

July

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, DC 20555

May 25, 1988

NRC INFORMATION NOTICE NO. 88-30: TARGET ROCK TWO-STAGE SRV SETPOINT
DRIFT UPDATE

Addressees:

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

Purpose:

This information notice is being provided to alert recipients to continuing problems associated with setpoint drift occurring in Target Rock two-stage safety/relief valves (SRVs) originally described in Information Notices (INs) 82-41, 83-39, 83-82, and 86-12 (References 1 - 4). It is expected that recipients will review the information for applicability to their facilities and consider actions, if 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.

Background:

On July 2, 1982, at Hatch Unit 1, all 11 Target Rock two-stage SRVs failed to open at their setpoints of 1080 psig, 1090 psig, and 1100 psig. Pressure in the reactor coolant system (RCS) rose to 1180 psig before three SRVs on one steamline opened and relieved RCS pressure rapidly. This incident focused concern on a problem that was beginning to be seen in those SRVs, called "setpoint drift".

The Georgia Power Company, the General Electric Company (GE), and the Target Rock Company initiated a study of the cause of the event at Hatch Unit 1. Other utilities that had installed two-stage Target Rock SRVs joined Georgia Power in an owners' group to look into the nature of the problem and its solutions.

Similar problems had been observed throughout the industry and reports indicated that the number of valves affected and the extent of the observed setpoint drift had been increasing. The problem was ultimately identified as one or both of two situations: (1) binding in the labyrinth seal area caused by tolerance buildup during manufacturing or (2) disc-to-seat bonding caused by oxides of the disc and seat material forming a continuous film and inhibiting disc movement.

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To address these problems, additional maintenance was performed to refurbish valves and replace parts found to be out of tolerance in the labyrinth seal area. This proved to be effective in some cases; however, problems caused by disc-to-seat bonding continued. A material, PH13-8Mo, whose oxide would not form a continuous film with the oxide of the seat material, was chosen for new discs. A trial test of valve performance after about 50% of the valves on a plant had new discs installed is currently being conducted.

Test Results:

Initial results of the test of the new discs were obtained in May of 1987 when the Hatch Unit 1 valves were tested. Of the five valves that had new discs installed, four had pilot valves that leaked before the test. Only one of these four pilot valves did not leak after the test. The valve that did not leak before the steam test had first been tested with nitrogen gas (N_2) to determine if the disc was stuck. It lifted at 5 psig N_2 . The remaining four valves lifted within 2% of setpoint. The technical specification (TS) limit is $\pm 1\%$ of the setpoint. One of these leaked so much that the bonnet pressure could not be stabilized and the delay time (time between lift of the pilot disc and the lift of the main disc) was excessive. Subsequently, the remaining valves were tested. Test values for all 11 valves are given in Table 1.

Disc numbers 313 and 1186, which are new discs, showed a lighter-color oxide which was less-adherent and softer in the steam area than was seen on the old discs in previous tests. Also, the seating area was bright and was not banded with the apparent cleft of the corrosion seen on the old discs in previous tests. Discs 1189 and 1002 showed similar corrosion properties, but were obviously steam drawn around the entire circumference. Disc 1189 showed signs that foreign material had been lodged between the disc and the seat. A stabilizer disc (Stellite) from one valve exhibited the same darker, harder, more-adherent corrosion as had been seen previously on the old (Stellite) discs. The decision was made to turn the new disc over to GE for testing and to replace the new discs with other new discs, but not to replace the old discs at that time.

Brunswick Unit 2 completed its testing for this cycle in early 1988. Initial reports indicate that valves with the PH13-8Mo discs lifted at +1.9%, -0.1%, -1.2%, +0.6%, and +4.0% of their setpoint. One valve was not tested. The old-style valves, with the Stellite 6 discs, lifted at +9.3%, -1.4%, -0.2%, +0.6%, and +2.6%*. Details are shown in Table 2.

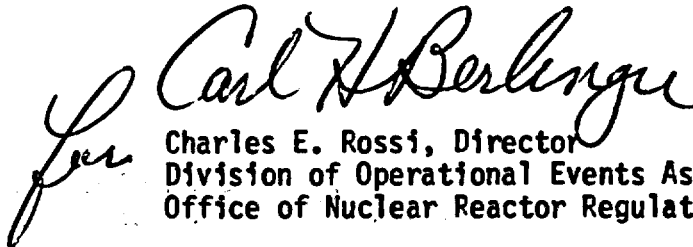
Hatch Unit 2 test results were also recently received. They show the valves with PH13-8Mo discs lifted at +2.9%, +1.8%, +0.7%, and -1.1%. The valves with the Stellite discs lifted at +1.5%, +0.3%, +4.1%, +0.2%, +2.8%, and +1.6%. Details are shown in Table 3.

Based on available test results, the valves with new discs appear to perform better than valves with old discs, and valves with old discs appear to perform better than they did in the past.

(*Second lift - the recorder was not running when the disc was first lifted).

If, when the analysis of the data is completed, the cause of the +4.0% drift on the Brunswick Unit 2 valve and the +2.9% drift on the Hatch Unit 2 valve can be determined, then PH13-8Mo may be proven to be an acceptable substitute for Stellite 6. The NRC will continue to follow the testing program.

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, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: Mary S. Wegner, AEOD
(301) 492-7818

Attachments:

1. Table 1, 1987 Test Results for Hatch Unit 1 Target Rock SRVs
2. Table 2, 1988 Test Results for Brunswick Unit 2 Target Rock SRVs
3. Table 3, Test Results for Hatch Unit 2 Target Rock SRVs
4. List of Recently Issued NRC Information Notices

References:

1. Information Notice No. 82-41, "Failure of Safety/Relief Valves to Open at a BWR."
2. Information Notice No. 83-39, "Failure of Safety/Relief Valves to Open at BWR - Interim Report."
3. Information Notice No. 83-82, "Failure of Safety/Relief Valves to Open at BWR - Final Report."
4. Information Notice No. 86-12, "Target Rock Two-Stage SRV Setpoint Drift."

TABLE 1
1987 TEST RESULTS FOR HATCH UNIT 1 TARGET ROCK SRVs

Valve Identifier		TS	Setpoint		Leak[1]	
Disc	SN		As-Found	Var	Prior	Post
New	1189	1090	1072	-1.65%	Yes	Yes
New	313	1080	1096	+1.48%	Yes	No
New	1002	1080	1101	+1.94%	Yes	Yes
New	1186	1100	5 (N2)	LT 1%	No	No
New	1190[2]	1100	1083	+1.55%	Yes	Yes
Old	1006	1090	1093	LT 1%	Yes	Yes
Old	1187	1090	1076	-1.28%	Yes	Yes
Old	1011	1080	1146[3]	+6.11%	No	No
Old	1009	1080	1053	-2.50%	Yes	Yes
Old	1004	1090	1101	+1.01%	Yes	Yes
Old	1003	1100	1116	+1.45%	Yes	Yes

SN = Serial Number
TS = Technical Specifications

Notes:

- [1] Pilot disc leakage.
- [2] Originally mounted on a Hatch body, but was removed due to leakage past the main disc. Remounted on a slave (Wyle) body. Pilot leakage was so great that the 30-minute stabilization of the bonnet temperature was waived.
- [3] Failed to lift when tested on 5 psig nitrogen.

TABLE 2
1988 TEST RESULTS FOR BRUNSWICK UNIT 2 TARGET ROCK SRVs

Valve Identifier				Setpoint			Leak[1]	N2 Test
Part Number	Disc	SN	SL	TS	As-Found	Var		
2B21-F013A	New	1109	A	1105	1126	+1.9%	Yes	No
2B21-F013B	Old	1103	A	1125	1230	+9.3%	Yes	No
2B21-F013C	Old	1099	B	1105	1090	-1.4%	No	Failed
2B21-F013D	New	1102	B	1115	1114[2]	-0.1%		
2B21-F013E	Old	1105	B	1115	1113	-0.2%	Yes	No
2B21-F013F	Old	1091	C	1105	1112	+0.6%	No	Failed
2B21-F013G	New	1106	C	1105	1092	-1.2%	Yes	No
2B21-F013H	New	1107	D	1115	1122	+0.6%	Yes	No
2B21-F013J	New	1108	D	1125	1170	+4.0%	Yes	No
2B21-F013K	Old	1101	C	1115	1144[2]	+2.6%		
2B21-F013L	New	1104	B[3]					

SN = Serial Number
SL = Steamline
TS = Technical Specifications

Notes:

- [1] Pilot disc leakage.
- [2] Second lift, valve was inadvertently lifted without recorder running.
- [3] Retainer bolts removed, spring preload lost, no as-found test done.

TABLE 3
TEST RESULTS FOR HATCH UNIT 2 TARGET ROCK SRVs

Valve Identifier		Setpoint			Leak[1]
Disc	SN	TS	As-Found	Var	
Old	301	1100	1116	+1.5%	Yes
New	302	1100	1132	+2.9%	Yes
Old	303	1110	1114	+0.4%	Yes
New	306	1110	1130	+1.8%	Yes, badly
New	307	1110	1118	+0.7%	Yes, badly
New	308	1090	1078	-1.1%	Yes
Old	310	1090	1135	+4.1%	No
Old	312	1090	1092	+0.2%	Yes
Old	314	1090	1121	+2.8%	Yes
New	315	1100	1109	+0.8%	Yes
Old	1001	1100	1118	+1.6%	Yes

SN = Serial Number
TS = Technical Specifications

Notes:

[1] Pilot disc leakage.

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-29	Deficiencies in Primary Containment Low-Voltage Electrical Penetration Assemblies	5/24/88	All holders of OLs or CPs for nuclear power reactors.
88-28	Potential for Loss of Post-LOCA Recirculation Capability Due to Insulation Debris Blockage	5/19/88	All holders of OLs or CPs for nuclear power reactors.
88-27	Deficient Electrical Terminations Identified in Safety-Related Components	5/18/88	All holders of OLs or CPs for nuclear power reactors.
85-35, Supplement 1	Failure of Air Check Valves to Seat	5/17/88	All holders of OLs or CPs for nuclear power reactors.
88-26	Falsified Pre-Employment Screening Records	5/16/88	All holders of OLs or CPs for nuclear power reactors and all major fuel facility licensees.
88-25	Minimum Edge Distance for Expansion Anchor Bolts	5/16/88	All holders of OLs or CPs for nuclear power reactors.
88-24	Failures of Air-Operated Valves Affecting Safety- Related Systems	5/13/88	All holders of OLs or CPs for nuclear power reactors.
88-23	Minimum Edge Distance for Expansion Anchor Bolts	5/16/88	All holders of OLs or CPs for PWRs.

OL = Operating License
CP = Construction Permit

If, when the analysis of the data is completed, the cause of the +4.0% drift on the Brunswick Unit 2 valve and the +2.9% drift on the Hatch Unit 2 valve can be determined, then PH13-8Mo may be proven to be an acceptable substitute for Stellite 6. The NRC will continue to follow the testing program.

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PREVIOUS CONCURRENCES

*See previous concurrences

**Transmitted by memorandum to C. H. Berlinger from J. E. Rosenthal dated March 16, 1988

***Comments received in memorandum to C. H. Berlinger from L. B. Marsh dated April 18, 1988

CHB
*D/DOEA:NR
CERossi
05/20/88
*OGCB:DOEA:NRR
RJKiessel
04/12/88

*C/OGCB:DOEA:NRR*PPMB:ARM
CHBerlinger TechEd
05/09/88 04/15/88
ROAB:DSP:AEODROAB:DSP:AEOD
MSWegner MChirma1
03/ /88 03/ /88

C/EMEB:DEST:NRREMEB:DEST:NRR
LBMarsh PTKuo
04/ /88 04/ /88
C/ROAB:DSP:AEOD *EMEB:DEST:NRR
JERosenthal CGHammer
03/ /88 04/ /88

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D/DOEA:NRR	*C/OGCB:DOEA:NRR*PPMB:ARM	***C/EMEB:DEST:NRR***EMEB:DEST:NRR
CEB:SSN	CHBerlinger TechEd	LBMarsh PTKuo
05/20/88	05/09/88 04/15/88	04/ /88 04/ /88
*OGCB:DOEA:NRR	**ROAB:DSP:AEOD**ROAB:DSP:AEOD**C/ROAB:DSP:AEOD	***EMEB:DEST:NRR
RJKiessel	MSWegner MChirnal	JERosenthal CGHammer
04/12/88	03/ /88 03/ /88	03/ /88 04/ /88

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CUB

D/DOEA:NRR	C/OGCB:DOEA:NRR	*PPMB:ARM	**C/EMEB:DEST:NRR	**EMEB:DEST:NRR
CERossi	CHBerlinger	TechEd	LBMarsh	PTKuo
04/ /88	05/9 /88	04/15/88	04/ /88	04/ /88
*OGCB:DOEA:NRR	*ROAB:DSP:AEOD	*ROAB:DSP:AEOD	*C/ROAB:DSP:AEOD	**EMEB:DEST:NRR
RJKiessel	MSWegner	MChirmal	JERosenthal	CGHammer
04/12/88	03/ /88	03/ /88	03/ /88	04/ /88

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CERossi	CHBerlinger	TechEd <i>pb</i>	LBMarsh	PTKuo
04/ /88	04/ /88	04/15/88	04/ /88	04/ /88
OGCB:DOEA:NRR	*ROAB:DSP:AEOD	*ROAB:DSP:AEOD	*C/ROAB:DSP:AEOD	**EMEB:DEST:NRR
RJKiesel	MSWegner	MChirnal	JERosenthal	CGHammer
04/12/88	03/ /88	03/ /88	03/ /88	04/ /88

OMK