

ATTACHMENT B  
IP3-88-004

Basic MOV Description And Design Base  
Information And Bases For Establishing Maximum  
Expected Differential Pressures

Table 1 - High Head SI Cold Leg Stop Valves

Table 2 - SI Pump 32 Suction Isolation Valves

Table 3 - Bit Isolation Valves.

New York Power Authority  
Indian Point Nuclear Power Plant  
Docket No. 50-286  
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## ATTACHMENT B

This attachment provides the information requested per Action Item (a) of IEB 85-03. The requirements of Action Item (a) can be summarized as follows:

"Review and document the design basis for the operation of each valve. This documentation should include the maximum differential pressure expected during both opening and closing the valve for both normal and abnormal events to the extent that these valve operations and events are included in the existing, approved design basis, (i.e., the design basis documented in pertinent licensee submittals such as FSAR analyses and fully-approved operating and emergency procedures, etc.) When determining the maximum differential pressure, those single equipment failures and inadvertent equipment operations (such as inadvertent valve closures or openings) that are within the plant design basis should be assumed."

As indicated in Attachment A, the ten MOV's determined to require evaluation per IEB 85-03 were selected based on their required functioning in establishing a high pressure injection flowpath from the RWST to RCS for short term, high pressure, cold leg injection and can be categorized as follows:

- 1) High Head SI Stop
- 2) SIS Pump 32 Suction Isolation
- 3) BIT Isolation

Whereas the selection of the MOV's is based on their required functioning in establishing the flowpath described above, it is noted that more rigorous criteria have been applied in establishing the maximum expected differential pressures that these MOV's can conservatively be expected to operate against. All modes of operation have been considered including recirculation modes (both cold leg and hot leg). (It is noted that the Authority's original response to IEB 85-03, as referenced in the cover letter to this attachment, excluded hot leg recirculation in establishing the subject differential pressures. As indicated above, however, hot leg recirculation has now been considered in establishing the maximum expected

differential pressures in order to be consistent with the approach outlined in the final report of the Westinghouse Owners Group Safety-Related MOV Program dated March, 1986 and in order to account for the potential of exposure to more bounding fluid conditions during such operation.)

Tables 1, 2 and 3 provide the design base information for the operation of the subject valves in addition to the maximum expected differential pressures, in accordance with Action Item (a) of IEB 85-03.

TABLE 1

INDIAN POINT 3 NUCLEAR POWER PLANT  
HIGH HEAD SI COLD LEG STOP VALVES

MOV: 856C,E,H,J<sup>(1)</sup>

Valve Data

W Tag No.: 2TM58FNH  
Manufacturer/Assembly  
Drawing No.: Velan/137.116  
Type: Globe  
Size: 2"  
Rating: 1500 lbs.

Actuator Data

Manufacturer: Limitorque  
Type-Size: SMB-00  
Order No./Serial No.: 345804D/113919 (856C)  
345804G-1/115119 (856E)  
345804C/113740 (856H)  
345804F/118374 (856J)  
Overall Unit Ratio: See Footnote (2)  
Spring No.: 60-600-0022-1 (856C,H, and J)  
60-600-0048-1 (856E) (3)

Gear Box Data

Manufacturer: Limitorque  
Type-Size: B-O  
Order No./Serial No.: 394370A/224356 (856C)  
394370A/224355 (856E)  
394370A/224353 (856H)  
394370A/224352 (856J)

Motor Data

Manufacturer/Serial No.:	Reliance/463489-GV (856C) Reliance/463489-1W (856E) Reliance/463489-GV (856H) Reliance/463489-DV (856J)
Start/Run Torque:	25 ft-lbs/5 ft-lbs
RPM <sup>(4)</sup> :	1800

Westinghouse E-Spec Data

Full Stroke Time to Open/Close (Sec.):	10/10
Max. Differential Pressure Valve Must Open/Close Against (psi):	2500/2500 (856C, E, H, & J)

Design Base Operating Data

SI-MOV-856C, E, H and J are energized and maintained in their "safe" open position as monitored from Control Room Panel SBF-2. These valves do not receive an SI signal and are not required to change position for the injection phase of SI. (While these valves are not required to function [i.e., change position] for the injection phase, they have been included within the scope of IEB 85-03 due to their normally energized condition.) Following the injection phase, these valves are left open for transfer to cold leg recirculation. These valves are closed for transfer to hot leg recirculation. In addition, these valves would be sequentially closed and re-opened to identify and isolate a LOCA outside containment. In the event of an inadvertent SI signal, these valves are not affected by SI termination as they are left open to remain in their "ready" state.

Maximum Expected Differential Pressures

For the open direction, the limiting case would be for the subject MOV's to be opened against the shut-off head of the SI pumps plus the RWST head of water (i.e., approximately 1550 psi). This would apply for scenarios where the 856

MOV had been inadvertently in a closed position prior to safeguards actuation or where the MOV is re-opened in response to a LOCA outside containment after it was determined that the injection header upstream of the MOV was intact. Other cases for establishing the maximum differential pressure that the 856 MOV's would be opened against are less limiting in that the RWST head of water would not be included.

As indicated above, there are basically two scenarios which would require the subject valves to be closed: 1) transfer to hot leg recirculation, and 2) identifying and isolating a LOCA outside containment. For purposes of conservatively establishing the maximum differential pressure that these valves would have to close against, the latter scenario is more limiting. For an intact injection header, these valves would be exposed to a differential pressure equivalent to the shutoff head of the SI pumps plus the RWST head of water (i.e., approximately 1550 psi). However, a ruptured injection header provides a more limiting case if it is conservatively assumed that the valve must close against RCS pressure. An RCS pressure equivalent to the low pressurizer pressure safety injection actuation setpoint of 1720 psig will be assumed as the limiting differential pressure to close these MOV's. It is noted that this assumes a break of the injection header upstream of MOV-856C, E or 856J, H and failure of the associated check valves downstream of these MOV's. In summary:

Maximum Expected Differential Pressure for Valve to Open/Close Against (As Determined for IEB 85-03: Item A) (psi): (approximately) 1550/1720.

Footnotes:

- (1) The original design of these MOV's provided for the Limitorque actuators to be installed atop the Velan valves. Per Consolidated Edison Modification Procedure MMS-75-3-03, dated December 30, 1975 (Project No. 5280-10), a design change was implemented which provided for relocation of the motor operators on the subject valves above the estimated post-accident flood level in the containment building. This was accommodated by the installation of a manual gear box on the valve itself, which is powered through a linkage assembly (universal joints, slip joints, 90° gear boxes, etc. manufactured by Stow Corporation) by the elevated motor operator. This

modification was reviewed and approved by the NRC as documented in Supplement No. 3 to the NRC Safety Evaluation Report for IP3 dated April 5, 1976.

- (2) The modification described in Footnote (1) above precludes the reporting of an overall unit ratio since the motor operator does not directly drive the valve stem. It is noted that whereas the linkage assembly consists of torque loss components, the manual gear boxes installed atop the Velan valves represent torque addition components by virtue of their 4:1 gear ratio.
- (3) 856C, H and J are original installations; 856E originally had a 60-600-0022-1 spring pack which was changed-out in 1987 to the spring number indicated. This change-out resulted from the IEB 85-03 testing performed for this MOV. (Refer to Attachment D for further details.)
- (4) RPM indicated is nominal design value. Nameplate value may vary slightly.

TABLE 2

INDIAN POINT 3 NUCLEAR POWER PLANT  
SI PUMP 32 SUCTION ISOLATION VALVES

MOV:	887A,B
<u>Valve Data</u>	
W Tag No.:	6GM42SB
Manufacturer/Assembly Drawing No.:	Aloyco/E-47366
Type:	Flex Wedge Gate
Size:	6"
Rating:	150 lbs.
<u>Actuator Data</u>	
Manufacturer:	Limitorque
Type-Size:	SMB-000
Order No./Serial No.:	354245B/137257 (887A) 3E0637A/311338 (887B)
Overall Unit Ratio <sup>(1)</sup> : (As confirmed by Limitorque)	57 (887A) 100 (887B) <sup>(2)</sup>
Spring No.:	60-600-0023-1 (887A) 60-600-0023-1 (887B) <sup>(3)</sup>
<u>Motor Data</u>	
Manufacturer/Serial No.:	Reliance/463428-F (887A) Reliance/A7601864M-NF-2 (887B)
Start/Run Torque:	5 ft-lbs/1 ft-lbs
RPM <sup>(4)</sup> :	1800



Westinghouse E-Spec Data

Full Stroke Time to Open/Close (Sec.):	120/120
Max. Differential Pressure Valve Must Open/Close Against (psi):	150/150

Design Base Operating Data

SI-MOV-887A,B are energized and maintained in their "safe" open position as monitored from Control Room Panel SBF-2. These valves do not receive an SI signal and are not required to change position for the injection phase of SI. (While these valves are not required to function [i.e., change position] for the injection phase, they have been included within the scope of IEB 85-03 due to their normally energized condition.) Following the injection phase, these valves are closed for transfer to cold leg recirculation. These valves are opened for transfer to hot leg recirculation. In addition, for certain postulated passive pipe failures during recirculation, the position of these valves would be changed. As an example, these valves would be closed during hot leg recirculation in the event of a passive pipe failure of the SI Pump 32 suction line downstream of these valves. In the event of an inadvertent SI signal, these valves are not affected by SI termination as they are left open to remain in their "ready" state.

Maximum Expected Differential Pressures

As indicated previously, the original response to IEB 85-03, as referenced in the cover letter to this attachment, only considered valve operation up to cold leg recirculation. For this case, the maximum expected differential pressures would be based on operation against the appropriate RWST head of water and are as reported in the original response. However, hot leg recirculation and passive pipe failures during such operation present more limiting operating requirements. As such, it will be assumed that these valves have to open and close against the discharge pressure of the low head injection subsystem. Specifically, it is assumed these valves have

to cycle against the design head of the recirculation pumps. In summary:

Maximum Expected Differential Pressure for Valve to Open/Close Against (As Determined for IEB 85-03: Item A) (psi): (approximately) 150/150.

Footnotes:

- (1) Overall Unit Ratio =  $\frac{\text{Motor RPM}}{\text{Unit RPM}}$  where Unit RPM =  $\frac{\text{Stem Speed}}{\text{Stem Lead}}$
- (2) 887A is original installation; the original operator on 887B was replaced in 1981 with a new operator having overall unit ratio indicated.
- (3) 887A is original installation; the replacement operator for 887B originally had a 60-600-0024-1 spring pack which was changed-out in 1987 to the spring number indicated. This change-out resulted from the IEB 85-03 testing performed for this MOV. (Refer to Attachment D for further details.)
- (4) RPM indicated is nominal design value. Nameplate value may vary slightly.

TABLE 3

INDIAN POINT 3 NUCLEAR POWER PLANT  
BIT ISOLATION VALVES

MOV:	1835A,B; 1852A,B
<u>Valve Data</u>	
W Tag No.:	4GM58FNP
Manufacturer/Assembly Drawing No.:	Anchor-Darling/94-12389
Type:	Double Disc Gate
Size:	4"
Rating:	1500 lbs.
<u>Actuator Data</u>	
Manufacturer:	Limitorque
Type-Size:	SMB-00
Order No./Serial No.:	334561B/91473A (1835A) 334561B/91466A (1835B) 334561B/91475A (1852A) 334561B/91481A (1852B)
Overall Unit Ratio <sup>(1)</sup> : (As confirmed by Limitorque)	23 (1835A, B; 1852A,B)
Spring No.:	60-600-0022-1 (1835A,B; 1852A,B)
<u>Motor Data</u>	
Manufacturer/Serial No.:	Peerless/MV84773 (1835A) Peerless/MV84775 (1835B) Peerless/MV84772 (1852A) Peerless/MV84762 (1852B)
Start/Run Torque:	25 ft-lbs/5 ft-lbs
RPM <sup>(2)</sup> :	1800

Westinghouse E-Spec Data

Full Stroke Time to Open/Close (Sec.):	10/10
Max. Differential Pressure Valve Must Open/Close Against (psi):	2500/2500

Design Base Operating Data

SI-MOV-1835A,B and 1852A,B are energized and maintained in their closed position as monitored from Control Room Panel SBF-2. These valves receive an SI signal and automatically open for the injection phase of SI. Following the injection phase, these valves are left open for transfer to both cold leg and hot leg recirculation. These valves would be closed in the event of certain postulated passive pipe failures during recirculation. In addition, SI-MOV-1835A and B would be closed for long-term low head recirculation to facilitate containment isolation of the high head subsystem. In the event of an inadvertent SI signal, SI termination requires these valves to be manually closed to restore them to their normal state.

Maximum Expected Differential Pressures

For conservatism, it is assumed that these valves have to open against a differential pressure equivalent to the shutoff head of the SI pumps plus the RWST head of water (i.e., approximately 1550 psi).

As indicated above, there are three scenarios which require these valves to be closed: (1) certain postulated pipe failures during recirculation, (2) long-term low head recirculation (to facilitate containment isolation) for SI-MOV-1835A and B, and (3) SI termination. Based on the operating procedures that govern the subject valve closures, it is noted that the SI pumps would be tripped or flow would be diverted (in the case of passive failures during recirculation downstream of these valves) prior to the valves being closed. Hence, the subject MOV's would not have to close against a differential pressure. In summary:

Maximum Expected Differential Pressure for Valve to  
Open/Close Against (As Determined for IEB 85-03: Item A)  
(psi): (approximately) 1550/0

Footnotes

- (1) Overall Unit Ratio =  $\frac{\text{Motor RPM}}{\text{Unit RPM}}$  where Unit RPM =  $\frac{\text{Stem Speed}}{\text{Stem Lead}}$
- (2) RPM indicated is nominal design value. Nameplate value may vary slightly.