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AUG 16 2005

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

Serial No. 05-546
KPS/LIC/MM:RO
Docket No. 50-305
License No. DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
LICENSEE EVENT REPORT LER 2005-010-00

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 2005-010-00

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 Mary Jo Merholz at (920) 388-8277.

Very truly yours,

Michael G. Gaffney
Site Vice President, Kewaunee Power Station

Attachment

Commitments made by this letter: None

IE22

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

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2007

LICENSEE EVENT REPORT (LER)

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

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TITLE (4)

Inadequate Engineering Analysis to Support Service Water Pump Operability

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
06	18	2005	2005	-- 010 --	00	08	16	2005	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check all that apply) (11)

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)	X 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)	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	TELEPHONE NUMBER (Include Area Code)
Mary Jo Merholz	(920) 388- 8277

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X	YES (If yes, complete EXPECTED SUBMISSION DATE).	NO		11	30	05

ABSTRACT

On June 18, 2005, with the Kewaunee Power Station in refueling shutdown mode, it was determined that the manual actions necessary to support service water pump operability were not supported by engineering analysis. The review of pump operability was prompted by questions from the Nuclear Regulatory Commission (NRC) Senior Resident Inspector. The NRC concerns were with the basis for the time period that the service water pumps could operate without bearing/seal water. This time period was not supported by any vendor documentation. The probable cause of this event is inadequate engineering analysis. A cause evaluation will be performed. Compensatory measures were put in place to ensure operability of the service water pumps. A plant modification will be installed to alert the control room when the service water pumps are switching from the station's equipment water supply to the station's service water supply. Evaluation continues on the existing design of the service water pump bearing/seal water system. A risk significance analysis is being performed. This analysis will determine if this event is 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 June 18, 2005, with the Kewaunee Power Station in refueling shutdown mode, it was determined that the manual actions necessary to support service water (SW) pump [P] operability were not supported by engineering analysis. The review of pump operability was prompted by questions from the Nuclear Regulatory Commission (NRC) Senior Resident Inspector.

Safety related SW is supplied by four vertical centrifugal pumps (refer to Figure 1 on Page 5 of this LER). Cooling and lubrication for the bearings is provided by an external source of clean bearing/seal water. This external bearing/seal water flow is provided to keep the bearings free of dirt, prolonging bearing life. Bearing/seal water, injected near the packing gland, flows through the upper stuffing box bearing and down through all the line shaft bearings and the upper suction bell bearing. A second bearing/seal water line runs down the outside of the pump to the lower suction bell bearing.

The normal bearing/seal water supply is provided by the plant equipment water pumps, which take their source from potable water. Bearing/seal water is supplied through a regulator set at 28 psig. Since this source of water is not safety related, backup bearing/seal water is taken automatically from the SW pump discharge through individual regulators set at 10 psig. The service water supply is filtered to 10 microns in a dual element cartridge filter.

Normal bearing/seal water flow to a running pump is about 1.25 gpm. A low flow alarm is provided if flow drops to 0.25 gpm. As described in a letter from the vendor contained in the Technical Manual, any amount of flow to the bearings will provide adequate flushing and cooling. Operating experience shows that when the safety related bearing/seal water supply is in service during periods of high lake turbulence, the cartridge filters are subject to fouling.

There is no control room indication that the normal supply has been lost and that the backup service water supply is supplying cooling water. If the normal supply were lost during a time of high lake turbulence causing plugging of the cartridge filters, the first control room indication of a problem would be the low flow alarm. It is known that when the low flow alarm is received there is still adequate flow to the bearings but it is not known how quickly the condition could progress to a complete loss of flow. Earlier evaluations by plant staff concluded that the SW pumps could operate for 2 to 4 hours with no bearing/seal water injection flow. This would leave adequate time for the operators to respond to the low flow alarm and shift to the standby filter cartridge. However, subsequent research could not find any documentation allowing pump operation with zero bearing/seal water flow. Although the pump vendor has stated that any flow is adequate, some flow must be maintained at all times to prevent bearing damage.

The upper and lower suction bell bearings and the line shaft bearings are completely submerged. Therefore, losing the bearing/seal water supply to them would not result in their losing cooling or lubrication.

The upper stuffing box bearing is located above the level of the pumped fluid. Therefore, if bearing/seal water to the stuffing box bearing is lost the bearing may operate dry. This would be expected to lead to the overheating of the bearing and possible seizure.

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If a plant event causes a loss of the non-safety related plant equipment water system, the safety related SW supply would automatically begin supplying bearing/seal water to the SW pumps through the cartridge filters. If lake conditions were turbulent with increased sand and sediment levels in the intake water, or if there was a severe lake weed intrusion in progress, the cartridge filters could begin clogging. As discussed above, the exact time it might take until clogging became severe is not known. If the cartridge filters became excessively clogged, a low flow alarm in the control room [CR] would have occurred. An operator would have been dispatched to shift to the standby cartridge filter and maintenance would have been called to replace the filter that was taken out of service. It is not known how long the operators would have had to respond before bearing/seal water injection flow was completely lost. It is also not known how long a service water pump would continue to operate if bearing/seal water injection were completely lost. It is possible that the stuffing box bearing would overheat, leading to seizure of the shaft.

EVENT ANALYSIS

This event is being reported under § 50.73(a)(2)(v)(B) as a condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to shut down the reactor and maintain it in a safe shutdown condition, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident. The safety system functional failure consequence of this event has not yet been determined. This event does not involve any specific equipment failures.

SAFETY SIGNIFICANCE

The SW System is designed to provide safe redundant cooling water supplies to equipment in the steam plant, to the containment fan coil units and to the reactor auxiliary systems. Supply of service water for an essential service is redundant and can be maintained in case of failure of one of the supply headers. The discovery of this event occurred during a forced outage, and the reactor was shut down. During previous plant operation, procedures were in place to dispatch an operator to shift bearing/seal water supply filters if a low flow alarm was received. The operation to shift to a clean standby filter is very quick and simple. It is likely that operator actions would have been effective to prevent damage to the SW pumps.

A detailed risk significance analysis will be performed. This analysis will determine if this event is a safety system functional failure.

CAUSE

The preliminary cause of this event is inadequate engineering analysis. Previous assessments of the effect of plugging of the SW pump cartridge filters used information from informal sources that was not verified to conclude that SW pumps could operate with no bearing/seal water. The pump vendor has not supported this conclusion and testing had not been done to demonstrate that this is true. A cause evaluation is being performed.

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

CORRECTIVE ACTIONS

1. A compensatory measure has been put in place to ensure timely shifting to a clean filter and replacement of the fouled filter if a SW pump low bearing/seal water cooling injection flow alarm is received. A qualified mechanical maintenance individual is continuously available in the immediate area of the SW pumps. This individual is equipped with all parts, tools and procedures needed to ensure timely shifting and replacement of the filters in the SW bearing/seal water system in the event they become clogged.

2. A plant modification will be installed to add a pressure switch that will annunciate in the control room as a warning when the bearing/seal water flow for the SW pumps are switching from the station's equipment water supply to the station's service water supply, where the in-line filter system is located. This will reduce the need for the compensatory measure stated in Corrective Action #1. The revised requirement will be to have the mechanical maintenance individual available within the protected area versus within the direct area of the SW pumps.

3. Evaluation continues on the existing design of the SW pump bearing/seal water system. Additional analysis is being performed to determine how rapidly filter clogging could lead to loss of bearing/seal water.

4. Potential modifications to the design of the SW pump bearing/seal water system are being investigated to eliminate the dependence on operator action.

5. A supplement to this LER will be forwarded to provide the results of the cause evaluation of this event and to provide information on the design basis, risk significance and safety system functional failure determination for the SW pump bearing/seal water system design. The supplement will also provide information on any additional corrective actions if applicable.

PREVIOUS SIMILAR EVENTS

LER 2005-012: Residual Heat Removal Pump Run-out Upon Loss of Instrument Air While Aligned for Sump Recirculation

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FIGURE 1