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Prairie Island Nuclear Generating Plant
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U S Nuclear Regulatory Commission
ATTN: Document Control Desk
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Prairie Island Nuclear Generating Plant Units 1 and 2
Dockets 50-282 and 50-306
License Nos. DPR-42 and DPR-60

Supplemental Information Regarding NRC Inspection Report 05000282/2010010; 05000306/2010010 (EA-10-070)

Reference: Letter from Nuclear Regulatory Commission (NRC) to Mr. Mark A. Schimmel, "Prairie Island Nuclear Generating Plant, Units 1 and 2 NRC Inspection Report 05000282/2010010; 05000306/2010010 Preliminary Greater Than Green Finding," dated May 27, 2010 (Accession Number ML101470607)

In the above referenced letter, the NRC indicated interest in further refining (1) the population of high energy line break piping that can realistically interact with cooling water or fire protection piping, and (2) the likelihood of a consequential pipe failure given that a defined interaction occurs. For this second item, the NRC sought an engineering justification regarding the low or high likelihood of consequential pipe failure.

Northern States Power Company, a Minnesota corporation, d/b/a Xcel Energy, appreciates the opportunity to provide the NRC with additional information. Enclosure 1, "High Energy Line Break Screening", provides a summary of the selection criteria and the population of high energy piping which was considered for further engineering analyses and addresses the likelihood of a consequential pipe failure. Enclosure 2, "Cooling Water Break Flows", provides a summary of the final verified break flows for various sized breaks in the Prairie Island Nuclear Generating Plant Cooling Water system supply header. The information in Enclosure 2 supersedes preliminary information provided to Laura Kozak on March 19, 2010. Enclosures 3 through 6 provide detailed engineering evaluations in support of the information provided in Enclosures 1 and 2.

This information is provided in support of the July 13, 2010 Regulatory Conference.

Please contact Randy Rippy at 612-330-6911 if you have any questions related to this submittal.

IE01
NRR

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

Mark A. Schimmel

Mark A. Schimmel
Site Vice President, Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosures (6)

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC

ENCLOSURE 1

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

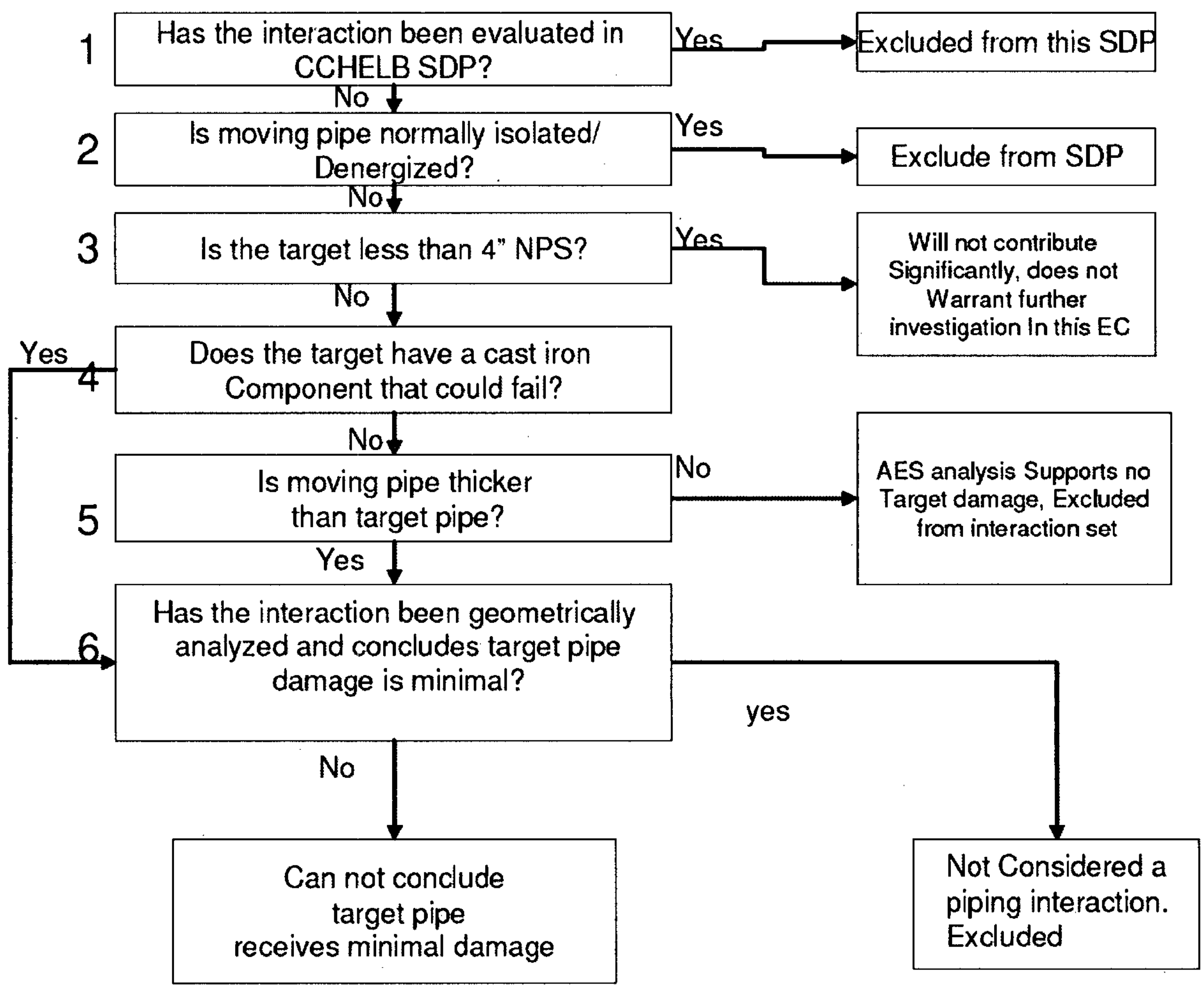
HIGH ENERGY LINE BREAK SCREENING

2 Pages Follow

High Energy Line Break Screening

The initial assessment of High Energy Line Break (HELB) pipe whip interactions assumed that all interactions resulted in target piping failure. This approach was conservative and resulted in the risk impact of HELB interactions to be over-estimated. Further analyses were performed to refine potential pipe interactions and their associated consequences.

Northern States Power Company, a Minnesota corporation, d/b/a Xcel Energy, developed the following method to further refine (1) the population of HELB piping that can realistically interact with Cooling Water or Fire Protection piping and (2) the likelihood of a consequential pipe failure given that a defined interaction occurs. This method and the results of the screening are documented in EC 16270 (provided in Enclosure 5). The method is shown graphically below.



Element 1 removes interactions that cause a break in Component Cooling Water (CC) piping. Turbine Building internal flooding due to these interactions was covered under an earlier performance deficiency and significance determination. Six interactions were screened out by this element.

Element 2 eliminates interactions where the high energy pipe is normally isolated during power operations. Twenty-two interactions were screened out by this element.

Element 3 screens out potential interactions that do not result in a significant flooding source. Based on the results in EC 16090 (provided in Enclosure 3), the 4" nominal pipe size (NPS) Cooling Water full break was determined to provide a flooding source of 2,912 gpm. This flooding flow will not threaten safety-related components until more than three hours after the break. This is ample time for the operating crew to isolate the flooding source. Thirty-five interactions were screened out by this element.

Element 4 bypasses the screening in Element 5 for piping that contains cast iron components. The analysis supporting Element 5 used ductile steel whipping pipes and targets, so it does not apply to targets containing cast iron components.

Element 5 is based on finite element analysis performed by Automated Engineering Services Corp. and Dynamax, Inc. that evaluates six pipe whip interactions for the Prairie Island Nuclear Generating Plant (PINGP) Turbine Building. These six interactions bound all but two interactions where the whipping pipe is of equal or less thickness than the target pipe. Those two interactions were transferred on to Element 6 for further review. The six interactions analyzed demonstrated that for the remainder of the HELB interactions in the PINGP Turbine Building, no significant damage results unless the whipping pipe has thicker walls than the target pipe. Thirty-four interactions were screened out by this element. The detailed analysis is included in EC 16275 (provided in Enclosure 6).

Element 6 reviewed the remaining population of HELB interactions and determined the possible pipe whip planes and arc travels. Each pipe whip plane was defined by the force acting axially along the severed section of the high energy pipe and the point at which a plastic hinge could form. In general, each HELB interaction has several pipe whip planes based on the possible break and plastic hinge locations. If the target is not located in a pipe whip plane within reach of the high energy line, then it was screened out based on geometry. Twenty-four interactions were screened out by this element.

The screening removed a total of 121 HELB-flooding interactions from consideration, significantly reducing the population of HELB-induced internal flooding interactions to be considered.

Ninety-eight (98) HELB interactions remain after this screening. The remaining interactions are designated in EC 16270 as 7, 9, 22, 23, 26 though 28, 31 through 38, 39a, 40a, 44, 45, 47, 50, 51, 52, 54, 55, 61, 64 through 72, 73, 74, 75, 77, 78, 79, 81, 83, 84, 85, 95, 120, 122, 126 through 133, 137, 138, 139, 140, 144 through 149, 153, 154, 158, 158a, 159a, 162, 165, 166, 167, 170 through 179, 186, 193 through 197, 200, 201, 202, 203, 204, and 205. EC 16270 is provided in Enclosure 5.

<u>References</u>

EC 16270, "Screening of Pipe Whip Interactions for SDP" (provided in Enclosure 5).

EC 16275, "Effects of Pipe Whip Interactions for Various Pipe Combinations for Internal Flooding SDP" (provided in Enclosure 6).

ENCLOSURE 2

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

COOLING WATER BREAK FLOWS

1 Page Follows

Cooling Water Break Flows

The table below is a summary of the break flow rates calculated for various pipe breaks in the Prairie Island Nuclear Generating Plant (PINGP) Cooling Water (CL) system. These breaks are all located in the CL supply header and would be a source for Turbine Building internal flooding. This information supersedes preliminary break flow rates provided to Laura Kozak of the Nuclear Regulatory Commission on March 19, 2010.

The final results given below used a new CL system model that was carefully specified and benchmarked against a typical configuration of the CL system. This analysis is documented in EC 16090 (provided in Enclosure 3).

Break Location	Nominal Piping Diameter, in.	Break size	Number of CL Pumps in operation	Break Flow, gpm
24-CL-67	24	Full Break	4	52,555[1]
16-CL-67	16	Full Break	3	33,269
12-CL-67	12	Full Break	3	20,222
6-CL-67	6	Full Break	2	7,780
4-CL-68	4	Full Break	2	2,912

In addition, the break flows for seismic failure of Cooling Water piping in the Turbine Building were assessed. Seismic failures were modeled as 14" diameter breaks occurring simultaneously on both units. The resulting break flow was 12,153 gpm to Unit 1 and 10,108 gpm to Unit 2. This analysis is documented in EC 16154 (provided in Enclosure 4).

<u>References</u>

EC 16090, "Turbine Building Flooding SDP: CL Turbine Building Pipe Break Analysis" (provided in Enclosure 3).

EC 16154, "Turbine Building Flooding SDP: CL Turbine Building Seismic Pipe Break Analysis" (provided in Enclosure 4).

[1]There are no 24" CL Supply Header Breaks in the scope of the significance determination because this piping is seismically qualified.