

1

SEP 13 1985

Docket No. 50-410

NOTE TO: Central File

FROM: Mary F. Haughey, Project Manager  
Licensing Branch No. 2  
Division of Licensing

SUBJECT: CORRESPONDENCE BETWEEN THE NRC AND THE HAUPTABTEILUNG FUR DIE SICHERHEIT DER KERNANLAGEN CONCERNING THE USE OF GULF AND WESTERN BALL VALVES AT THE LEIBSTADT NUCLEAR POWER STATION

The enclosed information includes correspondence between the NRC and the Hauptabteilung fur die Sicherheit der Kernanlagen concerning the use of Gulf and Western Ball Valves at the Leibstadt Nuclear Power Station. These are the same valves that are used as Mainstream Isolation Valves (MSIV's) at Nine Mile Point 2. The enclosed correspondence documents the operating history and problems with these valves at the Leibstadt Nuclear Power Plant in Switzerland. A copy of the May 23, 1985 report was made available to Niagara Mohawk Power Corporation for their information.

Mary F. Haughey, Project Manager  
Licensing Branch No. 2  
Division of Licensing

Noted: Walter R. Butler

Enclosure: As stated

DISTRIBUTION

Docket File	LB#2Reading	PRC System	MHaughey	EHylton	JRead	PDR	LPDR
<i>M. Haughey</i> LB#2/DL/PM		LB#2/DL/LA		LB#2/DL/BC			
MHaughey:mk		EHylton		WButler			
9/13/85		9/ /85		9/13/85			

FOIA-89-438

B/4

8509230755 XA

OCT 26 1984

DISTRIBUTION  
AEB R/F  
WPasedag

*Jacques,  
into  
9-mile file*

Mr. F. Weehuizen  
Bundesamt fur die Energiewirtschaft  
Hauptabteilung fur die Sicherheit der Kernanlagen  
5303 WURENLINGEN, Switzerland

Dear Mr. Weehuizen,

At a recent CSNI/GREST meeting I met Mr. G. Prohaska, who referred me to you as the best contact for some information concerning the Swiss experience with a specific BWR main steam isolation valve (MSIV). We are currently in the process of evaluating the potential for leakage of a new double-seat MSIV for a U. S. plant for which no previous U. S. experience exists. We understand that a similar valve is installed at the Leibstatt BWR in Switzerland. Furthermore, we have heard that some difficulties were encountered in making these valves meet applicable leakage criteria. I would appreciate any information concerning the pre-operational testing and operational experience with the MSIV's on the Leibstatt plant. If you can make the information available, our interest centers on:

1. The leak rates encountered in pre-operational testing
2. Any additional test data following start-up
3. Your assessment of the causes of leakage, particularly if excessive leakage was encountered
4. Corrections or modifications, if any, to the valves to improve performance.

Your help with this issue will be much appreciated.

Sincerely,

Walter F. Pasedag  
Accident Evaluation Branch  
Division of Systems Integration

cc: J. LaFleur

*85-9230756 XA*

OFFICE	DSI:AEB					
NAME	WPasedag					
DATE	10/26/84					



Hauptabteilung für die Sicherheit der Kernanlagen  
Division Principale de la Sécurité des Installations Nucléaires  
Divisione Principale della Sicurezza degli Impianti Nucleari

CH - 5303 Würenlingen, 29. Mai 1985  
☎ 056/893811

Ihre Nachricht vom  
V communication du  
V comunicazione del  
Oct. 26, 1984

Ihr Zeichen  
V ref. - V rif

Unser Zeichen  
N ref. - N rif  
BW/re

Mr. W.F. Pasedag  
Accident Evaluation Branch  
Division of System Integration  
United States Nuclear Regulatory  
Commission  
Washington DC 20555  
U. S. A.

Leibstadt ball-type valves

Dear Mr. Pasedag;

Last October you asked for specific information about the Leibstadt ball-type valves, referring to our Mr. Prohaska.

Enclosed please find our report about the subject. If you need more information, please specify the points in question.

Sincerely,

*W. Brändli*

W. Brändli  
Division of Reactor Safety  
SWISS FEDERAL NUCLEAR SAFETY DIVISION

Enclosure  
2 copies of HSK 12/240

~~8509230757 XA~~



Bundesamt für Energie  
Office fédéral de l'énergie  
Ufficio federale dell'energia

Hauptabteilung für die Sicherheit der Kernanlagen  
Division principale de la Sécurité des Installations Nucléaires  
Divisione principale per la Sicurezza degli Impianti Nucleari

5303 Würenlingen  
Tel. 056 / 982853

Datum: May 23, 1985		Aktenzeichen: HSK 12/240
Typ / Charakter: Technical Report		Klassifikation: --
Bearbeiter: W. Brändli F. Weehuizen /re		Visum: <i>W. Brändli</i>
Projekt, Thema, Gegenstand: Leibstadt NPP		Seiten: 3 Zeichnungen: 8
		Auftrags-Nr.: --

Titel

Experience with ball-valves in the main steam and feedwater lines at Leibstadt Nuclear Power Station

Zusammenfassung oder Inhaltsverzeichnis

The nuclear power station Leibstadt, a GE BWR/6 plant with a Mark III Containment, has 6 Energy Product Group shut-off valves located in the steam tunnel. A 33" diameter ball-valve is mounted on each of the four main steamlines between the outer containment isolation valve and turbine building penetration. A 27" valve is similarly mounted on each feedwater line. Ball surfaces are of tungsten carbide with a stellite underlay.

The feedwater shut-off valves are closed during reactor shut-down, enabling the condensate and feedwater system to be purged through the condensate polishing system. The shut-off valves on the main steamlines act as an activity release barrier against post LOCA leakage through the main steam isolation valves.

The choice of this type of valve was dictated by the tight space requirements at the installed location, as well as by the manufacturer's guarantees concerning leak tightness and seismic design. Other known and proven valves would have needed too much space. (Shut-off valves, in addition to the isolation valves, were not provided in the original project.)

Verteiler: NRC Washington

Ablage:

8549230-758 XA

During pre-operational tests failures and damage occurred on several occasions:

- On the 5<sup>th</sup> October 1982 one of the two feedwater valves remained leak tight during a pressure test only up to 24 bar/341 psi. At about 25 bar/356 psi a serious leakage occurred. During a later test of the same valve a leakage of about 220 kg/h was measured at only 6 bar/85 psi. When the displacement pump used for leak-testing was stopped, the pressure in the volume (110 m<sup>3</sup>) being tested sank to 1 bar within 5 minutes. The other valve remained leak tight up to 169 bar/2404 psi. The four valves on the main steam lines passed the leak rate test.

After testing all six valves were opened up. All showed evidence of interior corrosion. The sliding spools, which bear on the surfaces of the ball, showed circumferential wear on one side of the valve and nickel deposition on the other (See appendix 1, remark A.) The spring loading on the sleeves was reduced and a new seal (manufacturer "Titan") was installed. The housing was ground-out circumferentially to obtain more radial clearance for the spools.

On the flange for the valve bonnet a part of the surface was machined and provided with a hard facing. The lantern rings on both upper and lower bearings were turned down. The self-sealing closure was damaged on the sealing surface in contact with the pressure seal. This surface also received a hard facing. The metallic sealing rings were replaced by seals of a softer material (remark B).

The thin tungsten carbide surface of the valve ball showed damage due to broken-out pieces in some areas. As a result of the damage, a review of the matching of ball and seat materials was undertaken by Prof. Grosch at the Technical University, Berlin. He expected more problems in the future from loss of the hard-metal layer.

- In the spring of 1983 problems with the valve drive mechanism arose. During closure of one valve on the main steamline plastic deformation of the frame assembly occurred. These valves are closed by spring-force and are jacked open hydraulically. The frames on all valves were strengthened. The pump and motor of the electrohydraulic control of the affected valve were replaced. Improvements to the hydraulic parts of the solenoid control valves were introduced. On all the main steamline valves the drive for manually tripping the valves closed was replaced. On one valve the main hydraulic cylinder was replaced twice, once because the drive spindle was bent and then when the cylinder was scored.

With all these problems, repairs and changes the management lost confidence in the reliability of the valves.

- In summer 1985 the HSK allowed KKL to replace the feedwater valves by non-return valves of the type already used for containment isolation in these lines. Wedged-plate slide-valves mounted at the upstream end of the lines in the turbine building now enable purging to be carried out through the condensate polishing system without involving the primary system.

No similar solution was available for the main steamlines, so the four large ball-valves will remain in operation. During normal reactor operation they will remain open. They will be tested only during the annual shutdown, when the lines are cold and not under pressure.

KKL has still the intention to propose other solutions, but only after experience about the behaviour of the valves in operation, and data concerning the leak-tightness of the inner and outer containment isolation valves, has been gathered over a period of several years.

To summarize, the ball-valves and their operators in Leibstadt have had severe and repeated problems. A solution has been found for the feedwater lines by means of non-return and slide valves. In the long term the management hopes to be able to change to another type of valve on the main steamlines.