



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555
DEC 8 1992

MEMORANDUM FOR: Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

FROM: Edward L. Jordan, Director
Office for Analysis and Evaluation
of Operational Data

SUBJECT: PRESSURE LOCKING AND THERMAL BINDING OF GATE VALVES

Enclosed is AEOD Special Study, S92-07, "Pressure Locking and Thermal Binding of Gate Valves." This study was initiated as a "last straw" response to yet another valve inoperability event due to pressure locking. The event occurred in July 1991, at the FitzPatrick plant where a low-pressure emergency core cooling system (ECCS) valve failed to operate during a special test.

The study shows that pressure locking and thermal binding causes may each be common-mode among trains of a given system and not only prevent the valve operator from opening the valve on demand but may damage the motor windings or valve internals so that subsequent remote operation is lost.

While the possibility of pressure locking and thermal binding of these valves has been known many years and at least six documents have communicated various aspects to industry, the report frequency for these problems has not diminished. The two strongest communications of the six occurred in 1984 and 15 of the approximately 20 reported instances occurred since 1987, 3 years to 8 years after the industry was alerted.

As a part of this study, AEOD staff reviewed the status of programs at six licensees in mid 1992 to obtain an understanding of industry preventive or corrective actions related to pressure locking and thermal binding. The results were disappointing because prior to the visit most licensees did not believe the problem was applicable to them, hence, little action had been initiated in response to the prior communications.

An idea of the risk associated with this common-mode failure mechanism may be drawn from the accident sequence precursor evaluation of the July 1991 FitzPatrick event which estimated the conditional core damage probability as approximately 4×10^{-4} if all four ECCS valves failed to open.

Aside from Information Notice IN 92-26 issued in April 1992, to promptly convey NRC concerns, we are unaware of any further NRC or industry action to address this issue. A relatively simple valve modification is effective in diminishing the likelihood of pressure locking. While thermal binding of wedging components is not as amenable to control with a simple physical change, the affect can be reduced through appropriate operating procedures or use of a different type valve.

160056

RETURN TO REGULATORY CENTRAL FILES

9212300115 921208
PDR ORG NEXD
PDR

RD-25 D03
SPECIAL Studies

KRD-7

Although difficult to quantify, I believe this problem warrants priority attention by NRC and Industry.

I propose that a Bulletin or Generic Letter be prepared. I further propose that this issue be the subject of an NRC/Industry workshop in order to adequately communicate with the proper licensee technical managers. The meeting would serve as an opportunity to obtain industry feedback on the most effective way to resolve this problem. As we have discussed, AEOD is prepared to actively participate in these efforts.

Original Signed by:
Denwood F. Ross

Edward L. Jordan, Director
Office for Analysis and Evaluation
of Operational Data

Enclosure: As stated

Distribution:

PDR	GMarcus, NRR	AEOD R/F
Central File	JNorberg, NRR	
ROAB R/F	JJacobson, NRR	
DSP R/F	TScarborough, NRR	
CHsu	ESullivan, NRR	
EBrown	RKiesel, NRR	
JRosenthal	ACHaffee, NRR	
VBenaroya	GWeidenhamer, RES	
EJordan	JPage, RES	
TRoss	RBaer, RES	
Novak	MVagins, RES	
LSpessard	ORothberg, RES	
KBrockman	FCherney, RES	
SRubin	KRaglin, TTC	
PBaranowsky	MTaylor, EDO	
WJones	RSavio, ACRS	
GLanik	PLewis, INPO	
DAllison	DQueener, NOAC	
AMadison	VChexal, EPRI	

ROAB
CHsu:rgz
12/7/92

ROAB
EBrown
12/ /92

ESR
E:ROAB
JRosenthal
12/7/92

DSP
VBenaroya
12/ /92

SEF for
D:DSP
TNovak
12/7/92

DD:AEOD
DRoss
12/8/92

DD:AEOD
EJordan
12/8/92