UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

August 9, 1988

NRC INFORMATION NOTICE NO. 88-59: MAIN STEAM ISOLATION VALVE GUIDE RAIL FAILURE AT WATERFORD UNIT 3

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice discusses a main steam isolation valve (MSIV) guide rail failure at Waterford 3 and its possible generic implications. The MSIV is a D-2 Power Seal type, manufactured by ACF Industries, WKM Valve Division. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On April 11, 1988, during a routine inspection at Waterford 3, MSIV debris was found in the strainer for the main turbine throttle valve. The disassembly and inspection of the two MSIVs at the plant revealed that the downstream guide rails in one of the valves (see attached drawing) had become completely dislodged, and several bolt heads on the still-attached upstream rails in the same valve had been completely severed. The other MSIV had several separated bolt heads on both upstream and downstream rails, but the guide rails were in place. There were also galling marks on the chamfer of the guide rail and on the shoe attached to the lever lock arm.

Discussion:

An analysis by the licensee indicates that the guide rail failure was caused by the force of the lever lock arm assembly contacting the rail. The valve, however, passed the inservice test requirements. The analysis concludes that even without the rails the valve could still perform its function, albeit at a closure time that is slower by about a second, under the worst-case condition. However, there is a possibility that a detached rail could jam the MSIV in a partially open position. The failure of one MSIV is accounted for in the utility's Safety Analysis Report.

After the failure at Waterford 3, a fiberscope examination of the WKM power seal MSIVs at San Onofre Unit 3 revealed a broken bolt lying in the bottom section of the body of one MSIV. Disassembly and inspection of this valve revealed three failed bolts, galling marks on the shoe and the chamfer, and an upstream rail slightly detached from the skirt plate. At the same plant, a shutdown cooling isolation valve of a similar design was also damaged. However, the licensee believes that this damage occurred during maintenance. The damage was similar to that found on the MSIVs, that is, galling marks, failed bolts, and detached rails, but, in addition, the skirt plate was fractured and the shoe was wedged into the lever arm pivot slot.

The NRC believes this type of failure could be generic to other plants. Valves of this type are also reported to be in use at San Onofre 2, South Texas 1 and 2, and Washington Nuclear Power Unit 2. Valves of similar design could exist at other plants. The preliminary indications suggest that the failures are attributable to deficiencies in fabrication, engineering, and materials. The corrective actions considered at Waterford and San Onofre 3 include

(1) stelliting the shoes and the chamfer on the rails

(2) verifying the bolt alignments

(3) doing nondestructive examinations of all new bolts

(4) changing the angles of the rails and of the shoes

(5) increasing the valve closure time (within system performance constraints)

(6) periodically making fiberscope examinations of the valve internals to detect excessive galling, severed guide rail bolts, and separated guide rails

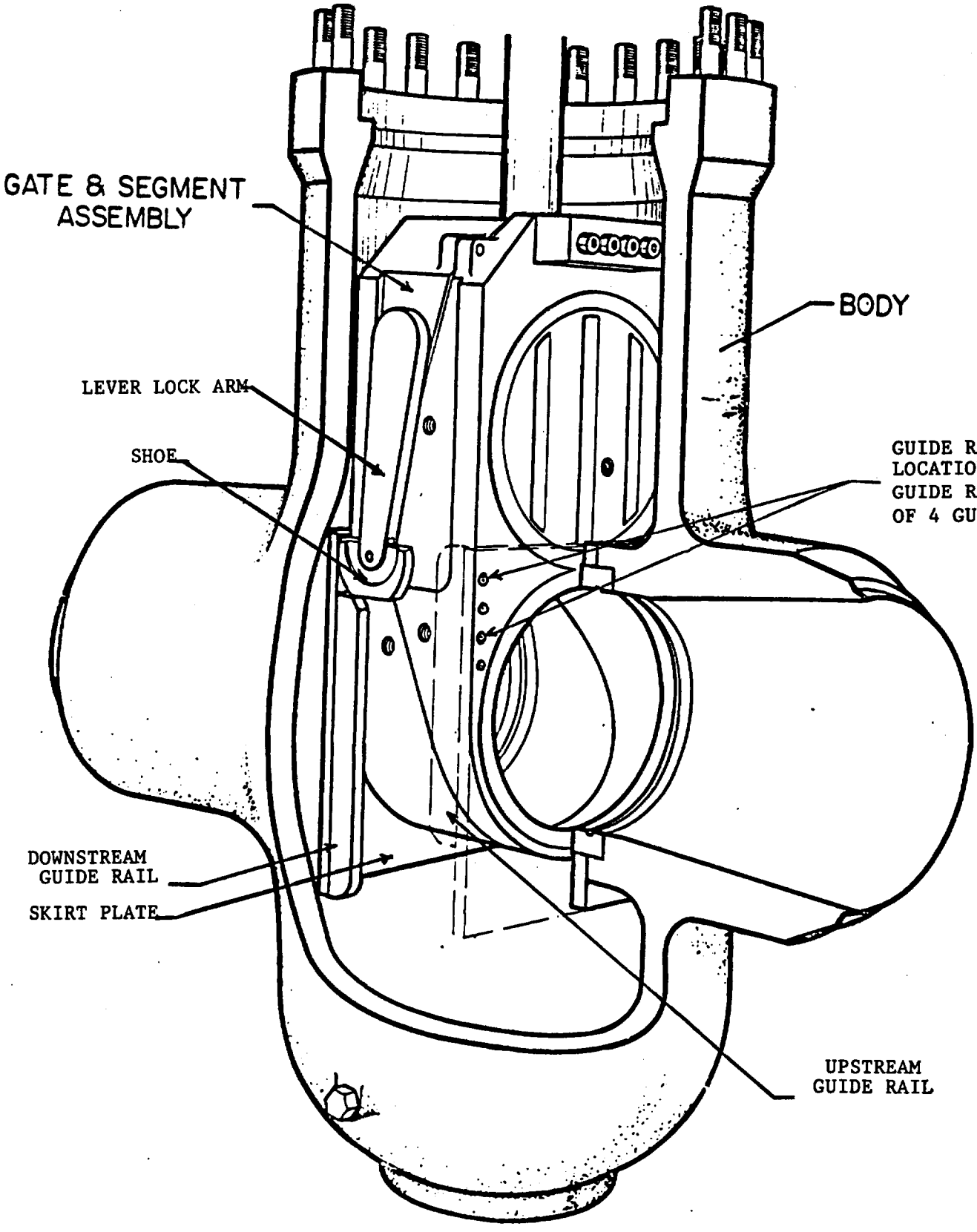
No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: Kenneth Dempsey, NRR
(301) 492-0918

Attachments:
1. Figure of Valve
2. List of Recently Issued NRC Information Notices


GATE & SEGMENT ASSEMBLY
BODY
LEVER LOCK ARM
SHOE
GUIDE RAIL BOLT LOCATIONS (9 PER GUIDE RAIL). TYPICAL OF 4 GUIDE RAILS
DOWNSTREAM GUIDE RAIL
SKIRT PLATE
UPSTREAM GUIDE RAIL

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-58	Potential Problems with ASEA Brown Boveri ITE-51L Time-Overcurrent Relays	8/8/88	All holders of OLs or CPs for nuclear power reactors.
88-57	Potential Loss of Safe Shutdown Equipment Due to Premature Silicon Controlled Rectifier Failure	8/3/88	All holders of OLs or CPs for nuclear power reactors.
88-56	Potential Problems with Silicone Foam Fire Barrier Penetration Seals	8/4/88	All holders of OLs or CPs for nuclear power reactors.
88-55	Potential Problems Caused by Single Failure of an Engineered Safety Feature Swing Bus	8/3/88	All holders of OLs or CPs for nuclear power reactors.
88-54	Failure of Circuit Breaker Following Installation of Amptector Direct Trip Attachment	7/28/88	All holders of OLs or CPs for nuclear power reactors.
88-53	Licensee Violations of NRC Regulations, Which Led to Medical Diagnostic Misadministrations	7/28/88	All manufacturers and distributors of radiopharmaceuticals for human use, nuclear pharmacies, and medical licensees.
88-52	Failure of Intrauterine Tandem of Fletcher Applicator Brachytherapy Devices During Patient Treatment	7/27/88	Medical licensees.
88-48, Supplement 1	Licensee Report of Defective Refurbished Circuit Breakers	7/26/88	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

After the failure at Waterford 3, a fiberscope examination of the WKM power seal MSIVs at San Onofre Unit 3 revealed a broken bolt lying in the bottom section of the body of one MSIV. Disassembly and inspection of this valve revealed three failed bolts, galling marks on the shoe and the chamfer, and an upstream rail slightly detached from the skirt plate. At the same plant, a shutdown cooling isolation valve of a similar design was also damaged. However, the licensee believes that this damage occurred during maintenance. The damage was similar to that found on the MSIVs, that is, galling marks, failed bolts, and detached rails, but, in addition, the skirt plate was fractured and the shoe was wedged into the lever arm pivot slot.

The NRC believes this type of failure could be generic to other plants. Valves of this type are also reported to be in use at San Onofre 2, South Texas 1 and 2, and Washington Nuclear Power Unit 2. Valves of similar design could exist at other plants. The preliminary indications suggest that the failures are attributable to deficiencies in fabrication, engineering, and materials. The corrective actions considered at Waterford and San Onofre 3 include

(1) stelliting the shoes and the chamfer on the rails

(2) verifying the bolt alignments

(3) doing nondestructive examinations of all new bolts

(4) changing the angles of the rails and of the shoes

(5) increasing the valve closure time (within system performance constraints)

(6) periodically making fiberscope examinations of the valve internals to detect excessive galling, severed guide rail bolts, and separated guide rails

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*SEE PREVIOUS CONCURRENCES

		D/DOEA:NRR CERossi 08/3 /88	*C/OGCB:DOEA:NRR CHBerlinger 08/01/88	*RPB:ARM TechEd 07/27/88
*OGCB:DOEA:NRR DCKirkpatrick 07/26/88	*EMEB:DEST:NRR KDempsey 07/28/88	*C/EMEB:DEST:NRR LBMarsh 07/29/88	*EAD/DEST:NRR JRichardson 07/29/88	*D/DEST:NRR LCShao 07/29/88

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DCKirkpatrick	KDempsey	LBMarsh	JRichardson	LCShao
07/26/88	07/28/88	07/29/88	07/29/88	07/29/88

Subsequent to the failure at Waterford 3, a fiberscope examination of the WKM power seal MSIVs at San Onofre Unit 3 revealed a broken bolt lying in the bottom section of the body of one MSIV. During disassembly and inspection of this valve, it was found to have three failed bolts, galling marks on the shoe and the chamfer, and an upstream rail slightly detached from the skirt plate. At the same plant, a shutdown cooling isolation valve of a similar design was also found to be damaged. However, the licensee believes that this damage occurred during maintenance. The damage was similar to that found on the MSIVs, i.e., galling marks, failed bolts, and detached rails, but, in addition, the skirt plate was fractured and the shoe was wedged into the lever arm pivot slot.

This type of failure is believed to be generic to other plants. Valves of this type are also reported to be in use at San Onofre 2, South Texas 1 and 2, and WPPS. Valves similar in design could exist at other plants. The preliminary indications are that the failures are attributable to deficiencies in fabrication, engineering, and materials. The corrective actions that have been considered at Waterford and San Onofre 3 include

(1) Stelliting the shoes and the chamfer on the rails.
(2) Verifying the bolt alignments.
(3) Doing nondestructive examinations of all new bolts.
(4) Changing the angles of the rails and of the shoes.
(5) Increasing the valve closure time (within system constraints).
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