

CONTROL BLOCK:

--	--	--	--	--	--

 ① (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

CON'T

0	1
7	8

REPORT SOURCE

L	6	0	5	0	-	0	3	2	4	7	0	7	0	2	8	1	8	0	7	2	8	8	1	9
60	61									68	69					74	75							80
DOCKET NUMBER											EVENT DATE						REPORT DATE							

0 2 | During normal operation with no evolutions in progress, a reactor scram occurred due |
0 3 | to a failed main steam line isolation valve (MSIV) on "C" main steam line. On 7/18/81 |
0 4 | while performing routine valve testing of the MSIV's, the "D" main steam line inboard |
0 5 | isolation valve failed to reopen following closure. Similar events have occurred |
0 6 | several times on both units, the last reported in LER 2-81-06. There are eight MSIV's |
0 7 | on each unit, four inboard and four outboard. Neither of these events affected the |
0 8 | health and safety of the public. Technical Specifications 3.6.3, 6.9.1.9b |

SYSTEM CODE		CAUSE CODE		CAUSE SUBCODE		COMPONENT CODE				COMP. SUBCODE		VALVE SUBCODE					
H	B	B	B	B	V	A	L	V	E	X	F	D					
9	10	11	12	13	14	15	16	17	18	19	20	21					
LER/RO REPORT NUMBER		EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE		REPORT TYPE		REVISION NO.							
8	1	0	6	0	0	3	L	0									
21	22	23	24	25	26	27	28	29	30	31	32						
ACTION TAKEN		FUTURE ACTION		EFFECT ON PLANT		SHUTDOWN METHOD		HOURS		ATTACHMENT SUBMITTED		NPRD-4 FORM SUB.		PRIME COMP. SUPPLIER		COMPONENT MANUFACTURER	
F	X	A	C	0	6	2	1	Y	Y	N	R	3	4	0			
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47			

1 0 MSIV F022C had closed due to separation of the valve stem disk from the stem. MSIV

1 1 F022D would not reopen because the valve main disk had separated from the valve

1 2 piston. Both valves were repaired by utilizing 3 locking pins $\geq 90^\circ$ apart in the

1 3 stem-stem disk connection and 2 locking pins 90° apart in the main disk-piston

1 4 assembly of each valve.

7	8	9	FACILITY STATUS		% POWER		OTHER STATUS		30	METHOD OF DISCOVERY		DISCOVERY DESCRIPTION		32	80	
1	5		F	28	0	9	6	29	NA		A	31	Operational Event			
7	8	9	ACTIVITY CONTENT		RELEASED OF RELEASE		AMOUNT OF ACTIVITY		35			LOCATION OF RELEASE		36	80	
1	6		Z	33	Z	34		NA			NA				80	
			PERSONNEL EXPOSURES		NUMBER		TYPE		DESCRIPTION		39					80
1	7		0	0	0	37	Z	38		NA						
7	8	9	PERSONNEL INJURIES		NUMBER		DESCRIPTION		41							
1	8		0	0	0	40		NA						80		
7	8	9	LOSS OF OR DAMAGE TO FACILITY		TYPE		DESCRIPTION		43							
1	9		Z	42		NA										

NRC USE ONLY

ISSUED DESCRIPTION (45)
 144 General Press Release on July 19, 1981

LER ATTACHMENT - RO #2-81-60

Facility: PSEP Unit No. 2

Event Date: 07/02/81

Investigations into the closures of MSIVs revealed that MSIV B21-F022C failed due to separation of the stem-disk from the stem and MSIV B21-F022D failed due to separation of the main disk from the piston. The separations resulted when threaded connections failed. Inspections of the valve components and a review of the operational history of other MSIV failures reported in previously submitted LER's indicate the separations resulted from an unknown combination of poor thread engagement, poor assembly methods, loose clearances, and relaxation of the pin and seating surfaces. Together, they lead to a loss of preload, unthreading, and/or straight separation. However, it is suspected that the separation is aggravated by flow instabilities arising from the close connection of pipe run elbows to the inlet of the inboard MSIVs as shown by the predominance of inboard valve failures.

For either type separation, it was determined that the main disk will drop into the body seat as has been found in past MSIV failures. The closing of the main disk will severely reduce main steam line flow through the affected steam line, shifting some of the reduced flow to the other lines and creating a pressure increase in the reactor. This creates a noticeable mismatch between the flows in the affected steam line, the other steam lines, and the feedwater lines due to the side-by-side arrangement of these flow indicators on the reactor control panel and the range of the indicators. The pressure spike creates a reactor power spike and a reactor level drop due to void collapse. These are obvious to the operator and in cases where the reactor is at a substantial power level, as in the case of the F022C closure, the reactor scrams. When a separation occurs during the performance of PT's which cycle the MSIVs, which happened in the case of the F022D failure to reopen, the operators are monitoring the steam line flows during these tests to verify their satisfactory performance so an abnormal condition is promptly detected. The MSIVs on the affected steam line are then closed in accordance with the requirements of technical specifications. Since the main disk and stem disk will seat after either type of separation, there will be no flow through the affected valve. However, seat leakage may increase through it because of loss of some of the guidance for seating the main disk or stem-disk.

To date, with the exception of one case, all MSIV failures have been the inboard valves, indicating a possible link with flow instabilities from the inlet steam line elbow which exists only on the inboard valves. The one case of an outboard valve failure is thought to be due to improper pinning from an earlier disassembly. As a result, a failure is most likely to occur on an inboard MSIV and the probability of the failure of an outboard valve is very small. Since the operation or failure of one MSIV will not affect the other, the outboard MSIV can be counted upon for achieving full isolation in the event the inboard valve suffers a disk separation. The failed valve itself would nearly achieve the desired isolation although the leakage may be greater than before.

The valve vendor performed an evaluation to determine if the increased clearance found on some of the valve components affected the ability of the MSIVs to

perform as required by the GE specifications and as assumed in the accident analyses. The evaluation determined that code allowable stresses are not exceeded and the valves will function as required; therefore, they still meet the design requirements.

An evaluation by CP&L and the valve vendor of these two failures as well as the other MSIV failures experienced in the past reveals that an MSIV separation on a steam line can be identified and promptly isolated as required by technical specifications and that the MSIVs can be counted on to function properly.

In order to return F022C and F022D to service and ensure their reliable operation, the following actions were or will be taken:

1. The stem and stem disk threaded connections were matched to ensure proper alignment.
2. The number of stem to stem disk pins was increased from two to three and the pin engagement, length, and diameter increased.
3. The number of disk to piston pins was increased from one to two and the pin engagement and length were increased.
4. Verification and QC checks were added to ensure proper pin engagement.
5. An evaluation of the failed pieces will be performed.
6. Both valves were local leak rate tested.

As a result of this event, the remaining MSIVs on Unit No. 2 will be inspected and modified as required during the next refueling outage. The Unit No. 1 MSIVs are presently being inspected and current plans are to complete any required modifications during the current Unit No. 1 outage.

Although it is felt that the changes implemented into the design of the MSIVs will greatly improve their reliability, further investigation into improvements in MSIV design and operation to prevent any future events will continue.