

**SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION**

**INDEPENDENT SAFETY ENGINEERING GROUP**

**ASSESSMENTS AND INVESTIGATIONS**

NUMBER ISEG-06	REV. NO. 1
PAGE 1 OF 8	
EFFECTIVE DATE 04-30-90	

Approval:

*MA McBurnett*  
Manager, Nuclear Licensing

Date:

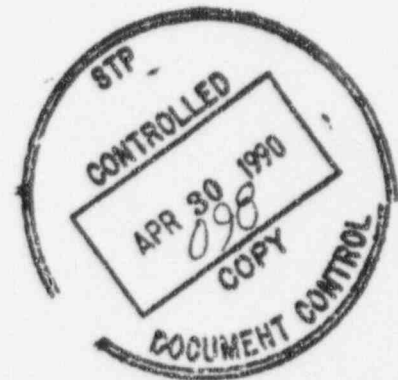
4-17-90

Approval:

*DK Henry*  
Director, ISEG

Date:

4-17-90



## SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

INDEPENDENT SAFETY ENGINEERING GROUP

ASSESSMENTS AND INVESTIGATIONS

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1.0 PURPOSE

This procedure provides general requirements for the performance of Assessments and Investigations by ISEG.

2.0 SCOPE

This procedure applies to the conduct of Assessments and Investigations performed by ISEG.

3.0 DEFINITIONS

## 3.1 Assessment/Investigation

An in-depth evaluation of various Plant activities, incidents, work practices, and management controls for the purpose of identifying areas where improvements could be made or to identify causal factors of undesirable events to preclude recurrence.

4.0 REFERENCES

4.1 ISEG-01, Organization and Responsibilities.

4.2 ISEG-03, Task Administration and Report Preparation.

5.0 RESPONSIBILITIES

5.1 The Director, ISEG is responsible for approving Assessment and Investigation Plans.

5.2 The Task Lead is responsible for proper performance and reporting of assigned Assessments and Investigations.

6.0 REQUIREMENTS

6.1 Administrative Processing of Assessments and Investigations is performed in accordance with ISEG-03, Task Administration and Report Preparation.

## 6.2 Assessments

## 6.2.1 Plan

The Task Lead ensures that an Assessment Plan is prepared which provides structure and direction for the performance of the Assessment. The plan includes the following minimum information:

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- 6.2.1.1 Purpose.
- 6.2.1.2 Scope.
- 6.2.1.3 Individuals to be interviewed.
- 6.2.1.4 Documents to be reviewed (includes technical references, procedures, design input/output, computer data, etc.)
- 6.2.1.5 Activities and hardware to be observed.
- 6.2.1.6 Tentative schedule.

The Director, ISEG approves the Assessment Plan. The Task Lead ensures that the plan is revised when significant changes in the stated scope or schedule occur.

#### 6.2.2 Preparation

The Task Lead ensures that personnel assigned to the Assessment are prepared to perform the assessment through the following actions, as appropriate:

- 6.2.2.1 Review of the Assessment Plan and division of Assessment responsibilities among assigned personnel.
- 6.2.2.2 Familiarization with Plant systems/structures involved.
- 6.2.2.3 Review of relevant instructions, procedures and other controlling documents.
- 6.2.2.4 Familiarization with applicable industry practices and standards.
- 6.2.2.5 Development of checklists or assumptions to be verified and questions to be answered.

#### 6.2.3 Performance

ISEG personnel ensure that when conditions appear to present a potentially significant adverse Plant safety and reliability concern,

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they are to immediately inform the Task Lead, the responsible organization management, and the Director, ISEG. Such conditions include those that may involve entry into a Plant Technical Specification action statement, or may involve showing the Plant to be in a condition outside the bounding assumptions of safety analyses, or may present an immediate and significant industrial safety hazard, or which may otherwise present an unjustifiable risk to Plant reliability.

The Task Lead ensures that appropriate management and supervision are informed of ISEG's intent to perform an Assessment.

Applicable guidance in Exhibit ISEG-06-A is utilized for the performance of the Assessment.

## 6.2.4 Reporting

6.2.4.1 The Task performers determine which preliminary conclusions are valid and significant and develop corresponding recommendations for areas where improvements could be made.

6.2.4.2 The Task Lead ensures that an Assessment report is prepared and processed in accordance with ISEG-03, Task Administration and Report Preparation.

## 6.3 Investigations

### 6.3.1 Plan

The Task Lead ensures that an Investigation Plan is prepared which provides structure and direction for the performance of the Investigation. The plan includes the following minimum information:

6.3.1.1 Problem statement.

6.3.1.2 Purpose.

6.3.1.3 Scope.

6.3.1.4 Individuals to be interviewed.



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- 6.3.1.5 Documents to be reviewed (includes technical references, procedures, design input/output, computer data, etc.).
- 6.3.1.6 Activities and hardware to be observed.
- 6.3.1.7 Tentative schedule.

The Director, ISEG approves the Investigation Plan. The Task Lead ensures that the plan is revised when significant changes in the stated scope or schedule occur.

## 6.3.2 Preparation

The Task Lead ensures that personnel assigned to the Investigation are prepared to perform the investigation through the following actions, as appropriate:

- 6.3.2.1 Review of the Investigation Plan and division of investigation responsibilities among assigned personnel.
- 6.3.2.2 Familiarization with Plant systems/structures involved.
- 6.3.2.3 Review of relevant instructions, procedures and other controlling documents.
- 6.3.2.4 Development of checklists or assumptions to be verified and questions to be answered.

## 6.3.3 Performance

ISEG's involvement with Investigations is independent of line organization performance of IP-1.45Q, Station Problem Reporting, Problem Report (PR) investigations. When PRs are assigned to line organizations for investigation, ISEG may also be requested to investigate the event. When this occurs ISEG investigates the event and submits an Investigation report in accordance with ISEG-03, Task Administration and Report Preparation, to the appropriate managers. If the Problem Report has been investigated (and associated

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Station Problem Report completed) the Director, ISEG may have the Task assigned as a Review of the PR event and investigation and performed in accordance with ISEG-05, Observations and Reviews.

When conditions appear to present a potentially significant adverse Plant safety and reliability concern, Investigation performers are to immediately inform the Task Lead, the responsible organization management, and the Director, ISEG.

The Task Lead ensures that appropriate management and supervision are informed that ISEG is performing an Investigation.

Applicable guidance in Exhibit ISEG-06-A is utilized for the performance of the Investigation.

#### 6.3.4 Reporting

6.3.4.1 The Task Lead determines the sequence of events involved with the subject event. The Task Lead ensures that appropriate causal factor, barrier and change analyses are performed. The Investigation team determines the causal factors and develops corresponding recommendations to prevent future occurrence of similar events.

6.3.4.2 The Task Lead ensures that an Investigation report is prepared and processed in accordance with ISEG-03, Task Administration and Report Preparation.

### 7.0 DOCUMENTATION

#### 7.1 QA Records

7.1.1 As discussed in ISEG-03.

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## 7.2 Working Documents

7.2.1 As discussed in ISEG-03.

8.0 ATTACHMENTS

8.1 ISEG-06-A - Guidance for Assessments and Investigations.

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EXHIBIT ISEG-06-A  
GUIDANCE FOR ASSESSMENTS AND INVESTIGATIONS

The guidance and/or requirements for assessment and investigation performance provided in IP-1.45Q, in NTD041, Systematic Problem Solving Process (SPSP) Training Program, and the following additional guidance is followed to the extent feasible given the conditions present.

- a. Ensure personnel being observed or interviewed are aware that the observer is from ISEG and that they are aware of ISEG's purpose in assessing or investigating activities.
- b. While observing, interviewing, and reviewing, take notes in sufficient detail such that specific hardware, documents and personnel involved can be sought out at a later date if additional questions arise. As soon as possible after the interview, review, or observation clarify and summarize all notes.
- c. While observing activities and interviewing personnel maintain an awareness of and note surrounding equipment status, work activity status, and possible industrial safety hazards.
- d. Do not prompt or lead those individuals being observed or questioned. The mere presence of an observer influences the behavior observed. Prompting further diminishes the validity that the observed performance resembles the usual performance.
- e. Maintain a central working file containing notes and supporting documentation.
- f. Keep the Task Lead informed of the progress of the task in terms of summaries of the information obtained, preliminary conclusions drawn, and additional time and actions necessary for completion.

EN29

OPGP03-ZX-0002

STP 486 (08/92)

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

# STATION PROBLEM REPORT

PAGE \_\_\_\_ OF \_\_\_\_

CAG

CATEGORY ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6

SPR NO. 930470

## PART 1: IDENTIFICATION OF CONCERN

A. UNIT # ☐ 1 ☐ COMMON  
☒ 2 ☐ BOTH

INITIATED: NAME JB COOK DEPT PED  
POSITION NSSS SECTION SUPV PHONE NO. 8218  
DATE 2/11/93 TIME 1120  
DISCOVERY: DATE 2/10/93 TIME 1500  
IMMEDIATE SUPERVISOR: NAME VR ALBERT  
CONCURRENCE DATE 2/11/93 TIME 1135

## B. PROBLEM DESCRIPTION

STI-94-011880-1

AFTER SI-MOV-0031A FAILED TO OPEN, A SEARCH OF WMS HISTORY REVEALED THAT THIS SAME VALVE HAS BURNED UP A MOTOR PREVIOUSLY. NO ROOT CAUSE WAS FOUND AT THAT TIME. ONE MOTOR ON UNIT ONE HAS ALSO BURNED UP.

[ ] CONTINUATION SHEET ATTACHED

## C. IMMEDIATE COMPENSATORY OR REMEDIAL ACTIONS TAKEN

2/11/93  
WR: ~~SI~~ RH-170062 WAS WRITTEN TO REPAIR THE MOV. THE MOV WAS MANUALLY SHUT TO PLACE IT IN A KNOWN CONFIGURATION.

[ ] CONTINUATION SHEET ATTACHED

## D. IDENTIFICATION

SYSTEM SI  
COMPONENT NO. AZSIMOV 0031A  
COMPONENT N. IE COLD LEG INT. ISOLATION  
BLDG RCB ROOM 108

ORIGINATOR

## INSTRUCTIONS FOR PART 1 COMPLETION

## ORIGINATOR:

DESCRIBE YOUR CONCERN GIVING AS MUCH INFORMATION AS POSSIBLE. FILL IN ALL APPLICABLE SECTIONS OR ATTACH DOCUMENTATION. INDICATE WHAT, WHEN, WHO, WHY, WHERE, HOW. LIST ANY REFERENCES.

DESCRIBE ANY IMMEDIATE COMPENSATORY/REMEDIAL ACTIONS TAKEN IN ADDITION TO WRITING THE SPR.

IF A COMPONENT, SYSTEM, BUILDING, ETC., IS INVOLVED, THEN COMPLETE THE APPLICABLE PORTION OF PART 1.

IF YOU HAVE ENOUGH INFORMATION TO IDENTIFY THE CAUSE AND REMEDIAL ACTION, THEN SO STATE.

OBTAIN IMMEDIATE SUPERVISORS CONCURRENCE IF POSSIBLE. IF NOT POSSIBLE OR IF ORIGINATOR DISAGREES WITH IMMEDIATE SUPERVISORS POSITION, DELIVER TO SHIFT SUPERVISOR OR CAG AS APPROPRIATE.

NOTE: IF POTENTIALLY REPORTABLE, OR IF ANY DOUBT EXISTS REGARDING REPORTABILITY, THEN HAND CARRY IMMEDIATELY TO THE SHIFT SUPERVISOR. OTHERWISE, DELIVER TO THE CAG ADMINISTRATOR.

IF ANY SECTION OR BLANK IS NOT COMPLETED, THEN RECORD N/A IN THE APPROPRIATE SECTION.

## PART 2: REPORTABILITY

A. PLANT MODE: (CIRCLE ONE) 1 2 3 4 5 6 NO-MODE

Rx POWER 0 Rx TEMP 343°F Rx PRESSURE 385 PSIG Rx TRIP YES [ ] NO [X]

ESF ACTUATION NA INITIATING SIGNAL NA

## B. OPERABILITY

[ ] OPERABILITY REVIEW REQUIRED WITHIN 24 HOURS. [ ] JCO REQUIRED [X] NA

SHIFT SUPERVISOR [Signature] DATE/TIME 2-11-93 1232

## C. REPORTABILITY DETERMINATION PER REPORTING MANUAL

[ ] REPORTABLE PER \_\_\_\_\_ WITHIN \_\_\_\_\_ TIME: HOURS  
LAW/PERMIT/LICENSE

## NOTIFICATIONS (SS)

DUTY PLANT MANAGER [ ] N/A PERSON CONTACTED \_\_\_\_\_ DATE/TIME \_\_\_\_\_ INITIALS \_\_\_\_\_

NRC RESIDENT INSP [ ] N/A PERSON CONTACTED \_\_\_\_\_ DATE/TIME \_\_\_\_\_ INITIALS \_\_\_\_\_

NRC OPS CENTER [ ] N/A PERSON CONTACTED \_\_\_\_\_ DATE/TIME \_\_\_\_\_ INITIALS \_\_\_\_\_

OTHER [ ] N/A PERSON CONTACTED \_\_\_\_\_ DATE/TIME \_\_\_\_\_ INITIALS \_\_\_\_\_

[ ] ADDITIONAL REPORTABILITY EVALUATION REQUIRED

[X] NOT REPORTABLE  
SHIFT SUPERVISOR [Signature] DATE/TIME 2-11-93 1232

## D. FINAL REPORTABILITY REVIEW

[ ] REPORTABLE PER \_\_\_\_\_ WITHIN \_\_\_\_\_ TIME: HOURS  
LAW/PERMIT/LICENSE

[X] NOT REPORTABLE

LICENSING REPRESENTATIVE [Signature] DATE 2/12/93  
[ ] CONTINUATION SHEET ATTACHED

## E. WRITTEN REPORT

TYPE \_\_\_\_\_ DUE DATE \_\_\_\_\_

F. NUCLEAR NETWORK REQUIRED [ ] YES [X] NO

SHIFT SUPERVISOR/LICENSING

## PART 3: ACTION ASSIGNMENT

## ACTION ORGANIZATION(S)

DEPARTMENT DED ACTION Investigation DUE 3-11-93

DEPARTMENT \_\_\_\_\_ ACTION \_\_\_\_\_ DUE \_\_\_\_\_

DEPARTMENT \_\_\_\_\_ ACTION \_\_\_\_\_ DUE \_\_\_\_\_

[ ] CONTINUATION SHEET ATTACHED

CAG



# PART 4: EVENT DESCRIPTION

[ ] CONTINUATION SHEET ATTACHED

## A. DESCRIPTION

SEE THE ATTACHED PAGES

## B. PROBLEM EVENT CODES

N.3.8

# PART 5: SPR CAUSES AND GENERIC IMPLICATIONS

[ ] CONTINUATION SHEET ATTACHED

## A. CAUSES

SEE THE ATTACHED PAGES

## B. GENERIC IMPLICATIONS

[ ] CONTINUATION SHEET ATTACHED

SEE THE ATTACHED PAGES

## C. CAUSE CODES

EVENT  
CAUSE

NOT DETERMINED YET. FINAL INVESTIGATION  
WILL PROVIDE THIS INFORMATION.

#1	PRIMARY	SECONDARY	ADDITIONAL			
#2	PRIMARY	SECONDARY	ADDITIONAL			
#3	PRIMARY	SECONDARY	ADDITIONAL			

INVESTIGATOR

INVESTIGATOR



## PART 6: REMEDIAL/COMPENSATORY/CORRECTIVE ACTIONS

### A. REMEDIAL/COMPENSATORY ACTION COMPLETED (BEYOND PART 1.C)

SEE THE ATTACHED PAGES

### B. CORRECTIVE ACTIONS

[ ] CONTINUATION SHEET ATTACHED

C1 SEE ATTACHMENT

\_\_\_\_\_ DUE DATE \_\_\_\_\_ RESP. MANAGER \_\_\_\_\_ DATE \_\_\_\_\_

C2

\_\_\_\_\_ DUE DATE \_\_\_\_\_ RESP. MANAGER \_\_\_\_\_ DATE \_\_\_\_\_

C3

\_\_\_\_\_ DUE DATE \_\_\_\_\_ RESP. MANAGER \_\_\_\_\_ DATE \_\_\_\_\_

INVESTIGATOR

## PART 7: APPROVALS/CONCURRENCE

A. INVESTIGATOR W. R. Webb DATE 3/19/93 INVESTIGATING MGR M. Pacy DATE 3/19/93

B. CAG (IF REQ'D) W. R. Webb DATE 12-27-9 Based upon investigation of 42932417

C. PORC (IF REQ'D) MTG No. \_\_\_\_\_

D. PLANT MANAGER (IF REQ'D) \_\_\_\_\_ DATE \_\_\_\_\_

E. QA (IF REQ'D) \_\_\_\_\_ DATE \_\_\_\_\_

SIGNOFFS

## PART 8: CLOSEOUT

### A. CLOSEOUT SUMMARY

CAG

CLOSURE AUTHORITY

QA OR CAG

DATE 8/10/94

## **PART 4: EVENT DESCRIPTION**

### **A. DESCRIPTION**

Motor Operated Valve (MOV) A2SIMOV0031A allows the Residual Heat Removal (RHR) or Low Head Safety Injection (LHSI) system Train A alignment with cold leg of the Reactor Coolant System (RCS). This Westinghouse supplied 8-inch flexible wedge gate valve is normally open. It is located in the RHR system and is designated as XRH0031A. The other two valves which perform a similar function in B and C Trains of the RHR system are XRH0031B and XRH0031C.

On 2/09/93, the RHR Train 2A was in operation. At 22:35, RHR Pump 2B was started. The Low Pressure Letdown was switched from Train 2A to Train 2B. A2SIMOV0031A was closed at 22:51 to allow Train A removal from service and perform a scheduled surveillance testing.

At 23:06, A2SIMOV0031A failed when stroked open from the control room for normal system alignment; the motor started to smoke and the breaker tripped due to thermal overload. The plant operator noticed an oily fluid leaking from the motor onto the lagging. The RHR and LHSI Train A was declared inoperable. The plant operator confirmed the valve's closed position by manual operation of the hand wheel.

The actuator was disassembled, cleaned, and inspected. The spring pack belleville springs were found to be filled with slightly hardened grease. The torque switch and limit switch assemblies were not damaged. The switch contacts properly operated from close to open and open to close actuation.

## **PART 5: SPR CAUSES AND GENERIC IMPLICATIONS**

### **DISCUSSION**

During a Design Basis Accident (DBA), the XRH0031 valves are closed to align flow from the LHSI pumps to the corresponding hot leg of the RCS for recirculation. Also, during initiation of the RHR system operation, XRH-0031 is closed to permit boron equalization within the RHR system prior to delivering flow to the RCS.

During normal operation, when putting the RHR train in service, this MOV is closed prior to starting the RHR pump. Then the RHR pump is started to warm-up the system and equalize the boron concentration in the system. After the boron is equalized and the system is warmed up, the MOV is opened to align the system with the RCS Cold Leg for cooldown process or maintaining the Mode 4 operation.

The investigation included a review of thermal binding and pressure locking scenario. The following summary is included for information:

## Thermal Binding

When subjected to rapid cool down, the valve body contracts a greater amount than the disc and pinches the disc in the seat; thus, causing the seat to bind the disc tightly. Excessive closing force also contributes to thermal binding phenomenon by driving the disc more into the seat, because, on cooling, the thermal binding effect is increased. Several potential remedies have been suggested to alleviate this situation. They are:

- a. Slightly opening and re-closing a valve during cooldown.
- b. Limiting valve actuator closing force.
- c. Changing the valve closure scheme <sup>from</sup> ~~form~~ torque to limit control to eliminate excessive seating forces during closing.
- d. Using Limitorque Model SB actuators with compensating spring pack.
- e. Replacing the disc with a more flexible disc.

## Pressure Locking

Pressure locking generally develops because of the rise in temperature of fluid trapped in the bonnet cavity and the area between the discs. The fluid may enter during the normal valve cycling, or by leaking through the seat of a closed valve with a delta-p across the disc. The fluid's thermal expansion increases the bonnet cavity pressure and results in pressure locking the valve disc.

Pressure locking phenomenon can delay the valve's stroke time or cause the valve actuator motor to stall. The suggested methods to prevent pressure locking are:

- a. Drilling a small hole on the upstream side of the valve disc to relieve pressure buildup in the bonnet and between the discs.
- b. Installing a pressure relief or vent valve in the bonnet.
- c. Installing an external bypass line with a manual valve from the bonnet to the upstream side of the valve.
- d. Stopping the valve disc travel by position limit switches rather than by motor torque.

Generally, valve operators are not sized to actuate against the binding forces which are generated by the thermal binding or by the pressure locking phenomena. Actuation in these conditions may result in locked-rotor current and rapid increase in temperature of the motor internals. Within 10 to 15 seconds, the heat may damage the motor or degrade the motor's capability to deliver a specified torque.

Industry experience has shown that the double disc and flexible wedge gate valves in many safety applications have not been operable due to the pressure locking and thermal binding.

## **A. CAUSE of EVENT**

On 1/26/88, 1SI-0031A failure resulted in a motor burn out. The root cause investigation by SPR 88-0030 was inconclusive. Because the change in temperature was not significant, the thermal binding was not considered as a potential root cause.

On 7/31/88, 2SI-0031A failure resulted in a motor burn out. Subsequently, a temporary motor installed to continue the Hot Functional Testing (HFT) also burned out on 8/31/88. However, the valve was manually stroked four times with ease after the second motor's burnout. Based on subsequent valve stroking the thermal binding was not considered a probable root cause. The temporary motor failure was caused by the motor bearing failure.

On 4/09/89, 2SI0031A again failed to open and resulted in a motor burn out. The system operation data showed that within one minute the RHR system temperature had dropped 120°F. There is no hard evidence of thermal binding, however, a possibility of thermal binding can not be completely discounted. Torque seating of the valve also could have been a contributing factor in thermal binding.

Prior to the 2/09/93 motor failure, the MOV 2SI-0031A was set for torque closure. Actuator inspection has revealed that the spring pack was full of semi-hardened grease. This condition could have restrained the spring pack compression and caused the valve disc to travel with much higher torque into the seat. In addition, the RHR Train 2A experienced a rapid cooldown of 120°F. Therefore, a potential of thermal binding exists.

Based on the above information DED has determined the primary root cause of SI-31A failure to be the hydraulic locking of the spring pack, resulting in excessive seating force and mechanical binding. Thermal binding may have been a contributing factor.

## **B. GENERIC IMPLICATIONS**

Implications of this event were considered for the Residual Heat Removal (RHR) trains B and C in Unit 2, and Trains A, B, and C in Unit 1.

A comparison of the system layout in the RHR trains A, B, and C indicates that Train-A has the shortest distance between the RHR heat exchanger discharge and the Cold Leg Isolation valve.

Train A	41 Ft. (Approximately)
Train B	55 Ft. (Approximately)
Train C	67 Ft. (Approximately)

The change in the system temperature during SI-31 valve closure is similar in magnitude. Since, the temperature change in all RHR trains is similar and there is no history of any valve problems in trains B and C, it is concluded that root cause of SI-31A failure in both units is not a result of thermal binding.

The Unit 1 MOVs and the train A MOV in Unit 2 are set to close on limit thus decreases the possibility of excessive force during valve closure and mechanical or thermal binding. The MOVs in trains B and C in Unit 2 are scheduled to change from torque close to limit close in the current refueling outage to eliminate their potential of mechanical or thermal binding. In addition, the actuators installed on these valves already have a compensating spring pack installed on them. The compensating spring pack prevents hard seating of the limit close valves by absorbing the excess seating force in spring pack compression.

In high temperature systems, motor operated gate valves may fail due to thermal binding when subjected to rapid cooling just prior to the opening stroke. Also, torque closing of the gate valves could potentially contribute to the excessive seating load when the spring pack is full of grease.

### **C. CONCLUSIONS**

Based on the above information DED has determined the primary root cause of SI-31A failure to be the hydraulic locking of the spring pack, resulting in excessive seating force and mechanical binding. Thermal binding may have been a contributing factor.

## **PART 6: REMEDIAL/COMPENSATORY/CORRECTIVE ACTIONS**

### **A. REMEDIAL/COMPENSATORY ACTION COMPLETED**

- R1. Service Request SI-178013 was written to change the closure scheme of the actuator from torque closed to limit closed. This activity was completed on 2/18/93.
- R2. DED initiated Service Request SI-179892, 178305, 178306 to inspect internals of the valves XRH0031A/B/C for damage and wear. This activity is scheduled in 2RE03.
- R3. Service Request RH-2-170062 was written to replace the damaged motor with a new motor and to refurbish the actuator. The motor was replaced under WAN# 93006029. The actuator was disassembled, cleaned, inspected and refurbished. The spring pack was disassembled, cleaned and reassembled prior to installation.

528  
46  
+  
11

**B. CORRECTIVE ACTIONS**

- C1. Review operating procedures for the high temperature systems and identify the motor operated gate valves which, due to rapid cooling, are potentially susceptible to thermal binding. *Perform with LTR IP 92-006 Item 5d*

DUE DATE 9/10/93 RESP. MANAGER M. Pacy DATE *MPacy 3/19/93*

- C2. Provide corrective actions for the valves which are identified above in C1 as susceptible to thermal binding.

DUE DATE 9/10/93 RESP. MANAGER M. Pacy DATE *MPacy 3/19/93*

- C3. Perform failure analysis of the motor to determine root cause for the locked rotor condition. Provide corrective action, as appropriate.

DUE DATE 5/15/93 RESP. MANAGER M. Pacy DATE *MPacy 3/19/93*

- C4. Provide the root cause in a Final Investigation Report, and the Casual Factor Work Sheet after the completion of the above corrective and remedial actions.

DUE DATE 9/10/93 RESP. MANAGER M. Pacy DATE *MPacy 3/19/93*

- C6. Re-establish thermal conditions which occurred on 2/10/93 and ~~then~~ see if binding occurs (unit 2)*



# SPR ACTION COMPLETION VERIFICATION FORM

1. SPR#: 930470

Action Item # (If Known): C3  
 NRC Related ☐ Yes ☒ No  
 Priority 3

2. ACTION #(s) STATEMENT(s) Perform failure analysis of the motor to  
determine Root Cause for the locked motor condition. Provide  
Corrective action as appropriate

3. THE ABOVE ACTION HAS BEEN VERIFIED COMPLETE BY:

		Attached*	
		Yes	No
a)	Document(s) # <u>SPR 93-2417-I</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
b)	Describe <u>The locked motor event identified in SPR 93-0470 was</u> <u>duplicate in SPR 93-2417 on BISIMOV00318. The Root Cause</u> <u>was determined to be Thermal Binding of the Valve. *X</u>		

4. DATE(s) COMPLETE: 12/16/93

AUTHORIZING SIGNATURE:

[Signature] 12/16/93  
 Date

\* VERIFICATION DOCUMENTS SHALL BE PROVIDED FOR NRC RELATED ISSUES.

\*\* Corrective actions are being developed as part of  
Corrective actions C1 & C2 of this SPR and as identified  
in the Corrective actions for SPR 93-2417.



PORC Review Evaluation

SPR

930470

Subject

Does the subject SPR meet any of the following criteria:

- |   | YES | NO |
|---|-----|----|
| 1) Concerns a REPORTABLE EVENT?   | —   | ✓  |
| 2) Concerns a <u>significant</u> operating abnormality or <u>significant</u> deviation from normal and expected performance of plant equipment or systems that <u>affect nuclear safety</u> ?   | ✓   | ✓  |
| 3) Concerns unanticipated deficiencies in the <u>design</u> or <u>operation</u> of structures, systems, or components that <u>affect nuclear safety</u> ?   | ✓   | ✓  |
| 4) * Concerns any accidental, unplanned, or uncontrolled radioactive release?   | —   | ✓  |
| 5) Concerns the violation of: <ul style="list-style-type: none"><li>• Codes</li><li>• Regulations</li><li>• Orders</li><li>• Technical Specifications</li><li>• Operating Licensing Requirements</li></ul> having <u>nuclear safety</u> significance? | —   | ✓  |
| 6) Concern the abnormal degradation of systems designed to contain radioactive material?  | —   | ✓  |

If any of the above questions are answered YES, THEN the subject SPR SHALL be submitted to PORC.

H. Anderson  
Evaluator

12-27-73  
Date

NOTE: SPR not to be submitted to PORC as SPR 932417 will be.

- \* An SPR that concerns uncontrolled radioactive release requires review and approval by the Plant Manager.

## 1.) REVIEW SUMMARY, cont.

Recommendation 1. Identify all gate valves in safety-related systems that are required to open for system operation and are potentially susceptible to the pressure locking of thermal binding phenomenon.

Evaluation: The review of all safety-related gate valves has been previously completed and included in the evaluation of OER item number SER 88-008, attached. This review included all normally closed 2 1/2 inch and larger safety-related, actuator-driven NSSS and BOP gate valves which may be susceptible to pressure locking or thermal binding due to process conditions. The valves identified are as follows:

<u>Valve #</u>	<u>Valve Function</u>
RH0019 A,B,C	RCS hot leg injection isolation
RH0060 A,B,C	RHR pump suction isolation
RH0061 A,B,C	RHR pump suction isolation
RH0066 A,B	RHR letdown to CVCS isolation
SI 008 A,B,C	HHSI hot leg injection isolation

Each of these valves is supplied by Westinghouse (not Anchor-Darling as in the subject SOER) and is provided with a valve stem leakoff connection. These valves are not susceptible to thermal binding since the system temperature during valve closure is not significantly different from the conditions which will exist when the valve is required to perform its safety function. Westinghouse performed a conservative analysis of the above valves to determine if the valve is capable of opening with consideration of pressure locking and thermal binding during all system operating modes. The results of this analysis (ref. ST-HL-WN-200000, dated November 25, 1986) indicated that six of these valves [RH0060 A,B,C and RH0061 A,B,C] could be susceptible to pressure locking or thermal binding and recommended that these valves be tested to demonstrate operability during hot functional testing. This testing was successfully performed (ref. SFR 87-0367).

Pressure locking or thermal binding of valves is an extremely unlikely event which requires an ideal combination of contributing factors. Some of these contributing factors are near perfect seating of the wedge, insignificant valve packing leakage, system operating mode, and system pressure and temperature. Therefore, the prediction of exactly which valves have the potential for this problem cannot be made with absolute certainty. The evaluation performed under SER 88-008 identified potentially susceptible valves; however, the only valve found to be inoperable due to possible pressure locking or thermal binding was the Unit 1 CV006 valve which was not identified in this evaluation. The evaluation performed on this valve and discussions with the valve vendor, Westinghouse, indicate that the failure of this valve was a highly unusual event which was due to a ideal, from the perspective of pressure locking and thermal binding, combination of contributing factors. This valve had extremely low packing leakage as demonstrated by test and a nearly perfect seat. This combination is postulated to have prevented the leakoff of fluid trapped in the valve bonnet which may have prevented the valve from operating. The identical valve in Unit 2 was tested and found to operate satisfactorily illustrating the random nature of this phenomenon. The corrective action taken was a modification of the Unit 1 valve CV006, ref. FCN TGXm-10724, to provide a pathway for pressure equalization across the wedge by drilling a hole in the valve disk as documented in the SER 88-008 evaluation. An alternative to this modification could have been a replacement of the existing wedge with a new wedge. This would have prevented the near perfect seating of this valve and allowed the valve to operate as required. Short of modifying all gate valves to provide a relief pathway (by drilling the disk or valve body) there is no method to assure that this phenomenon will never occur. Actions on this scale are not justified based on the unlikely occurrence of this event. In addition, there is no actions that can be taken during the design, procurement, installation, or maintenance of valves which can absolutely preclude this phenomenon. Since there is no satisfactory methodology for identifying which valves may be susceptible to pressure locking or thermal binding, no further action is required for recommendation 1 of SOER 84-007.

Recommendation 2: For the valves identified in recommendation #1, take appropriate actions to ensure that these gate valves will open when required.

Evaluation: As discussed in the evaluation of recommendation 1, actions to ensure valve operability have been taken. All valves are currently operable. No additional action is required.

Recommendation 3: Operations and maintenance personnel training should include instructions on the valve failure mechanisms discussed in this SOER, including how to diagnose the failure mechanism and the action necessary to recover from the failure.

Evaluation: The Westinghouse analysis and hot functional testing performed at STPEGS have demonstrated that all valves which may be susceptible to pressure binding are capable of operating as designed. The operability of these valves may be effected by manually seating the valve or by subsequent valve maintenance activities (wedge replacement or seat lapping). Operators should be trained regarding the potential for creating a pressure locked or thermally bound valve due to maintenance activities.

# PORC Review Evaluation

SPR  
Subject

930470

SI MOV0314 failure

Does the subject SPR meet any of the following criteria:

	YES	NO
1) Concerns a REPORTABLE EVENT?	___	<u>✓</u>
2) Concerns a <u>significant</u> operating abnormality or <u>significant</u> deviation from normal and expected performance of plant equipment or systems that <u>affect nuclear safety</u> ?	<u>✓</u>	___
3) Concerns unanticipated deficiencies in the <u>design</u> or <u>operation</u> of structures, systems, or components that <u>affect nuclear safety</u> ?	___	<u>✓</u>
4) Concerns any accidental, unplanned, or uncontrolled radioactive release?	___	<u>✓</u>
5) Concerns the violation of:	___	<u>✓</u>
• Codes		
• Regulations		
• Orders		
• Technical Specifications		
• Operating Licensing Requirements		
having <u>nuclear safety</u> significance?		
6) Concern the abnormal degradation of systems designed to contain radioactive material?	___	<u>✓</u>
7) Should be otherwise reviewed by PORC? Explain: _____ _____ _____ _____ _____	___	___

If any of the above questions are answered YES, THEN the subject SPR SHALL be submitted to PORC.

W Henderson  
Evaluator

3-23-93  
Date

## Houston Lighting &amp; Power Company

## OFFICE MEMORANDUM

To

M. Pacy

From

C. T. Bowman

Subject

SPR # 930470

4/26/93

Based on our review, the subject SPR investigation has been reopened for the following reason(s).

Provide final investigation Report (ref  
64) and include discussion of  
long term hot leg mode of operation

Accordingly, your group is requested to reopen investigation  
with an assigned due date of 9-10-93.

SMH/pt

cc:

G. L. Parkey  
P. Fellingham



# SPR ACTION COMPLETION VERIFICATION FORM

1. SPR #: 93-0470 Action Item # (If Known): 93-0470-I INVEST.  
 NRC Related ☐ Yes ☒ No  
 Priority 3

2. ACTION #(s) STATEMENT(s) Provide Root Cause in a final investigation  
report and include a causal factor work sheet after completion of Remedial  
& Corrective Actions

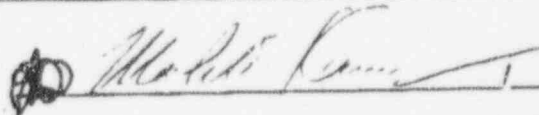
3. THE ABOVE ACTION HAS BEEN VERIFIED COMPLETE BY:

		Attached*	
		Yes	No
a)	Document(s) # <u>SPR-93-2417-I</u>	<input checked="" type="checkbox"/> M	<input checked="" type="checkbox"/> <u>MS 12/2/93</u>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>

b) Describe This event was duplicated in SPR 93-2417 on BPSIMOU0031B. That  
SPR was investigated and identified this event as part of the generic concerns

4. DATE(s) COMPLETE: 12/16/93

AUTHORIZING SIGNATURE:

 12/16/93  
 Date

\* VERIFICATION DOCUMENTS SHALL BE PROVIDED FOR NRC RELATED ISSUES.

The Root Cause was determined to be Thermal Binding of the Valve.  
Attachment 1 to SPR 93-2417-I provides the detailed engineering  
analysis. The documentation meet the intent of 93-0470-1.1.  
There is no need to write an additional report on this event.

concur  
W. H. H. H. H. H.  
12-27-93



# SPR ACTION COMPLETION VERIFICATION FORM

1. SPR#: 930470

Action Item # (If Known): R2  
 NRC Related ☐ Yes ☒ No  
 Priority \_\_\_\_\_

2. ACTION #(s) STATEMENT(s) Perform Special Test Procedure IEP07-RH-0001  
to confirm that the proposed change to operating procedure  
OPOPO2-RH-0001, adequately address the thermal bending  
issue for SI 31 MOV's.

3. THE ABOVE ACTION HAS BEEN VERIFIED COMPLETE BY:

		Attached*	
		Yes	No
a)	Document(s) # <u>IEP07-RH-0001</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>

b) Describe Completed special test IEP07-RH-0001 under SR# 912798 complete  
Satisfactorily

4. DATE(s) COMPLETE: 2/7/94

AUTHORIZING SIGNATURE: \_\_\_\_\_

[Signature] 2/8/94  
 Date

\* VERIFICATION DOCUMENTS SHALL BE PROVIDED FOR NRC RELATED ISSUES.

Temperature Monitoring of the RHR System  
and Stroke Test of SI-MOV-0031B

11EP07-RH-0001

Rev. 0

Page 9 of 9

RHR TESTING DATA SHEET

11EP07-RH-0001-1

(Page 1 of 1)

STEP

5.1 Shift Supervisor permission to start test:

*DKH*  
Shift Supervisor

1047  
Time

2-7-94  
Date

5.5 RTD data taking commenced:

1220  
Time

2-7-94  
Date

5.9 Step 9.18 of OPOP02-RH-0001 complete:

1737  
Time

2-7-94  
Date

5.10 RTD Data taking completed:

2032  
Time

2-7-94  
Date

5.13 Shift Supervisor notified test complete:

*James Neil*  
Test Coordinator

2032  
Time

2-7-94  
Date

5.14 Test Results: (Attach RTD temperature data and ERFDADS data).

Remarks SEE Attached. Satisfactory test results. SI-MOV-0031B  
stroked properly and necessary data has been gathered.

Reviewed By:

*James Neil*  
Test Coordinator

02-07-94  
Date

This form, when completed, SHALL be retained for the life of the plant.

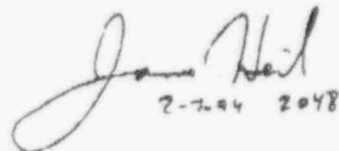
11EF07-RH-0001 DATA SHEET CONTINUATION

Initial assessment of raw data indicates that by cooling down RH-0031B first (using the pump "jog") the valve will attain uniform temperatures prior to its closure. This uniform temperature would help in solving the thermal binding problem.

The system was cooled passively by allowing it to sit idle with cooling to the heat exchanger. Although, large temperature transients were still seen at the pump suction and discharge RTDs.

An evaluation will be performed as to the effectiveness of this procedural revision. Relevant facts and observations that might effect this evaluation are listed below.

1. Much additional time elapsed between the initial jogging of the pump (step 9.7 of OPOP02-RH-0001, and the closing of MOV-0031B. Instead of a 70 minute expected time duration, it was about 3 hours, 45 minutes. This allowed additional passive cooling of the system. This time lapse occurred due to having to wait for MOVATS test equipment to be installed on MOV-0031B.
2. The pump jogs were longer than had been planned. The first and second jogs as observed by the test coordinator at the pump were 6 and 8 seconds respectively. This would act to cool the whole system down uniformly.
3. Prior to closing MOV-0031B in step 9.11, the valve had to be manually closed to provide clearance for the installation of strain gage instrumentation. No abnormally high torque was experienced during this manual stroke. It was then electrically opened to ensure proper positioning prior to its closed stroke.
4. The pump seal cavity and casing joint were observed during the pump cooldown portion of the procedure OPOP02-RH-0001, STEP 9.13. No leakage was seen. The slight seal leakage normally seen at higher temperatures, stopped.
5. The Fluke paper jammed up at 1604. The feeder had to be adjusted. Data printing was recommenced at 1613. This was during a thermally static portion of the procedure so it will have little impact.
6. The open stroke of the valve (step 9.17) had to be reperformed. On the first attempt the data connection into the computer came loose and no data was obtained. The valve was then electrically closed in order to perform opening stroke for VDT data.

  
2-2-94 2048

# SPR ACTION COMPLETION VERIFICATION FORM

1. SPR#: 930470

Action Item # (If Known): C1  
 NRC Related ☐ Yes ☒ No  
 Priority \_\_\_\_\_

2. ACTION #(s) STATEMENT(s) C1) Review Operating procedures for the High Temperature system, identify the MOV gate valves which, due to rapid cooling, are potentially susceptible to Thermal Binding.

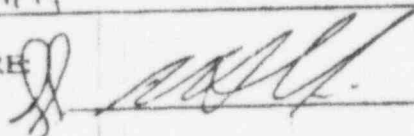
3. THE ABOVE ACTION HAS BEEN VERIFIED COMPLETE BY:

		Attached*	
		Yes	No
a)	Document(s) # <u>DBR review package</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>

b) Describe During the Design Basis Review (DBR) process all GL 87-10 MOVs were reviewed for potential susceptibility to Thermal Binding. This is documented as part of the DBR review.

4. DATE(s) COMPLETE: 8/9/94

AUTHORIZING SIGNATURE



8/9/94  
Date

\* VERIFICATION DOCUMENTS SHALL BE PROVIDED FOR NRC RELATED ISSUES.

**RECEIVED**

AUG 10 1994  
 CORRECTIVE ACTION GROUP

ACTUATOR  
TORQUE  
CLOSED

MOTOR WAS  
FUNCTIONAL  
OK?

MOTOR WAS  
FUNCTIONAL -  
WAS LEAKING  
WAS OK?

REPLACE  
MOTOR  
REPAIR  
MOTOR

HOW MANY  
MOVES FAILED  
ON THIS MOV  
REPAIR(S)

ALL IN OPEN  
STROKE  
(YES)

SPRING FACIL  
FULL OF GUM  
(HARD - GUM  
GUM)

CLEAN AND  
RE-FLUSH  
OVER TOWARD

INSTALL  
STRAIN GAGE  
AND DIAGNOSTIC  
TEST

ACTUATOR  
ACTION OK?

ACTUATOR  
FAILED IN  
OPEN STROKE  
SR-1-60

INSPECT  
INTERNAL  
OF ACTUATOR  
AND W-NGER

REPAIR DISC  
DESIGN IS IT  
OK

REPAIR DISC  
Temp Data  
between last  
previous W-NGER  
STOPS

REPAIR DISC  
Temp Data  
between last  
previous W-NGER  
STOPS

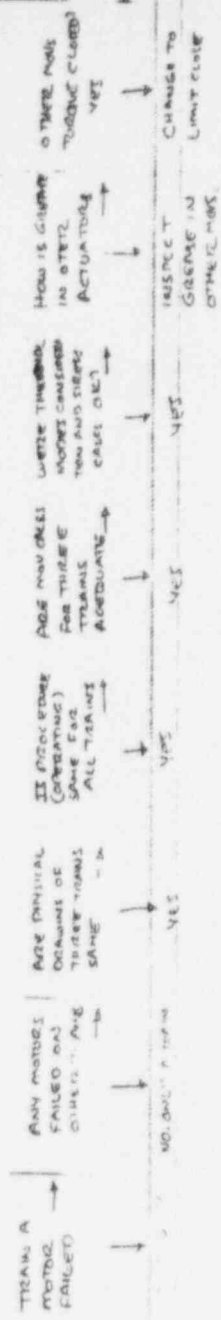
VALUE FAILED  
TO OPEN. IT  
WAS CLOSE A  
FEW MINUTE  
BEFORE

DISASSEMBLE  
AND INSPECT  
INTERNAL

Temp (Mid)  
drilled from  
T-13 to T-15  
(R-100 C-100)

TEMPERATURE  
R-100 C-100  
R-100 C-100

# TRAIN ANALYSIS FOR RHR SYSTEM



ARE OTHER MONITORS  
DETERMINED  
↓  
INSTALL STRAIN  
GAGES AND  
GAL 89-10787

# SPR ACTION COMPLETION VERIFICATION FORM

1. SPR#: 930470

Action Item # (If Known): C2  
 NRC Related ☐ Yes ☒ No  
 Priority \_\_\_\_\_

2. ACTION #(s) STATEMENT(s) C2: Provide Corrective Actions for the valves which are identified in C1 as susceptible to Thermal Binding.

3. THE ABOVE ACTION HAS BEEN VERIFIED COMPLETE BY:

		Attached*	
		Yes	No
a)	Document(s) # <u>DBR review packages</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	# <u>Pressure Locking &amp; Thermal Binding Report 7/21/94</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>
	# _____	<input type="checkbox"/>	<input type="checkbox"/>

b) Describe See Attached

4. DATE(s) COMPLETE: 8/9/94

AUTHORIZING SIGNATURE: [Signature]

8/9/94  
Date

• VERIFICATION DOCUMENTS SHALL BE PROVIDED FOR NRC RELATED ISSUES.

**RECEIVED**

AUG 10 1994

CORRECTIVE ACTION GROUP



***PRESSURE LOCKING AND THERMAL BINDING***

***REPORT***

***July 21, 1994***

July 21, 1994

Subject: Pressure Locking and Thermal Binding Status Report as of June 28, 1994.

Reference Documents:

- 1) (Draft / Not issued) Pressure Locking / Thermal Binding Evaluation Program dated 1/18/94, see attachment 1. For Information Only.
- 2) (Draft / Not issued) Westinghouse Gate Valve Data / Calculation Study for STP's GNL 89-10 Program; dated 2/10/94, see attachment 2. For Information Only.
- 3) Engineering Instruction EI 4.06, entitled "MOV Design Basis Review", rev. 2, see attachment 3.
- 4) (Draft / Not issued) Calculation Binder No. MC-6441, entitled "Pressure Locking / Thermal Binding", rev. 0.
- 5) "STP Pressure Locking / Thermal Binding Order of Magnitude" Calculation, dated 1/29/94, see attachment 4.
- 6) Correspondence from L. Battaglia, to R. Kersey, dated 2/9/94; subject: "Effect of Line Loads on MOV requirements". See attachment 5.
- 7) Calculation No. MC-6442, section 3.24, rev. 0; entitled "Phase I: GL 89-10 Justifications".

Executive Summary

The potential valve inoperability caused by the phenomena of Pressure Locking / Thermal Binding ("PL / TB") is a common-mode failure mechanism that can prevent a gate valve from opening, and could render redundant trains of safety systems or multiple safety systems inoperable. As a result, STP has developed a "PL / TB" Program and related documents (refs. 1 thru 6) for:

### Executive Summary (cont'd)

- \* Identifying and evaluating the spectrum of GNL 89-10's MOV's, if any, that have been or that may be subjected to "PL / TB"
- \* Determining what conditions may introduce the failure mechanism under both normal and accident conditions.
- \* Providing a uniform and standard technical approach for all MOV related work.
- \* Proposing corrective actions as necessary.

The scope of this program has identified, specifically thru the Design Basis Review (DBR) package preparation process, approximately sixty six MOV's which are susceptible to "PL / TB", see table 1. From this group, thirty six MOV's had calculations (ref. 4) performed on a stand alone basis which applied analytical tools to quantify the additional thrust due to "PL / TB", as applicable. Twelve of these MOV's (1,2-RH-60 and 61 A,B,C) needed reconciliation as a result of thermal binding. See attachment 1 for more details.

Since none of the thirty six MOV's which had in-depth analysis performed produced any operability concerns, analysis for the thirty pending MOV's is being delayed until further industry and NRC thermal binding guidance exists.

### Conclusion:

Corrective Action C2 requested that corrective actions be initiated for the 66 valves identified as being susceptible to Thermal Binding (TB). An engineering evaluation and corrective actions were performed for the SI 31 MOVs (6 MOVs total) with subsequent testing validating the effectiveness of the operational procedure changes. 30 additional MOVs had engineering evaluations performed with no additional corrective actions recommended. Based on the evaluations to date and the imminent issuance of an NRC Generic Letter on the subject, no further actions are being taken at this time and this corrective action should be closed. In addition, outside the MOV31's, STP has no evidence of an inoperability due to a Thermal Binding event.

Based on the corrective actions to the SIMOV31's, and the engineering evaluations completed to date Corrective Action C2 is considered complete.

TABLE I

*"PL / TB" SUSCEPTIBLE MOV's*

MOV ID(s)	DRAFT CALC. No.	ACCEPT. AS IS?	COMMENTS
1,2 - CV - 0003	MC-6441, rev. 0	Yes	
1,2 - CV - 0006	MC-6441, rev. 0	Yes	
1,2 - RH - 0060A	MC-6441, rev. 0	Yes	See Attachment 1
1,2 - RH - 0060B	MC-6441, rev. 0	Yes	See Attachment 1
1,2 - RH - 0060C	MC-6441, rev. 0	Yes	See Attachment 1
1,2 - RH - 0061A	MC-6441, rev. 0	Yes	See Attachment 1
1,2 - RH - 0061B	MC-6441, rev. 0	Yes	See Attachment 1
1,2 - RH - 0061C	MC-6441, rev. 0	Yes	See Attachment 1
1,2 - SI - 0008A	MC-6441, rev. 0	Yes	
1,2 - SI - 0008B	MC-6441, rev. 0	Yes	
1,2 - SI - 0008C	MC-6441, rev. 0	Yes	
1,2 - SI - 0019A	MC-6441, rev. 0	Yes	
1,2 - SI - 0019B	MC-6441, rev. 0	Yes	
1,2 - SI - 0019C	MC-6441, rev. 0	Yes	
1,2 - SI - 0031A	MC-6441, rev. 0	Yes	
1,2 - SI - 0031B	MC-6441, rev. 0	Yes	
1,2 - SI - 0031C	MC-6441, rev. 0	Yes	
2 - RC - 0001A	MC-6441, rev. 0	Yes	
2 - RC - 0001B	MC-6441, rev. 0	Yes	
1,2-RH-0066 A,B,C	PENDING		
1,2-RH-0067 A,B,C	PENDING		
1,2-SI-0016 A,B,C	PENDING		
1,2 - CV - 0465	PENDING		
1,2 - CV - 0468	PENDING		

TABLE I

*"PL / TB" SUSCEPTIBLE MOV's*

MOV ID(s)	DRAFT CALC. No.	ACCEPT. AS IS?	COMMENTS
1,2 - CV - 0112A	PENDING		
1,2 - CV - 0112B	PENDING		
1,2 - CV - 0112C	PENDING		
1,2 - CV - 0113A	PENDING		
1,2 - CV - 0113B	PENDING		

ORIGINAL

REA Q0910

STP 646A (01/91) SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

RFA # 91-1852

REQUEST FOR ACTION

PAGE 1 OF 6

1. UNIT 2

2 SYSTEM ZZ

3. NEED DATE: 11/11/91

3A. EXPECTED DATE: 11/11/91

4. NONCONFORMING CONDITION: YES NO

DESIGN ENGINEERING EVALUATION  
REJECT REWORK REPAIR USE-AS-IS

15. SPR REQUIRED: YES NO

13. PRIORITY  
• CRITICAL TO CONTINUED OPERATION YES(PRI 1) NO  
LOO EXPIRATION TIME/DATE  
WORK DOCUMENT(S)  
• CRITICAL TO WORK IN PROGRESS: YES(PRI 2) NO  
WORK DOCUMENT(S) SEE ATTACHED  
• CRITICAL TO SCHEDULED WORK: YES(PRI 3) NO  
WORK WEEK/OUTAGE 2/RE02  
WORK DOCUMENT(S) SEE ATTACHED  
• OTHER (JUSTIFY)  
APPROVED BY

6. SUBJECT: THE USE OF OPMPO2-ZG-0011 (ALTERNATE VALVE PACKING AND LIVE LOAD PACKING) AND THE USE OF SITE SPECIFICATION - 5L749TSI018 (ALTERNATIVE VALVE PACKING AND LIVE LOAD DESIGN)

7. ACTION REQUESTED: (1) APPROVE THE USE OF THE "INDIVIDUAL VALVE SURVEY SHEET" FROM THE SITE SPEC. - 5L749TSI018 FOR DATA COLLECTION IN PLACE OF ADDENDUM 1 OF OPMPO2-ZG-0011. THE ADDENDUM 1 DATA SHEET WILL REFERENCE ATTACHED SURVEY SHEET. (AMH'd)

8. REASON FOR REQUEST: TO ENSURE TRACIBILITY OF PACKING DATA AND TO ENSURE PROPER REVIEW OF PACKING DATA, AS CALLED OUT IN OPMPO2-ZG-0011.

9. REFERENCE DOCUMENTS OPMPO2-ZG-0011 SITE SPECIFICATION - 5L749TSI018  
OPMPO4-ZG-0003

A.D. JOYNT 7777 11-9-91 11500 IPS/OMD  
10 ORIGINATOR (PRINT) 11 EXT 12 DATE TIME DEPT/DIV  
R.F. PENN STI-93-015466-5  
10A SUPERVISOR

NONCONFORMING CONDITIONS ONLY (REPORTABILITY CHECK)  
MODE LIMITATION NR CRA REQUESTED YES NO CRA DUE BY DATE TIME  
REASON FOR REQUEST NR  
SHIFT SUPERVISOR [Signature] 11/9/91 1524  
SHIFT SUPERVISOR REMARKS None

ROUTING TABLE (DEPT. MANAGER NAMES ONLY)

FROM/DATE SENT	TO	DATE RECEIVED
McBURNETT /	Deane D. J.	11-9-91
D. J. Deane 12-4-91	M. Burnett	12-4-91
McBURNETT / 4-16-92	LEAGUE	04-16-92

CLOSED



## REQUEST FOR ACTION CONTINUATION SHEET

RFA # 91-1852

PAGE 2 OF 8

ACTION REQUESTED CONTINUED FROM COVER.

(2) ALLOW FOR SYSTEM ENGINEER APPROVAL SIGNATURE AND REVIEW SIGNATURE (OF PACKING DESIGN AND PACKING MANUFACTURE) ON THE REVIEW CYCLE OF THE WORK PACKAGE. AN ATTACHED LIST IS PROVIDED BY WR NUMBER AND VALVE NUMBER <sup>OR H.P. #</sup> OF VALVES THAT WILL NEED SYSTEM ENGINEER REVIEW. PACKAGES THAT ARE NOT LISTED ON THE ATTACHMENT AND ARE FOUND TO MEET THE REVIEW CRITERIA SHOULD BE COVERED BY THIS RFA.

(3) REFERENCE ATTACHED ADDENDUM 1 FOR SIGNATURE AND DATA REQUIREMENTS. \* REQUIRES ENG. SIGNATURE.

(4) THIS RFA SHOULD NOT ADDRESS VALVES THAT ARE "LIVE-LOADED" THESE WORK PACKAGES ARE ALREADY ROUTED FOR SYSTEM ENGINEER REVIEW.

ORIGINAL

STP 641B (01/91)

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

REQUEST FOR ACTION

PAGE 3 OF 8

RFA # 91-1852

15 RESPONSE:

①. It is permitted to use the Individual Valve Survey Sheet in place of the Addendum 1 Valve Packing Data Sheet as specified (i.e., ~~attach~~ the Addendum 1 sheet to reference the Survey Sheet, and the completed Survey Sheet attached to Addendum 1).

②. Allowance is given for the H&P Project Manager, or his designee, associated with the NHT Secondary Valve remark effort to sign for 'ENGINEER' in both the 'PLANNER' block and 'REVIEW' block on the Addendum 1 'Valve Packing Data Sheet' form. This allowance is provided for the valves that are static packed only with an alternate packing style. This includes those valves listed on the attached form as well as others that meet the above criteria.

FOR NONCONFORMING CONDITIONS ONLY:  
RESPONDING DEPARTMENT'S DISPOSITION DETAILS

REJECT REPAIR REWORK USE-AS-IS

PARTIAL ☐ FINAL ☒ INVALIDATE ☐

DESIGN CHANGE DOCUMENT REQUIRED?

YES ☐ NO ☒ IF YES, LIST IN BLOCK 17

ADMINISTRATIVE CONTROL(S)/ACTION(S)  
REQUIRED PER FINAL DISPOSITION?

NO ☒ YES ☐

IMPLEMENTING DEPT NA

IMPLEMENTING DEPT CONCURRENCE

NA / DATE

This response will permit proper closure of the Secondary Valve work packages.

SPR REQUIRED? YES ☐ NO ☒ IF YES, SPR NO \_\_\_\_\_

RESPONSE BY [Signature] 12-4-91 / 1110 7854 PED  
DATE TIME EXT. DEPT./DIV

DEPT. MANAGER OR DESIGNEE 12-4-91 / 1110  
DATE TIME

FOR NONCONFORMING CONDITIONS

16. DISPOSITION APPROVAL:

[Signature] 12-4-91 / 1110 [Signature] 12-4-91 / 1250  
PLANT MANAGER OR DESIGNEE DATE TIME SHIFT SUPERVISOR DATE TIME

17. NCR DISPOSITION HAS BEEN IMPLEMENTED BY THE FOLLOWING DOCUMENT(S).

DOCUMENT	DATE IMPLEMENTED	(PRINT)	SIGNATURE
SEE ATTACHMENTS (PAGES 6-8 OF 8)	4/16/92	A.D. JOYNT	[Signature]
	1/1		
	1/1		
	1/1		

\* SIGNATURE BY INDIVIDUALS IMPLEMENTING DISPOSITIONS ASSOCIATED WITH WORK DOCUMENTS (I.E. WR, PM, ETC.)

18. RFA CLOSED ON 12/3/93 RFA COORDINATOR [Signature] 12/3/93  
DATE DATE

ADDENDUM 1  
VALVE PACKING DATA SHEET  
(Page 1 of 2)

**ORIGINAL**

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Front of Typical Form

PACIOS.DPW 08/70

<p>1 NAME _____</p> <p>3 TAG/TPS _____</p> <p>7 VALVE FIGURE NO. _____</p> <p>10 PACKING DESIGN          CONFIGURATION <input type="checkbox"/> ADDENDUM 2 CONFIGURATION _____ <input type="checkbox"/> OTHER ( _____ SHEETS ATTACHED DETAILING DESIGN)          LIVE LOAD <input type="checkbox"/> NO <input type="checkbox"/> YES ( _____ SHEETS ATTACHED DETAILING DESIGN)          ENGINEER <i>[Signature]</i> _____          PRINT NAME _____ SIGNATURE _____ DATE _____       </p> <p>11 COMMENTS _____</p> <p>12 PLANNER _____          PRINT NAME _____ SIGNATURE _____ DATE _____ EXTENSION _____       </p>		<p align="center"><b>VALVE PACKING DATA SHEET</b> OPMP02-ZG-0011</p> <p>2 ACT NO _____</p> <p>4 VALVE MFG. _____ 5 VALVE TYPE _____ 6 VALVE SIZE AND PRESSURE _____</p> <p>8 VALVE ACTUATOR  <input type="checkbox"/> POWER <input type="checkbox"/> MANUAL       </p> <p>9 BONNET TYPE  <input type="checkbox"/> BOLTED <input type="checkbox"/> WELDED <input type="checkbox"/> OTHER _____       </p> <div style="display: flex;"> <div style="width:45%;"> <p>13 VALVE STUFFING BOX DATA</p> <p>- STUFFING BOX ID _____</p> <p>B - VALVE STEM DO _____</p> <p>C - STUFFING BOX DEPTH _____</p> <p>D - BLAND BOX HEIGHT _____</p> <p>14 LANTERN RING? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>LOCATED _____ FROM BOTTOM OF STUFFING BOX</p> <p>LANTERN RING HEIGHT _____</p> <p>15 VALVE PACKING BLAND DATA</p> <p>BLAND STUD TYPE: <input type="checkbox"/> BOWING BOLT <input type="checkbox"/> ALL THREAD <input type="checkbox"/> OTHER _____</p> <p>E - BLAND STUD DIAMETER _____</p> <p>F - RADIAL CLEARANCE _____</p> <p>G - AXIAL CLEARANCE _____</p> <p>H - NUT SIZE _____</p> <p>I - AVAILABLE STUD LENGTH _____</p> <p>16 BLAND NUTS TORQUED? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>TORQUE APPLIED _____</p> <p>17 COMMENTS _____</p> </div> <div style="width:55%; text-align: center;"> </div> </div>	
<p>18 CRAFTSMAN _____          PRINT NAME _____ SIGNATURE _____ DATE _____</p> <p>19 FOREMAN _____          PRINT NAME _____ SIGNATURE _____ DATE _____</p> <p>20 ENGINEER <i>[Signature]</i> _____          PRINT NAME _____ SIGNATURE _____ DATE _____</p>	<p align="right">PAGE ____ OF ____</p>		

**ORIGINAL**

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DATE \_\_\_\_\_

# INDIVIDUAL VALVE SURVEY SHEET

DISTRIBUTOR \_\_\_\_\_  
SPECIALIST \_\_\_\_\_  
UTILITY \_\_\_\_\_ PLANT \_\_\_\_\_

COMPLETED BY \_\_\_\_\_  
REVIEWED BY \_\_\_\_\_  
VALVE NO. \_\_\_\_\_ PAGE NO. \_\_\_\_\_

## VALVE DATA

EN: \_\_\_\_\_ DWG NO: \_\_\_\_\_  
MFG. \_\_\_\_\_ MODEL NO: \_\_\_\_\_  
SIZE \_\_\_\_\_ TYPE: \_\_\_\_\_  
SYSTEM PRESSURE \_\_\_\_\_ TEMP: \_\_\_\_\_  
LOCATION  
SYSTEM \_\_\_\_\_  
AREA \_\_\_\_\_

CONTAINMENT inside ☐ outside ☐  
SAFETY RELATED: yes ☐ no ☐

PROCEDURE NO. \_\_\_\_\_

ACTION power ☐ manual ☐  
FREQUENCY OF ACTION: \_\_\_\_\_

## PACKING DATA

STYLE 5300GTP: \_\_\_\_\_  
ID: \_\_\_\_\_ OD: \_\_\_\_\_ HT: \_\_\_\_\_  
QTY: \_\_\_\_\_ ITEM # \_\_\_\_\_  
STYLE ONE-CE \_\_\_\_\_  
ID: \_\_\_\_\_ OD: \_\_\_\_\_ HT: \_\_\_\_\_  
QTY: \_\_\_\_\_ ITEM # \_\_\_\_\_  
SEQUENCE: \_\_\_\_\_

## BUSHING DATA

ID: \_\_\_\_\_ OD: \_\_\_\_\_ HT: \_\_\_\_\_  
QTY: \_\_\_\_\_ ITEM NO. \_\_\_\_\_

## STUFFING BOX DATA

STEM OD: \_\_\_\_\_ BOX I.D.: \_\_\_\_\_

BOX DEPTH: \_\_\_\_\_

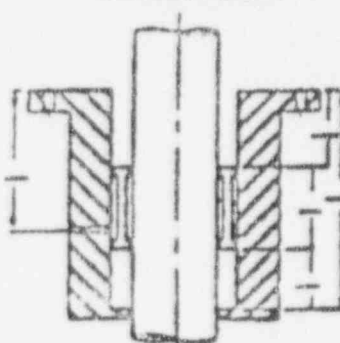
LANTERN RING

yes ☐  
no ☐  
HT: \_\_\_\_\_

PIPED ☐

PLUGGED ☐

## LANTERN RING



DATE PACKED: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

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NNI --- CHESTERTON --- STP  
VALVE RLPACK PROGRAM-2RE02

WR NUMBER	TPNS NUMBER	VALVE SIZE	MANUFACTURE NAME	PACKING SIZE	LIVELOAD OR STATIC
CD-082228	CD-0134	4"	PACIFIC	1-1/2 X 2-1/4 X 3/8	STATIC
XCD-152804	CD-0604	4"	PACIFIC	1 X 1-1/2 X 1/4	STATIC
CD-152835	N2CD-TV-7413	2"	FISHER	1/2 X 1 X 1/4	STATIC
DES-106445	ES-MOV-0063	16"	PACIFIC	1-7/8 X 2-5/8 X 3/8	STATIC
FW-130571	FW-0518	14"	PACIFIC	2-3/4 X 3-3/4 X 1/2	STATIC
FW-152806	FW-0187	8"	PACIFIC	1-7/8 X 2-5/8 X 3/8	STATIC
GS-067774	GS-0015	4"	CRANE	1-1/4 X 1-7/8 X 5/16	STATIC
HD-085616	HD-0619	3/4"		5/8 X 1 X 3/16	STATIC
HD-104277	ZC-0326	1/2"	KEROTEST	1/2 X 7/8 X 3/16	STATIC
HD-116936	HD-LV-7282	6"	FISHER	1/2 X 1 X 1/4	STATIC
HD-116948	HD-0209	8"	PACIFIC	1-5/8 X 2-3/8 X 3/8	STATIC
HD-130570	HD-0445	1"	KEROTEST	5/8 X 1-3/8 X 3/8	STATIC
XHD-130633	HD-0243	8"	PACIFIC	1-5/8 X 2-3/8 X 3/8	STATIC
HD-131177	HD-0206	8"	PACIFIC	1-5/8 X 2-3/8 X 3/8	STATIC
HD-131627	HD-MOV-0371	6"	PACIFIC	1-3/8 X 2-1/8 X 3/8	STATIC
HD-132327	HD-LV-7357	6"	FISHER	3/4 X 1-3/8 X 5/16	STATIC
HD-132328	HD-LV-7361	6"	FISHER	3/4 X 1-3/8 X 5/16	STATIC
HD-132971	HD-MOV-0366	6"	PACIFIC	1-3/8 X 2-1/8 X 1/4	STATIC
HD-133427	HD-0047	3"	PACIFIC	1 X 1-1/2 X 1/4	STATIC
HV-139805	HV-0003	1-1/2"	HANCOCK	9/16 X 15/16 X 3/16	STATIC
HY-105813	HY-0008	1"	DRESSER	7/16 X 3/4 X 5/32	STATIC
HY-115629	HY-0036	1/2"	DRESSER	3/8 X 5/8 X 1/8	STATIC
HY-115639	HY-0037	1/2"	DRESSER	3/8 X 5/8 X 1/8	STATIC
MD-104578	MD-0440	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-105537	MD-0779	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC

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NN1 --- GASTERTON --- STP  
VALVE RUPACK PROGRAM-CRE02

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WR NUMBER	TINS NUMBER	VALVE SIZE	MANUFACTURE NAME	PACKING SIZE	LIVELOAD OR STATIC
MD-112513	MD-LV-7923	2"	FISHER	1/2 X 1 X 1/4	STATIC
MD-116858	MD-0496	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-130485	MD-FV-6156	2"	FISHER	3/4 X 1-3/8 X 5/16	STATIC
MD-130543	MD-0436	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-130563	MD-0549	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-130585	MD-0438	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-132438	MD-0432	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-133439	MD-0430	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-133440	MD-0434	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MD-133441	MD-0789	1-1/2"	KEROTEST	25/32 X 1-5/16 X 1/4	STATIC
MS-105596	MS-0253	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-112531	MS-0297	1"	KEROTEST	5/8 X 1-1/16 X .219	STATIC
MS-112532	MS-0301	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-112534	MS-0248	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-112535	MS-0285	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-115914	MS-MOV-0083	1"	HANCOCK	11/16 X 1-5/8 X 1/2	STATIC
MS-118569	MS-0293	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-118570	MS-0281	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-130516	MS-0225	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-130520	MS-0265	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-130521	MS-0264	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-130522	MS-0273	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-130525	MS-0277	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-130524	MS-0255	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-131174	MS-0301	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
MS-132162	MS-0426	1"	KEROTEST	5/8 X 1 X 3/16	STATIC



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NN: --- GREGGERTON --- STP  
VALVE RUPACK PROGRAM-2RE02

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WR NUMBER	TPNS NUMBER	VALVE SIZE	MANUFACTURE NAME	PACKING SIZE	LIVELOAD OR STATIC
SB-112539	SB-0214	2"	KEROTEST	29/32 X 1-27/64 X 1/4	STATIC
SB-112545	SB-0213	2"	KEROTEST	29/32 X 1-27/64 X 1/4	STATIC
SD-118047	SD-0026	1"	VOGT	1/2 X 3/4 X 1/8	STATIC
ZM-116360	ZM-0541/0543	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZM-130413	ZM-0395	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZM-131812	ZM-0409	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZM-131815	ZM-0429	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZM-131819	ZM-0462	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZM-132097	ZM-0392	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZM-151506	ZM-0399	1"	KEROTEST	5/8 X 1 X 3/16	STATIC
ZN-112544	ZN-0059	2"	DRESSER	1-1/16 X 2-3/16 X 9/16	STATIC
ZN-131811	ZN-0101	2"	KEROTEST	5/8 X 1 X 3/16	STATIC

FILE:VLUPP.WK1