

Dominion Energy Kewaunee, Inc.
N490 Highway 42, Kewaunee, WI 54216-9511



NOV 09 2005

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 05-717
KPS/LIC/RR: RO
Docket No. 50-305
License No. DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
LICENSEE EVENT REPORT 2005-008-01

Dear Sirs:

Pursuant to 10 CFR 50.73, Dominion Energy Kewaunee, Inc., hereby submits the following Licensee Event Report applicable to Kewaunee Power Station.

Report No. 50-305/ LER 2005-008-01

This report has been reviewed by the Plant Operating Review Committee and will be forwarded to the Management Safety Review Committee for its review.

If you have any further questions, please contact Rick Repshas at (920) 388-8217.

Very truly yours,

Michael G. Gaffney
Site Vice President, Kewaunee Power Station

Attachment

Commitments made by this letter: NONE

JE22

cc: Mr. J. L. Caldwell
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Mr. S. C. Burton
NRC Senior Resident Inspector
Kewaunee Power Station

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0066), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)

Kewaunee Power Station

DOCKET NUMBER (2)

05000305

PAGE (3)

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TITLE (4)

Turbine-Driven Auxilliary Feedwater Pump Inoperable Due to Insufficient Net Positive Suction Head

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	20	2005	2005	-- 08 --	01	11	09	2005	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR .: (Check all that apply) (11)						
POWER LEVEL (10)		000		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
				20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
				20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
				20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
				20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
				20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
				20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
				20.2203(a)(2)(v)	X	50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
				20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
				20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME: Gary Harrington - Licensing/ Rick Repshas
TELEPHONE NUMBER (Include Area Code): (920) 388-8559/388-8217

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT

On April 20, 2005, with the plant in refueling shutdown mode, it was determined that the turbine-driven auxiliary feedwater pump would have been rendered inoperable due to insufficient net positive suction head following a postulated main steam line break event. Consequently, for greater than the past three years, plant Technical Specifications have not been met for having the turbine-driven auxiliary feedwater train operable with the reactor coolant system heated >350 degrees F. This is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications. The cause of the occurrence is an original system design error. Previous calculations and testing that were performed for auxiliary feedwater system response to a main steam line break event were focused on ensuring that adequate auxiliary feedwater flow would be provided by the turbine-driven AFW pump without due consideration of all suction head parameter concerns. Auxiliary feedwater system changes, including suction pressure protection, revised discharge pressure switch settings, and procedure changes were completed to compensate for the design deficiency. This occurrence is deemed to have very low risk significance and does not constitute a safety system functional failure.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

EVENT DESCRIPTION

On April 20, 2005, with the plant in refueling shutdown mode, it was determined that the turbine-driven auxiliary feedwater (AFW) [BA] pump [P] would have been rendered inoperable due to insufficient net positive suction head (NPSH), following a postulated main steam line break (MSLB) event. Consequently, for greater than the past three years, plant Technical Specification 3.4.b.1.B has not been met for having the turbine-driven AFW train operable with the reactor coolant system (RCS) [AB] heated >350 degrees F.

Subsequent analysis determined that there is also a small probability that the motor-driven AFW pumps would have been damaged, rendering them unable to provide flow to the Steam Generators (SG) [SG].

EVENT ANALYSIS

During review of design information associated with a planned modification of the AFW system correct previously identified AFW system design deficiencies, it was determined that insufficient NPSH may exist for each of the plant's three AFW pumps following a MSLB event. The insufficient NPSH results, in part, from the excessive flow (runout) condition of the AFW pumps as they supply flow to the depressurized SG.

During a MSLB event, the resultant high flow rates cause a decrease in AFW pump NPSH. When cavitation of the pump occurs, discharge pressure drops rapidly. The motor-driven AFW pumps were equipped with a low discharge pressure switch that initiated a pump trip at 350 psig. From discussions with the pump vendor and from testing performed, it was determined that, for both the train A and train B motor-driven AFW pumps, there is a high probability that the AFW pump discharge pressure switches [PS] would have caused a protective trip of the motor-driven pumps, prior to the pumps being rendered inoperable from damage due to low NPSH. Following action to isolate the faulted SG, the motor-driven AFW pumps could then have been restarted, supplying flow to the intact SG for continued heat removal. After undergoing a protective trip from their discharge pressure switches, sufficient time is available to manually restart the motor-driven AFW pumps for continued heat removal, due to the inherent cooldown that occurs as the faulted SG blows down in a MSLB event.

From discussion with the vendor, it was determined that there is a low probability that one or both of the motor-driven AFW pumps would have been damaged before tripping, rendering them unable to subsequently provide flow to the SGs. For large MSLBs, discharge pressure would be expected to drop rapidly, initiating a pump trip. While severe damage to the pump is unlikely, the vendor estimated a 5% probability that damage might occur that would render the pump unable to be restarted and deliver sufficient flow. For smaller MSLBs, pump discharge pressure may have

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dropped to a value slightly above the low discharge pressure setpoint. In this case, the pump would have operated for a short time while cavitating before operators took action that reduced flow. For this case, the vendor estimated a 15 to 20% probability of pump damage rendering the pump inoperable.

The turbine-driven AFW pump low discharge pressure switch was set to initiate a pump trip at 100 psig. Due to this low setpoint, it was determined that the switch would likely not have caused a protective trip of the pump in time to prevent pump damage. Consequently, in responding to a postulated MSLB, the turbine-driven pump would have been rendered inoperable due to low NPSH.

SAFETY SIGNIFICANCE

This occurrence is deemed to have very low risk safety significance and does not constitute a safety system functional failure. The increased core damage frequency (CDF) due to AFW pump insufficient net positive suction head (NPSH) is 2.2E-7/year, which is very low risk significance. In this calculation, the turbine driven AFW pump fails due to cavitation in an unisolated steam line break. Although the motor driven AFW pumps are likely to be tripped before damage occurs, their failure probability is increased for unisolated steam line breaks used in this analysis.

This CDF is considered to be very low risk significance. The NPSH issue is only one portion of the total AFW suction/discharge pressure trip issue which NRC Inspection Report No. 05000305/2005010 (DRP) determined to result in a total CDF increase up to 7E-6/year, which is low to moderate safety significance. Reference previous similar events section.

CAUSE

The cause of the occurrence is an original system design error. Previous calculations and testing that were performed for AFW system response to a MSLB event were focused on ensuring that adequate AFW flow would be provided by the turbine-driven AFW pump without due consideration of all suction head parameter concerns.

CORRECTIVE ACTIONS

1. An evaluation was conducted to determine the extent of the non-conformance and to determine if the AFW pumps would have been able to perform their safety functions. The licensing basis requirements for the AFW system were reviewed and the failure modes that might be created by the low discharge pressure trip switch deficiency were determined.

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2. AFW system design changes, including the addition of a low suction pressure trip feature for the AFW pump trains, revised discharge pressure trip settings and enhanced operating procedure guidance were implemented to correct the low NPSH issue.

PREVIOUS SIMILAR EVENTS

LER 2005-002, Auxiliary Feedwater Pumps Assumed to Fail from Postulated Loss of Primary Water Source – Safe Shutdown and Accident Analysis Assumptions Not Assured – Inadequate Design of Pump Protective Equipment

LER 2005-006, Auxiliary Feedwater Pumps Postulated to Fail Due to Air Ingestion Through Pump Packing

LER 1997-001, NRC Inspection Identifies Two Potential Unreviewed Safety Questions and One Potential Inadequate TS