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

August 25, 1994

NRC INFORMATION NOTICE 94-61: CORROSION OF WILLIAM POWELL GATE VALVE DISC HOLDERS

Addressees

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

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to problems related to the corrosion of carbon steel disc holders in William Powell gate valves ordered with stainless steel internal components. 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 are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

In December 1991, Farley Nuclear Plant maintenance personnel replaced a gate valve stem, disc and disc holder assembly for the "Service Water (SWS) to Component Cooling Water (CCW) System Room Cooler." The stem assembly was replaced because the holder and disc separated from the valve stem as a result of severe corrosion on the boss edge (the "ears") of the disc holder. Although the valve stem moved in the open direction when the valve was operated, the detached valve disc and holder remained in the closed position and obstructed SWS flow to the CCW system room cooler.

Southern Nuclear Operating Company (the licensee) and Farley personnel evaluated the cause of the failure and determined that the carbon steel disc holder had become corroded. The disc holder is mounted between the stainless steel stem and disc and is submersed in service water (an electrolytic solution). This situation subjected the disc holder to localized galvanic corrosion. The use of a carbon steel disc holder may have been a misapplication of internal valve component material.

In July 1992, the maintenance/engineering support group (MESG) at Farley issued a memorandum to Southern Nuclear management describing concerns with

the disc holders in stainless steel gate valves supplied by William Powell. In a telephone conversation with MESG, the Vice President of Engineering and Quality Control at William Powell stated that the valve disc holders might be stainless steel, carbon steel, or another (alloy) material.

The William Powell company identified the as-shipped disc holder material for each valve based on specific valve identification, serial, and drawing numbers supplied by Farley.

In July 1992, the licensee reviewed information supplied by William Powell and found 22 SWS valves (11 per unit) that were supplied with carbon steel disc holders and that the licensee considered to be susceptible to the form of corrosion discovered in December 1991. The licensee had removed 4 of the 22 valves from the system for other Farley plant modifications. The remaining 18 valves were all 25 cm (10-inch) gate valves, used in normal and emergency containment cooler discharge isolation valve applications. These containment coolers are necessary to control the pressure inside containment for a loss-of-coolant accident (LOCA) or a main steam line break.

During a Unit 1 outage in 1992 and a Unit 2 outage in 1993, the licensee inspected the remaining 18 susceptible valves for evidence of corrosion on the valve disc holders. Nine of the valves showed little or no signs of galvanic corrosion or disc holder deformation. Upon further investigation, the licensee noted that these valve assemblies had been reworked between 1989 to 1991. All nine valves were rebuilt after surveillance tests revealed excessive stem rotation. The licensee rebuilt the valves using upgraded William Powell Company valve stem, disc, and disc holder assembly packages in which the disc holders were made of stainless steel.

The remaining nine valves contained the original valve internal assemblies. The disc holders in these valves showed varying degrees of deterioration and galvanic corrosion. The licensee repaired the internal valve components during the outages.

Discussion

Southern Nuclear Operating Company determined that the Alabama Power Company, the original plant licensee, ordered stainless steel valves specifically for the SWS. The original bid clearly stated that these valves would be used in such an environment. It appears that the licensee was unaware that the valves contained carbon steel disc holders. Unit 1 valves had been in service approximately 14 years, and Unit 2 valves had been in service about 9 years before the problems noted in 1991. To date only one valve, the aforementioned room cooler valve, has failed and been considered inoperable.

The corrosion problem can not be detected through external visual inspection or valve performance until the valve fails completely. Valve disc holders that are not severely corroded will continue to function normally. The only way to find the problem before a complete failure is to remove the valves from service, disassemble them, and inspect the valve internal components.

This problem is not necessarily limited to SWS environments. The operating parts of any valve subjected to similar electrolytic conditions could be susceptible to corrosion if improper materials are installed. The experience at Farley indicates that even valves specifically purchased for use in raw water cooling systems may contain inappropriate materials.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Director for
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contacts: Michael J. Morgan, RII
(205) 899-3386 or 3387

Frank Grubelich, NRR
(301) 504-2784

Attachment:
List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
94-60	Potential Overpressurization of Main Steam System	08/22/94	All holders of OLs or CPs for pressurized-water reactors.
94-30, Supp. 1	Leaking Shutdown Cooling Isolation Valves at Cooper Nuclear Station	08/19/94	All holders of OLs or CPs for nuclear power reactors.
94-59	Accelerated Dealloying of Cast Aluminum-Bronze Valves Caused by Microbiologically Induced Corrosion	08/17/94	All holders of OLs or CPs for nuclear power reactors.
94-58	Reactor Coolant Pump Lube Oil Fire	08/16/94	All holders of OLs or CPs for pressurized water reactors.
94-57	Debris in Containment and the Residual Heat Removal System	08/12/94	All holders of OLs or CPs for nuclear power reactors.
94-56	Inaccuracy of Safety Valve Set Pressure Determinations Using Assist Devices	08/11/94	All holders of OLs or CPs for nuclear power reactors.
94-55	Problems with Copes-Vulcan Pressurizer Power-Operated Relief Valves	08/04/94	All holders of OLs or CPs for nuclear power reactors.
91-79, Supp. 1	Deficiencies Found in Thermo-Lag Fire Barrier Installation	08/04/94	All holders of OLs or CPs for nuclear power reactors.
94-54	Failures of General Electric Magne-Blast Circuit Breakers to Latch Closed	08/01/94	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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Office of Nuclear Reactor Regulation

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OFFICE	RPB:ADM*	OGCB:DORS*	RII* per phoncon	RII* per phoncon	
NAME	TechEd	AJKugler	MJMorgan	FSCantrell	
DATE	07/12/94	07/13/94	08/04/94	08/09/94	
OFFICE	C/EMCB:DE*	D/DE*	AC/OGCB:DORS	D/DORS	
NAME	JStrosnider	BWSheron	ELDoolittle	BKGrimes for	
DATE	07/27/94	07/29/94	08/15/94	8/19 /94	

DOCUMENT NAME: 94-61.IN

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NAME	JStrosnider	BWSheron	EGoodlittle	BKGrimes	
DATE	07/27/94	07/29/94	8/15 /94	/ /94	

DOCUMENT NAME: G:\ANDY\POWELL.IN

The experience at Farley indicates that even valves specifically purchased for use in raw water cooling systems may contain inappropriate, inadequately analyzed, materials.

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PER PHONCON PER PHONCON

OFFICE	RPB:ADM*	OGCB:DORS	RII	RII	~~EMEB:DE~~
NAME	TechEd BY E-MAIL	AJKugler	MJMorgan	FSCantrell	~~FGrubelich~~
DATE	07/12/94	07/13/94	08/04/94	08/09/94	~~/ /94~~
OFFICE	C/~~EMEB~~:DE EMCB	D/DE	AC/OGCB:DORS	D/DORS	
NAME	~~RHilessman~~ JStrosnider for	BWSheron	ELDoolittle	BKGrimes	
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