential pressure testing of

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specific MOVs is not practicable during the current plant outage because the plant is not physically in a refueling configuration, the Authority will update this submittal to advise the NRC staff. The commitment made by the Authority in this letter is identified in the attached listing. Specific descriptions of the program to address Generic Letter 89-10 are considered part of the commitment to meet the generic letter and are not identified as commitments.

If you have any questions regarding this submittal, please contact Mr. K. Vehstedt at (914) 736-8993.

Very truly yours,

FOR
L. M. Hill
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Indian Point 3 Nuclear Power Plant

LMH/vjm

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List of Commitments

Number	Commitment	Due
IPN-94-060-01	It is the Authority's goal to complete the analyses and testing recommended in Supplement 6 to Generic Letter 89-10 prior to restart. The Authority plans to have all of the valves in the program set up to the best available data and statically tested. The Authority is utilizing the IP3 Individual Plant Examination (IPE), which is currently undergoing internal review, to categorize the relative risk significance of individual MOVs. Prior to restart the Authority will have dP tested those valves characterized as being of "high" or "medium" relative risk significance, where practicable and meaningful. The results of previous static and dP tests are presently being evaluated to ascertain if additional field testing is warranted prior to restart. In the event that differential pressure testing of specific MOVs is not practicable during the current plant outage because the plant is not physically in a refueling configuration, the Authority will update this submittal to advise the NRC staff.	Prior To Restart

Status of the Indian Point 3 Motor Operated Valve (Generic Letter 89-10) Program

Introduction

A teleconference was held on April 20, 1994 between staff members of the New York Power Authority and the NRC to discuss various aspects of the Indian Point 3 (IP3) Generic Letter 89-10 motor operated valve (MOV) program. During that teleconference, the Authority agreed to submit the following information:

(1) a program plan summarizing MOV testing to be completed prior to restart from the current outage,

(2) revised position statements with regards to "mispositioning" scenarios and "practicable and meaningful" differential pressure testing,

(3) an update of the open items contained in NRC Inspection Report 92-80,

(4) a description of the decision logic to be used to prioritize differential pressure testing of MOVs which are not scheduled to be tested prior to restart, and

(5) a schedule for full program implementation.

This document discusses each of these five subject areas in detail.

1. Program Plan to Support Restart

1.1 Background

As currently defined, there are eighty-nine (89) valves within the scope of the IP3 Generic Letter 89-10 program. Prior to the current outage, sixty (60) MOVs had been statically tested and twenty-nine (29) differential pressure (dP) tested. The Authority's schedule called for achievement of full program implementation prior to restart from the next regularly scheduled refueling outage.

1.2 Program Scope for the Current Outage

The Authority plans to have all of the valves in the program set up to the best available data and statically tested prior to restart. The Authority is utilizing the IP3 Individual Plant Examination (IPE), which is currently undergoing internal review, to categorize the relative risk significance of individual MOVs. Prior to restart the Authority will have dP tested those valves characterized as "high" or "medium" relative risk significance, where practicable and meaningful. The results of previous static and dP tests are presently being evaluated to ascertain if additional field testing of those MOVs is

warranted prior to restart.
The Authority will provide the detailed information specified in Supplement 6 to Generic Letter 89-10 after the outage has been completed. Completed packages for each valve will be available for inspection when testing is completed.

1.3 Use of the Individual Plant Examination

As of May 5, 1994, a total of nineteen (19) MOVs have been characterized as "high" or "medium" relative risk significance. Of that population, eleven (11) are characterized as "medium" and eight (8) as "high" relative risk significance. Table 1 contains a list of the "IPE" valves and includes the function, normal and accident position(s), and relative risk ranking of each valve.

The ranking method used was the Risk Achievement Worth (RAW) importance measure. The RAW importance measure is based upon the core damage or radiological release frequency which would result if the particular MOV had a failure probability of unity, i.e., guaranteed failure. RAW is expressed as a multiple of the baseline core damage frequency and, by definition, must be greater than or equal to unity. Utilizing the RAW importance measure, MOVs within the scope of the Generic Letter 89-10 program scope were placed into one of the three following categories:

Category	Criterion	Comments
High	RAW$\geq$ 1.5	Equivalent to a 50% or greater increase in the baseline frequency
Medium	1.05 $\leq$RAW$<$ 1.5	Equivalent to a 5% to 50% increase in the baseline frequency
Low	RAW$<$1.05	Equivalent to less than a 5% increase in the baseline frequency

In assigning a relative risk significance category to an MOV, consideration was given to the possibility of common cause failure modes. Individual MOVs received the same ranking as the common cause group of valves of which they are a part. This follows recommendations in Section 6.2 of NUMARC Report 93-05, which states, "...if the assessment of common cause events resulted in a group of MOVs having a significant impact on CDF [core damage frequency], then those MOVs should be added to the high priority category as well."

The IPE system models consider multiple MOV failure modes and, for some valves, more than one failure position. The ranking analyses discussed above consider only demand failures, i.e., "failure to open" and "failure to close". The relative ranking methodology also addressed deterministic considerations as recommended in

Supplement 6 to Generic Letter 89-10.

In addition to probabilistic importance measures, deterministic methods were also employed in the ranking methodology as recommended in Supplement 6 to Generic Letter 89-10. The considerations as to how a particular MOV is ranked from a deterministic perspective are summarized in the following "screening" questions:

(1) Is the MOV part of a system or train that is redundant to another system or train which does not contain any MOVs? If the answer is "yes", a lower ranking might be justified.

(2) Is the MOV normally in position to perform its required function? If the answer is "yes", i.e., the MOV is not required to change state in order to perform its intended safety function, the MOV was given a "low" relative risk significance ranking.

(3) Is the MOV important for scenarios that are not explicitly modeled in the IPE, i.e., external events and shutdown modes of operation? If the answer is "yes", the MOV was placed into a higher relative risk significance category - unless the answer to either question #1 or #2 above was "yes".

One additional deterministic consideration which could have been used to justify a lower risk significance category concerns the past performance history of the MOV. If past performance has shown an MOV to be reliable and the valve is tested under design bases conditions, a lower risk significance ranking would be justified. No attempt was made to utilize this screening criterion for purposes of prioritizing Generic Letter 89-10 testing.

2. **<u>Revised Position Statements Regarding "Practicable", "Meaningful" and "Mispositioning" Scenarios</u>**

Switch settings and allowable thrust windows for MOVs within the scope of the Generic Letter 89-10 program are based on conservative design basis calculations which consider the following factors:

* a stem coefficient of 0.2

* a valve factor of 0.5 for gate valves (other than non-leak sensitive valves which will be set up based on a valve factor of 0.45) or the valve factor derived from dP testing and in all cases based on the mean seat contact diameter (including consideration of appropriate area subjected to differential pressure, i.e., seat based or guide based)

* a valve factor of 1.1 for globe valves

* degraded voltage conditions

* potential elevated ambient temperature conditions including consideration of motor heating during prior postulated operation

* diagnostic equipment accuracy

In combining the above factors into the design bases calculations, and ultimately in switch settings, significant margin has been/will be available to ensure reliable MOV performance under various operating scenarios.

2.1 Position Statement Concerning "Practicable" and the Extrapolation of Test Data to the Design Basis Condition

MOVs which can not be tested under design bases differential pressure and flow conditions, will be tested under the maximum achievable conditions to provide the best available MOV test data. Guideline criteria are currently under development and internal review and will be used to determine the acceptability of extrapolation of test results to the design condition.

2.2 Position Statements Concerning "Meaningful" Scenarios

Low Differential Pressure Applications

If the calculated thrust associated with differential pressure is less than 10% of the total calculated required thrust, then the dP component of the thrust is less than the accuracy of the diagnostic test equipment. It is unlikely the response of the valve to differential pressure would be detectable. For such valves, the static test fully characterizes the response of the MOV and is effectively defined as the differential pressure test. Such valves are characterized as having been fully dP tested upon completion of their static tests (i.e., the static test is the dP test).

Differential Pressure Test Limitations

If the maximum differential pressure achievable during testing is small relative to the design differential pressure, then it might not be possible to extrapolate the test results. In such instances, the affected MOVs will be set up and statically tested based on the EPRI methodology or later industry information determined to be better.

MOVs With 100% Margin to the Design Basis Condition

If the ratio of the as-left thrust (following static testing) to the minimum required stem thrust under design basis conditions is greater than or equal to 2.0 (100% margin), then the MOV has sufficient margin to accommodate potential uncertainties in performance characteristics related to rate-of-loading or data extrapolation. While the static test does not characterize MOV performance under design basis conditions, the valve is justified based on an extrapolation from zero psid and the large available margin.

2.3 Position Statement Concerning Valve Mispositioning

The original scope of the IP3 Generic Letter 89-10 test program included the consideration of mispositioning scenarios in the determination of the differential pressure for each MOV. It is the Authority's understanding the NRC staff is developing a supplement to Generic Letter 89-10 to remove the mispositioning requirement for PWRs, as has previously been done for BWRs via Supplement 4 to the GL 89-10. Therefore, the Authority will not be considering mispositioning scenarios in the field settings and associated calculations for MOVs within the scope of our program.

3. Update of the "Open Items" Associated With NRC Inspection Report 92-80

NRC Inspection Report 92-80 documents the results of the Phase 1 review of the IP3 Generic Letter 89-10 program. Table 1 of that report contains a list of licensee plans and commitments for continued MOV program improvement. An updated status of each of the listed items follows. Note that the titles of the items listed in the inspection report are used to provide this status.

3.1 Design Basis Reviews

Switch settings for MOVs within the scope of the GL 89-10 program are based on detailed analyses which consider/reflect:

* the effects of elevated ambient temperature on motor performance
* revised electrical (degraded voltage) calculations

Flow and temperature evaluations are currently undergoing internal review and will be incorporated into the final design basis calculation packages. Design fluid temperature information was used in the MOV weak-link analyses and the design maximum ambient temperature, as derived from equipment qualification profiles, was utilized for quantification of motor starting torque derate. A test guideline document is being developed which includes discussion of "target" flow and differential pressure conditions to be established for test purposes. The appropriate target values will be incorporated into the valve/system specific test procedures. A formal methodology is being developed for the evaluation of test information for cases where the test conditions differ from the design basis conditions.

3.2 MOV Switch Settings and Set Point Control

The Authority is currently developing a series of position papers related to the GL 89-10 program. Those papers are based on EPRI guidelines and available industry data. Topics which are being addressed in those papers include: torque related issues such as valve factor assumptions in design basis calculations, validation of design calculation assumptions through comparison with field test results, stem friction coefficient assumptions, and rate-of-loading considerations.

The revised design basis MOV capability calculations being used during the current outage are generally based on a valve factor value of 0.5 (for gate valves). MOV switch settings, including thermal overload sizing, will be controlled in accordance with existing modification control procedure MCM-8.

Sizing equations for the Crane Teledyne actuators for the main boiler feedpump discharge isolation valves have been completed.

It is the Authority's position that torque switch limiter plates are not safety-related devices and hence their presence or absence has no bearing on MOV capability to perform their intended safety functions. However, the Authority believes it would be prudent to have the limiter plates installed and will verify the installation of the limiter plates or install new limiter plates, post-startup, as part of regularly scheduled actuator preventive maintenance activities.

3.3 <u>Motor-Operated Valve Testing</u>

Position papers related to flow and temperature conditions, test results evaluation, and data extrapolation will address the five concerns detailed in the inspection report. Note the Authority has evaluated the potential use of multi-point testing in an effort to enhance extrapolation techniques and, based on the results of the EPRI flow loop testing, determined such testing is not warranted.

3.4 <u>MOV Maintenance, Modifications, and Post Maintenance Testing</u>

A post-work test matrix was developed in November 1993 and is presently being used to determine testing requirements during the present outage. In addition, a corporate level position paper is being developed to define "standard" post-work testing requirements for MOVs within the scope of our Generic Letter 89-10 program.

3.5 <u>Periodic Verification of MOV Capability</u>

A maintenance procedure has been developed to adjust/set the limit switches for the safety injection system butterfly valves, SI-HCV-638 and SI-HCV-640.

3.6 <u>MOV Failures, Corrective Actions, and Trending</u>

A computer database dedicated to MOVs has not been developed as yet. The

Authority is pursuing both the purchase of existing commercial software and the internal development of a program for those purposes. A decision as to which database would be of the most benefit will be made prior to restart.

3.7 Motor-Operator Valve Training

Diagnostic testing is being performed during the current outage by trained, qualified personnel from ITT MOVATS. The Authority is considering the potential benefits of using in-house personnel to perform such testing subsequent to restart. Should it be determined that use of in-house personnel is preferable, the Authority will develop "qualification cards" for Authority personnel involved in data collection or data (trace) evaluation activities.

3.8 Schedule

All actions necessary to follow the guidance of Generic Letter 89-10 will be completed prior to startup from the next regularly scheduled refueling outage.

4. Decision Logic to Prioritize Differential Pressure Testing of MOVs which are not Scheduled to be Tested Prior to Restart

Testing of MOVs which have not previously been dP tested are not scheduled to be dP tested during the current outage, and for which dP testing is both practicable and meaningful, will be prioritized based on the following logic:

(1) Every effort will be made to dP test MOVs which can be tested during system configurations developed to support dP testing of valves within the restart scope of work.

(2) MOVs which are physically inaccessible during power operation will be given priority over valves which can be tested with the unit on line.

(3) Every effort will be made to perform dP testing of MOVs in conjunction with scheduled ASME Section XI testing.

(4) Diagnostic MOV testing will be coordinated with the thirteen week rolling schedule of system outages after plant startup from the current outage.

5. Schedule for Full Program Implementation

The Authority is currently committed (see Inspection Report 92-80) to achieve full program implementation prior to restart from the next regularly scheduled refueling outage.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position Normal	Position Accident	*Risk Ranking*	Comment
1	CCW	AC-FCV-625	RCP CCW Thermal Barrier Return Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP thermal barrier cooling. Closed for Phase B containment isolation and interfacing systems LOCA.
2	CCW	AC-MOV-769	RCP CCW Supply Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP thermal barrier and bearing cooling. Closed for Phase B containment isolation and interfacing systems LOCA.
3	CCW	AC-MOV-784	RCP CCW Bearing Return Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP bearing cooling. Closed for Phase B containment isolation and interfacing systems LOCA.
4	CCW	AC-MOV-786	RCP CCW Bearing Return Isolation	Open	Open/ Closed	*Low*	Same as AC-MOV-784.
5	CCW	AC-MOV-789	RCP CCW Thermal Barrier Return Isolation	Open	Open/ Closed	*Low*	Same as AC-FCV-625.
6	CCW	AC-MOV-797	RCP CCW Supply Isolation Valve	Open	Open/ Closed	*Low*	Same as AC-MOV-769.
7	CCW	AC-MOV-822A	31 RHR HX CCW Outlet Isolation Valve	Closed	Open	*High*	Required for core cooling during sump recirculation and shutdown cooling modes.
8	CCW	AC-MOV-822B	32 RHR HX CCW Outlet Isolation Valve	Closed	Open	*High*	Required for core cooling during sump recirculation and shutdown cooling modes.
9	CVC	CH-LCV-112B	RWST Makeup To Charging Pump Suction Isolation	Closed	Open	*Low*	LCV-112B opens on lo-lo VCT level. Emergency boration provided by CH-MOV-333.
10	CVC	CH-LCV-112C	VCT Outlet Valve	Open	Open/ Closed	*Low*	Must remain open to provide continued suction to charging pumps for normal CVCS makeup. LCV-112C closes on lo-lo VCT level; interlocked with LCV-112B.
11	CVC	CH-MOV-205	Charging Flow to Regen Hx Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" for emergency boration during ATWS and for normal CVCS makeup during very small LOCAs. Also provides containment isolation.
12	CVC	CH-MOV-222	Seal Water Return Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" for RCP seal injection. Also provides containment isolation during Phase B CIS.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position Normal	Position Accident	*Risk Ranking*	Comment
13	CVC	CH-MOV-226	Charging Flow to Regen Hx Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" for emergency boration during ATWS and for normal CVCS makeup during very small LOCAs. Also provides containment isolation.
14	CVC	CH-MOV-250A	31 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
15	CVC	CH-MOV-250B	32 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
16	CVC	CH-MOV-250C	33 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
17	CVC	CH-MOV-250D	34 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
18	CVC	CH-MOV-333	Emergency Boration Valve	Closed	Open	*Medium*	Needed for emergency boration during ATWS. However, depending on cause of ATWS, alternate long-term shutdown possible by manually tripping reactor trip breakers/MG sets.
19	CVC	CH-MOV-441	31 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
20	CVC	CH-MOV-442	32 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
21	CVC	CH-MOV-443	33 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
22	CVC	CH-MOV-444	34 RCP Seal Injection Cont Isolation	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE -- provides RCP seal injection. Closes upon receipt of a containment isolation signal.
23	MFW	BFD-MOV-2-31	31 Main Boiler Feed Pump Discharge Stop	Closed [1]	Re-open	*Low*	Req'd for aligning condensate flow to SGs or re-establishing main feedwater.
24	MFW	BFD-MOV-2-32	32 Main Boiler Feed Pump Discharge Stop	Closed [1]	Re-open	*Low*	Req'd for aligning condensate flow to SGs or re-establishing main feedwater.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position		Risk Ranking	Comment
				Normal	Accident		
25	RCS	RC-MOV-535	Motor Operated Isolation to PCV-455C	Closed [5]	Open/ Closed	*High*	Opened during high RCS pressure conditions; closed to isolate stuck-open PORV.
26	RCS	RC-MOV-536	Motor Operated Isolation to PCV-456	Closed [5]	Open/ Closed	*High*	Opened during high RCS pressure conditions; closed to isolate stuck-open PORV.
27	RHR	AC-MOV-1870	RHR Miniflow Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE. May be required to close to prevent direct release of containment sump water to RWST during internal recirculation. However, redundancy provided by check valve SI-881 and MOVs SI-882 and AC-743.
28	RHR	AC-MOV-730	RHR Loop Suction Isolation Valve	Closed	Open/ Closed	*Low*	Required to open for normal shutdown cooling. However, AFW is capable of maintaining the plant in hot shutdown for approximately 12 days (with backup city water). Valve required to remain closed to prevent interfacing systems LOCA.
29	RHR	AC-MOV-731	RHR Loop Suction Isolation Valve	Closed	Open/ Closed	*Low*	Required to open for normal shutdown cooling. However, AFW is capable of maintaining the plant in hot shutdown for approximately 12 days (with backup city water). Valve required to remain closed to prevent interfacing systems LOCA.
30	RHR	AC-MOV-743	RHR Miniflow Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE. May be required to close to prevent direct release of containment sump water to RWST during internal recirculation. However, redundancy provided by check valve SI-881 and MOVs SI-882 and AC-1870.
31	RHR	AC-MOV-744	RHR Pump Discharge Isolation	Open	Open/ Closed/ Re-open	*Medium*	Modeled as "failure to remain open" in IPE during injection. Valve is closed during switchover to internal sump recirculation for containment isolation. If internal recirculation is unavailable, valve must be re-opened to provide external recirculation. *A "medium" ranking has been assessed using deterministic methods -- the MOV has multiple active failure modes and provides redundancy to the recirculation pumps (internal recirculation).*
32	RHR	AC-MOV-745A	31/32 RHR HX Inlet Isolation Valve	Open	Open	*Low*	Modeled as "failure to remain open" in IPE.
33	RHR	AC-MOV-745B	31/32 RHR HX Inlet Isolation Valve	Open	Open	*Low*	Modeled as "failure to remain open" in IPE.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position: Normal	Position: Accident	*Risk Ranking*	Comment
34	SIS	SI-HCV-638	31 RHR HX Outlet Flow Control Valve	Throttled	As Req'd	*Medium*	Throttled as required during shutdown cooling and post-LOCA sump recirculation.
35	SIS	SI-HCV-640	32 RHR HX Outlet Flow Control Valve	Throttled	As Req'd	*Medium*	Throttled as required during shutdown cooling and post-LOCA sump recirculation.
36	SIS	SI-MOV-1802A	Recirc Pump Discharge Isolation Valve	Closed	Open/ Closed	*High*	Open during internal sump recirculation cooling -- modeled in Level I and Level II analyses. Closed during external sump recirculation and normal RHR shutdown cooling to reduce probability of flow diversion to recirculation sump.
37	SIS	SI-MOV-1802B	Recirc Pump Discharge Isolation Valve	Closed	Open/ Closed	*High*	Open during internal sump recirculation cooling -- modeled in Level I and Level II analyses. Closed during external sump recirculation and normal RHR shutdown cooling to reduce probability of flow diversion to recirculation sump.
38	SIS	SI-MOV-1810	RWST Outlet Isolation Valve	Open	Open/ Closed	*Low*	Open during injection phase of LOCAs. Isolates HHSI pump suction from RWST during high-head sump recirculation phase. However, check valve SI-847 must also fail open to allow backflow to RWST.
39	SIS	SI-MOV-1835A	BIT Outlet Isolation Valve	Closed	Open	*Low*	Required to open to supply flow from SIPs 32/33 thru BIT header. However, non-BIT header provides alternate HHSI flow path for SIPs 31 and 32.
40	SIS	SI-MOV-1835B	BIT Outlet Isolation Valve	Closed	Open	*Low*	Required to open to supply flow from SIPs 32/33 thru BIT header. However, non-BIT header provides alternate HHSI flow path for SIPs 31 and 32.
41	SIS	SI-MOV-1852A	BIT Inlet Isolation Valve	Closed	Open	*Low*	Required to open to supply flow from SIPs 32/33 thru BIT header. However, non-BIT header provides alternate HHSI flow path for SIPs 31 and 32.
42	SIS	SI-MOV-1852B	BIT Inlet Isolation Valve	Closed	Open	*Low*	Required to open to supply flow from SIPs 32/33 thru BIT header. However, non-BIT header provides alternate HHSI flow path for SIPs 31 and 32.
43	SIS	SI-MOV-1869A	32 RHR HX Outlet to RHR Miniflow/SIP Suction	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE. Also provides isolation capability for interfacing systems LOCAs.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position		Risk Ranking	Comment
				Normal	Accident		
44	SIS	SI-MOV-1869B	31 RHR HX Outlet to RHR Miniflow/SIP Suction	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE. Also provides isolation capability for interfacing systems LOCAs.
45	SIS	SI-MOV-746	32 RHR HX Outlet Injection Stop Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase and low-head recirculation. Closed during high-head sump recirculation.
46	SIS	SI-MOV-747	31 RHR HX Outlet Injection Stop Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase and low-head recirculation. Closed during high-head sump recirculation.
47	SIS	SI-MOV-842	SIP Recirculation Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase. Provides containment isolation during recirculation.
48	SIS	SI-MOV-843	SIP Recirculation Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase. Provides containment isolation during recirculation.
49	SIS	SI-MOV-850A	31 SIP Discharge Stop Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase. Performs containment isolation function during interfacing systems LOCA. However, requires failure of three downstream check valves and one upstream check valve.
50	SIS	SI-MOV-850C	31 SIP Discharge Stop Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase. Performs containment isolation function during interfacing systems LOCA. However, requires failure of three downstream check valves and one upstream check valve.
51	SIS	SI-MOV-851A	32 SIP Discharge Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE. May have to be closed during transfer to sump recirculation to prevent overpressure of HHSI pump 32 suction piping or during long-term recirculation to isolate a system leak.
52	SIS	SI-MOV-851B	32 SIP Discharge Isolation Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE. May have to be closed during transfer to sump recirculation to prevent overpressure of HHSI pump 32 suction piping or during long-term recirculation to isolate a system leak.
53	SIS	SI-MOV-856B	High Head SI Hot Leg Injection Stop	Closed	Open	*Low [2]*	Needed for post-LOCA hot-leg recirculation; interlocked w/ MOV-856H and J

TABLE 1
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	System ID	Valve ID	Function	Position		Risk Ranking	Comment
				Normal	Accident		
54	SIS	SI-MOV-856C	High Head SI Cold Leg Injection Stop	Open	Open/ Closed	*Low [2]*	Modeled as "failure to remain open" in IPE during injection phase and cold leg recirculation cooling. Closed during hot-leg recirculation; also provides isolation capability during interfacing systems LOCAs.
55	SIS	SI-MOV-856E	High Head SI Cold Leg Injection Stop	Open	Open/ Closed	*Low [2]*	Modeled as "failure to remain open" in IPE during injection phase and cold leg recirculation cooling. Closed during hot-leg recirculation; also provides isolation capability during interfacing systems LOCAs.
56	SIS	SI-MOV-856G	High Head SI Hot Leg Injection Stop	Closed	Open	*Low [2]*	Needed for post-LOCA hot-leg recirculation; interlocked w/ MOV-856C and E
57	SIS	SI-MOV-856H	High Head SI Cold Leg Injection Stop	Open	Open/ Closed	*Low [2]*	Modeled as "failure to remain open" in IPE during injection phase and cold leg recirculation cooling. Closed during hot-leg recirculation; also provides isolation capability during interfacing systems LOCAs.
58	SIS	SI-MOV-856J	High Head SI Cold Leg Injection Stop	Open	Open/ Closed	*Low [2]*	Modeled as "failure to remain open" in IPE during injection phase and cold leg recirculation cooling. Closed during hot-leg recirculation; also provides isolation capability during interfacing systems LOCAs.
59	SIS	SI-MOV-866A	31 Spray Pump Discharge Isolation	Closed	Open	*Medium*	Used for containment spray injection -- containment temperature/pressure control and fission product scrubbing. Also provides RWST injection into recirculation sumps.
60	SIS	SI-MOV-866B	32 Spray Pump Discharge Isolation	Closed	Open	*Medium*	Used for containment spray injection -- containment temperature/pressure control and fission product scrubbing. Also provides RWST injection into recirculation sumps.
61	SIS	SI-MOV-880A	31 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
62	SIS	SI-MOV-880B	31 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position		*Risk Ranking*	Comment
				Normal	Accident		
63	SIS	SI-MOV-880C	32 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
64	SIS	SI-MOV-880D	32 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
65	SIS	SI-MOV-880E	33 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
66	SIS	SI-MOV-880F	33 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
67	SIS	SI-MOV-880G	34 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
68	SIS	SI-MOV-880H	34 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
69	SIS	SI-MOV-880J	35 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
70	SIS	SI-MOV-880K	35 FCU Charcoal Filter Dousing Isolation	Closed	Open	*Low*	For fire suppression of FCU carbon filters. Negligible contribution to containment performance (Level II) analysis.
71	SIS	SI-MOV-882	RHR Pumps Suction Isolation From RWST	Open	Open/ Closed	*Medium [3]*	Modeled as "failure to remain open" in IPE during injection phase. Isolates RHR suction from RWST during sump recirculation. However, use of external (RHR) recirculation is conditional on the failure of internal recirculation. *A "medium" ranking has been assessed using deterministic methods -- the MOV is important for external recirculation, which provides redundancy to internal recirculation.*
72	SIS	SI-MOV-883	RHR Pumps Recirculation to RWST	Closed	Closed	*Low*	Not required to change position in IPE model; however, valve is used to drain reactor cavity following refueling.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position Normal	Position Accident	*Risk Ranking*	Comment
73	SIS	SI-MOV-885A	Cont Sump RHR Suction Isolation	Closed	Open/ Closed	*Medium*	Provides suction to RHR pumps during external recirculation; however, preferred cooling is from the recirculation pumps (internal recirculation). Also provides containment isolation function. *A "medium" ranking has been assessed using deterministic methods -- the MOV has multiple active failure modes and provides redundancy to the recirculation pumps (internal recirculation).*
74	SIS	SI-MOV-885B	Cont Sump RHR Suction Isolation	Closed	Open/ Closed	*Medium*	Provides suction to RHR pumps during external recirculation; however, preferred cooling is from the recirculation pumps (internal recirculation). Also provides containment isolation function. *A "medium" ranking has been assessed using deterministic methods -- the MOV has multiple active failure modes and provides redundancy to the recirculation pumps (internal recirculation).*
75	SIS	SI-MOV-887A	32 SIP Suction Isolation Valve	Open	Open/ Closed/ Re-Open	*Low [2]*	Remains open during injection phase. Closed during switchover to high-head recirculation. Re-opened during high-head recirculation if either SIP 31 or 33 fails. Also re-opened during hot-leg recirculation.
76	SIS	SI-MOV-887B	32 SIP Suction Isolation Valve	Open	Open/ Closed/ Re-Open	*Low [2]*	Remains open during injection phase. Closed during switchover to high-head recirculation. Re-opened during high-head recirculation if either SIP 31 or 33 fails. Also re-opened during hot-leg recirculation.
77	SIS	SI-MOV-888A	Low Head To High Head SI Recirc Stop	Closed	Open	*High*	Provides suction to SIPs during high-head recirculation.
78	SIS	SI-MOV-888B	Low Head To High Head SI Recirc Stop	Closed	Open	*High*	Provides suction to SIPs during high-head recirculation.
79	SIS	SI-MOV-889A	32 RHR HX Outlet To Spray Header Stop	Closed	Open	*Medium [4]*	Provides containment spray (fission product scrubbing) during sump recirculation via RHR/recirc pumps.
80	SIS	SI-MOV-889B	31 RHR HX Outlet to Spray Header Stop	Closed	Open	*Medium [4]*	Provides containment spray (fission product scrubbing) during sump recirculation via RHR/recirc pumps.
81	SIS	SI-MOV-894A	31 Accumulator Discharge Isolation	Open	Open	*Low*	Modeled as "failure to remain open" in IPE.

TABLE 1
IP3 MOV Population in Generic Letter 89-10

	System ID	Valve ID	Function	Position		*Risk Ranking*	Comment
				Normal	Accident		
82	SIS	SI-MOV-894B	32 Accumulator Discharge Isolation	Open	Open	*Low*	Modeled as "failure to remain open" in IPE.
83	SIS	SI-MOV-894C	33 Accumulator Discharge Isolation	Open	Open	*Low*	Modeled as "failure to remain open" in IPE.
84	SIS	SI-MOV-894D	34 Accumulator Discharge Isolation	Open	Open	*Low*	Modeled as "failure to remain open" in IPE.
85	SIS	SI-MOV-899A	32 RHR HX Outlet Injection Stop Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase and low-head recirculation. Closed during high-head sump recirculation.
86	SIS	SI-MOV-899B	31 RHR HX Outlet Injection Stop Valve	Open	Open/ Closed	*Low*	Modeled as "failure to remain open" in IPE during injection phase and low-head recirculation. Closed during high-head sump recirculation.
87	SIS	SI-MOV-990A	Recirc Pump Sample Isolation Valve	Closed	Open	*Low*	For post-accident sampling only
88	SIS	SI-MOV-990B	Recirc Pump Sample Isolation Valve	Closed	Open	*Low*	For post-accident sampling only
89	SIS	SI-MOV-994A	Recirc Pump Sample Iso, Tie To Sample HDR	Closed	Open	*Low*	For post-accident sampling only

Notes

[1] During normal operation these valves are open. Upon a reactor trip, the operators are instructed to close the valves. In the event that auxiliary feedwater is subsequently lost and bleed and feed cooling is unsuccessful, the valves must be re-opened to establish condensate flow or re-establish main feedwater.

[2] The contribution of hot-leg recirculation failure following a large-break LOCA is negligible to the core damage frequency.

[3] Despite the presence of a check valve to prevent backflow to the RWST, the concern is also continued depletion of the RWST, which could cause failure of the RHR pumps during sump recirculation. (The combination of containment pressure and sump elevation head may not be high enough to close check valve SI-881, resulting in continued depletion of the RWST and eventual cavitation of the RHR pumps).

[4] MOV ranking based on deterministic methods.

[5] In past cycles, the plant has operated with the PORV block valves closed due to leaking PORVs.