Docket 50 - 305

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

August 23, 1973

Karl Kniel, Chief, PWR Project Branch No. 2, L

AUGUST 1, 1973 MEETING WITH NORTHERN STATES POWER CORPORATION RE PRAIRIE ISLAND (50-282) AND WISCONSIN PUBLIC SERVICE CORPORATION RE KEWAUNEE (50-305)

The purpose of the meeting was to discuss the redesign of the main steam check and isolation valves for the Kewaunee plant and the Prairie Island plant. An attendance list is enclosed.

The main steam check and isolation valves for the Prairie Island plant and the Kewaunee plant are identical valves manufactured by Schutte Koerting. A sketch of the valve is enclosed. The redesign includes changing the material of the discs for both the isolation valve and the check valve from the 250 maraging steel used in the original design to 410 stainless steel used in the design of turbine stop valves. The original discs in the Kewaunee plant had been found to contain cracks after preoperational tests.

The Nuclear Services Corporation has performed analyses of the maximum translational energy of the swinging discs following a postulated steam pipe rupture and analyses of the corresponding maximum stresses and strains in the components of the valves when the swinging discs are arrested. The valve discs were assumed to be fully open - 80 degrees for the isolation valve and 70 degrees for the check valve. A maximum energy of 1.177×10^6 inch pounds was calculated for the check valve and 1.162×10^6 inch pounds for the isolation valve following steam pipe rupture. Design energy is 1.35×10^6 inch pounds. An energy of 0.095×10^6 inch pounds was calculated for spurious closing of the isolation valve while operating at rated power.

The RELAPSE-3 code was used to analyze the blowdown in the steam system and the consequent pressure acting across the disks. The model for the moving valve disk was inserted into RELAPSE in this calculation.

The maximum energy following pipe rupture was calculated to result in plastic deformation in the disc, tail link, body, and body seat and elastic deformation in the rock shaft and disc pin. A finite element stress analysis code was used in this analysis and a summary of results is presented in the enclosed table. Maximum strains were less than 50% of the ultimate strain. The maximum energy following a spurious closing at rated power was calculated to result in plastic deformation of a lesser amount in the disc, body and body seat and elastic deformation in the tail link, rock shaft and disc pin.

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Mr. Ray Maccary requested that consideration be given to the number of spurious closures that can be accommodated in the isolation valves. Since plastic deformation occurs, strain hardening of the materials may result in different behavior of the valve. He also pointed out that 50% of ultimate strain criterion should not be considered as an acceptance criterion for components that must be relied upon to function in a steam line break situation.

Mr. R. C. DeYoung requested that consideration be given to inspection of the valve components following hot functional testing during the first refueling and during forced outages in the first fuel cycle. He also requested that alternative valve designs be considered for installation during the first refueling shutdown.

Mr. R. Jensen (NSP) said that they would inspect the components of the valves in both steam lines of Prairie Island Unit 1 after the hot functional tests, forced outages and the first fuel cycle to determine any effects of spurious valve closing or corrosion. He also stated that NSP will investigate alternative valve designs for installation after the first fuel cycle and will advise us of their schedule for the investigation within a few weeks.

Mr. C. Giesler (WPS) said that they would also inspect the main steam isolation valves in the Kewaunee plant following hot functional tests and after the first fuel cycle. The architect-engineer is the same for both Prairie Island and Kewaunee so that the investigation of alternative valve designs will be applicable to the Kewaunee plant.

Mr. W. J. Collins described the failures that have occurred on similar main steam isolation valves at other facilities. At one plant the rock shaft had cracked through 50% of the material, apparently due to a fatigue mechanism. A replacement disc was made too large so that binding in the body occurred. Piston shafts of air cylinders suffered pitting corrosion damage. A solenoid failed from corrosion attack causing failure of the valve to operate. The applicants said they were aware of deficiencies in similar valves at other plants and had factored this experience into the redesign of its valves.

Mr. R. Jensen (NSP) said he would file an amendment within a few weeks providing details of the above information on the redesign of the main steam check and isolation valves, including a description of the new design, analysis of the energy in the disc following pipe rupture and an analysis of the corresponding strain in the valve components, a description of the inspection of valve components up to the first fuel reloading and a description of the investigation to find alternative valves for installation during the first fuel reload.

Mr. C. Geisler will similarly amend the Kewaunee application.

L. L. Kintner
Senior Project Manager
PWR Project Branch No. 2
Directorate of Licensing

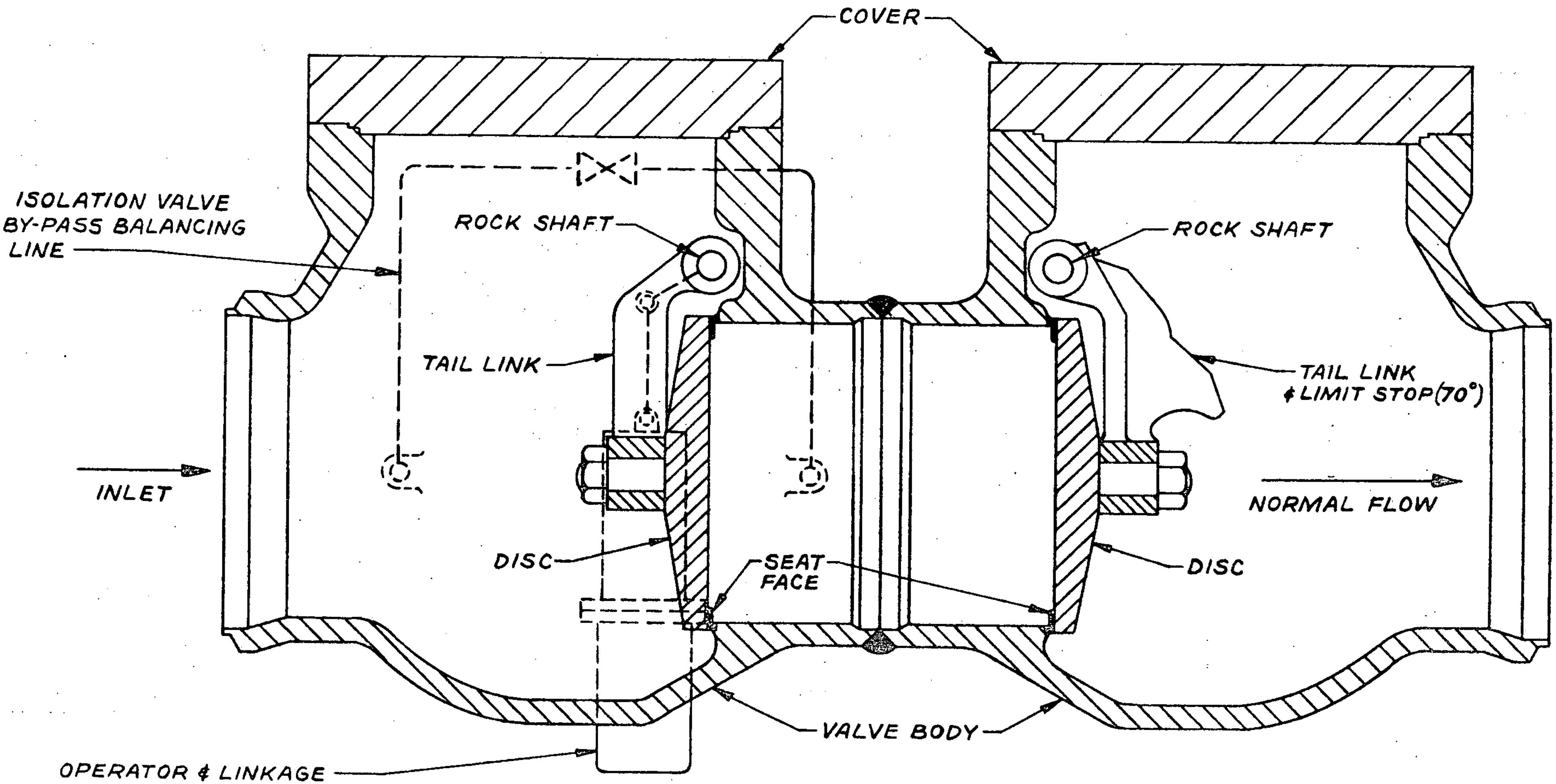
AEC-NSP-WPS MEETING RE M.S.I.V.
August 1, 1973

List of Attendees

Name	Affiliation
L. L. Kintner	AEC-Licensing
W. J. Collins	AEC-RO
J. Henderson	AEC-RO
J. Knight	AEC-TR
R. Klecker	AEC-RP
R.C. DeYoung	AEC-RP
R. Maccary	AEC-TR
K. Kniel	AEC-RP
Carl Giesler	Wisconsin Public Service
Roland Jensen	NSP
William Lowry	PSE
Claude Didier	PSE
Max DeLong	PSE
M. Bjeldanes	NSP
G. A. Randall	NSC
J. S. Horowitz	NSC
V. K. Chexal	NSC
D. W. Hayes	AEC- RO- Region III
F. A. Dreher	AEC-RO
C. H. Harmsen	NSP

RESULTS OF ANALYSIS FOR STEAM LINE VALVE

Valve Component	Steam Line Break Maximum Strain	Spurious Closure Maximum Strain	Capability Ultimate Strain
Disk	9%	1%	23%
Tail Link	4%	-	30%
Body	6%	5%	26.5%
Body Seat	12%	10%	30%
Rock Shaft	Below Yield	-	-
Disk Pin	Below Yield	-	-



MS ISOLATION VALVE

MS CHECK VALVE