Dominion Energy Kewaunee, Inc.
N490 Hwy 42, Kewaunee, WI 54216
Web Address: www.dom.com

Dominion®

MAY 24 2012

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Serial No. 12-370
LIC/NW/R0
Docket No.: 50-305
License No.: DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
LICENSEE EVENT REPORT 2011-005-01

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

Report No. 50-305/2011-005-01

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

In addition to having been reported pursuant to 10 CFR 50.73(a)(2)(i)(B) for any operation or condition prohibited by the plant's Technical Specifications (TS); and 10 CFR 50.73(a)(2)(v), as an event or condition that could have prevented the fulfillment of a safety function; a third reporting criterion has been identified. The LER has been amended to add reporting pursuant to 10 CFR 50(a)(2)(vii), for any event where a single cause or condition caused two independent trains to become inoperable that are designed to control the release of radioactive material and mitigate the consequences of an accident.

If you have any further questions, please contact Mr. Jack Gadzala at (920) 388-8604.

Very truly yours,

A. J. Jordan
Site Vice President, Kewaunee Power Station

Attachment(s)

Commitments made by this letter: NONE

IE22
NRR

cc: Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
2443 Warrenville Road
Suite 210
Lisle, IL 60532-4352

Mr. K. D. Feintuch
Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop O8-H4A
11555 Rockville Pike
Rockville, MD 20852-2738

NRC Senior Resident Inspector
Kewaunee Power Station

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORYCOMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Service (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), 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.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Kewaunee Power Station	**05000305**	**1** OF **5**

4. TITLE

Shield Building Ventilation Train Inoperable for Longer Period Than Allowed by Technical Specifications

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
01	26	2011	2011	-- 005 --	01	05	24	2012	FACILITY NAME	05000

9. OPERATING MODE

1

10. POWER LEVEL

100%

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

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☒ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☒ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(include Area Code)*
Patrick G Ehlen	**(920) 388-8320**

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	VB	SPT	Keane	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

During a routine equipment inspection at 1725 CST on January 26, 2011, one printed circuit board in the "A" shield building ventilation (SBV) system control cabinet was found partially detached from its mounting plate with three of its four mounting posts broken. The card remained electrically connected and operating, but was only supported by its attached electrical wiring and one mounting post. This condition rendered "A" train SBV inoperable since the partially restrained card could not be assured to function during a seismic event. The mounting post failures were due to separation (tearing) of a neoprene section of the standoff extension fasteners on the posts. This condition was subsequently determined to have likely existed since shortly after the circuit board was installed on December 3, 2010, until the mounting posts were replaced on January 27, 2011.

With one SBV system train inoperable, Technical Specification (TS) 3.6.c.1, applied. SBV system train "A" was inoperable for greater than the time periods permitted by TS 3.6.c.1. Therefore, this event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B) for any operation or condition prohibited by the plant's Technical Specifications. Since the redundant SBV train (B) was twice removed from service concurrent with train "A" being inoperable, and the other train's circuit mounting posts also could not be assured to function during a seismic event, this condition is also being reported as an event or condition that could have prevented the fulfillment of a safety function, pursuant to 10 CFR 50.73(a)(2)(v) and as a common cause inoperability of independent trains, pursuant to 10 CFR 50.73(a)(2)(vii).

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Kewaunee Power Station	05000305	2011	-- 005 -	01	2 OF 5

NARRATIVE

Event Description

As part of routine ongoing maintenance activities, Kewaunee Power Station (KPS) had received replacement shield building ventilation (SBV)[VC] printed circuit boards [ECBD] with a slightly different configuration than the original boards. These new boards contained attached subcomponents, which were fastened with screws that were longer than the existing standoff mounting posts [SPT] used for mounting the circuit board onto its cabinet housing [CAB] plate (older boards' subcomponents were assembled with shorter screws or fasteners that did not protrude as much). Mounting a newer board onto its cabinet mounting plate resulted in the longer subcomponent screw tips pressing against the cabinet mounting plate and deforming the board. Although a flexible insulating sheet [INS] (fish paper) was attached to the mounting plate to prevent an electrical short between the plate and the longer screws, KPS staff deemed the circuit card distortion to be undesirable. To resolve this condition, the vendor recommended installation of standoff extensions [VB] to the existing mounts.

On December 3, 2010, standoff extensions were added onto the "A" train SBV printed circuit board to increase the board's separation from the mounting plate in the cabinet housing (and thereby prevent contact between the plate and the board components' longer screws without relying on the insulating sheet). On January 6, 2011, this same activity was performed on "B" train SBV. These standoff extensions are sandwich mount vibration isolators [VB] that use a neoprene material as the dampener (neoprene spacer with an attached metal threaded connector). An item equivalency evaluation had been performed to evaluate the difference in mounting for the replacement circuit boards. However, the standoff extensions were obtained from a commercial grade supplier, whereas the item equivalency evaluation did not address the additional details needed to consider use of a commercial grade component in a safety related system.

During a routine equipment inspection at 1725 CST on January 26, 2011, one printed circuit board in the "A" SBV system control cabinet was found partially detached from its mounting plate with three of its four standoff extensions broken. The mounting post failures consisted of separation (tearing) of the neoprene material adjacent to the interface between the neoprene and the screw head (threaded connector). The card remained electrically connected and operating, but was only supported by its attached electrical wiring and one mounting post. This condition rendered "A" train SBV inoperable since the partially restrained card could not be assured to function during a seismic event.

This condition was believed to have been initiated by overtorquing of the "A" train SBV circuit board mounting posts during installation and therefore likely existed since shortly after the circuit board was installed on December 3, 2010, until the mounting post extensions were removed on January 27, 2011.

Review of station logs determined that the redundant (B) train of SBV had been removed from service to perform routine activities on two occasions during the period when "A" train SBV was inoperable. The first occurrence was December 6, 2010 for about 20 hours to perform charcoal and filter testing on "B" train SBV. The second occurrence was January 3, 2011 for about 5 hours during "B" emergency diesel generator (EDG) testing (the SBV system remained in operation during this test; however, the "B" train EDG provides emergency power to "B" train SBV; therefore, "B" train SBV was considered inoperable during EDG testing).

Technical Specification (TS) 3.6, "Containment System", stated (in part):

a. All of the following conditions shall be satisfied whenever CONTAINMENT SYSTEM INTEGRITY,

as defined by TS 1.0.g, is required:

1. Both trains of the Shield Building Ventilation System, including filters, shall be OPERABLE or the reactor shall be shut down within 12 hours, except that when one of the two trains of the Shield Building Ventilation System is made or found to be inoperable for any reason, reactor operation is permissible only during the succeeding 7 days.

With one or both SBV system trains inoperable, Technical Specification (TS) 3.6.c.1, applied. SBV system train "A" was inoperable for greater than the time periods permitted by TS 3.6.c.1. Therefore, this event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B) for any operation or condition prohibited by the plant's Technical Specifications. Since the redundant SBV train (B) was twice removed from service concurrent with train "A" being inoperable, this condition also constituted an event or condition that could have prevented the fulfillment of a safety function. As such, this condition is also being reported pursuant to 10 CFR 50.73(a)(2)(v).

Appropriate recognition that the failure likely existed since shortly after the circuit board was installed on December 3, 2010, did not occur until several months after the failure was initially discovered. The failure occurrence date was not recognized earlier due to inadequate followup to the initial operability evaluation. Initially, the "A" train SBV was considered to have become inoperable "upon discovery" (on January 26, 2011), since no conclusive evidence existed to conclude an earlier failure date. However, a subsequent evaluation indicated that the standoff extensions on "A" train SBV were likely damaged during the installation process or failed shortly after installation. This determination was not factored back into the original operability evaluation in a timely manner. Consequently, the inoperability of "A" train SBV for a period greater than permitted by Technical Specifications was not realized until after the 60-day reporting requirement of 10 CFR 50.73 for this condition had elapsed.

During subsequent evaluations, concerns were raised about the ability of the standoff extensions on the undamaged "B" train SBV to withstand a seismic event (due to the soft material properties of the neoprene mounting standoff, as discussed in the Cause section below). Because a detailed material analysis of the neoprene that had been used on the undamaged "B" train SBV was not available from the vendor, the strength of these standoffs could not be conclusively determined. Without conclusive evidence to the contrary, they were conservatively judged as being unable to remain intact during a seismic event. These standoffs were installed on both trains from January 6 to January 26, 2011. Since both SBV trains had similar standoffs, this condition is being conservatively reported as a common cause inoperability of independent trains, pursuant to 10 CFR 50.73(a)(2)(vii).

Although the governing Technical Specification for the SBV system was changed during this intervening period (conversion to Improved Technical Specifications), this Technical Specification change does not result in a material change to the events described, nor to the resulting conclusions.

Event and Safety Consequence Analysis

The primary containment [NH] has a secondary containment called the shield building, which is a concrete structure that surrounds the steel primary containment vessel. Between the containment vessel and the shield building inner wall is an annular space that collects the majority of the containment leakage that may occur following a loss of coolant accident (LOCA).

The SBV system establishes a negative pressure in the annulus between the shield building and the steel

containment vessel. Filters [FLT] in the system then control the release of radioactive contaminants to the environment. Shield building OPERABILITY is required to ensure retention of primary containment leakage and proper operation of the SBV system.

The SBV system reduces the radioactive content in the shield building atmosphere following a design basis accident (DBA). Loss of the SBV system could cause site boundary doses, in the event of a DBA, to exceed the values given in the licensing basis. The SBV system consists of two separate and redundant trains. The accident analysis assumes that only one train of SBV is functional due to a single failure that disables the other train.

Although the "A" train SBV was inoperable because the printed circuit board was not completely attached to its cabinet mounting plate, the circuit card remained electrically connected and was functioning properly to control the system. The failure concern was that the circuit board could come in contact with an exposed ground point in the enclosure cabinet (during a seismic event), which could cause the circuit to fail. However, the interior of the enclosure provides limited opportunity for contacting a ground path and causing failure. The interior of the enclosure is painted, the terminal strips have recessed screw terminals, the wire lugs are insulated, and there is a protective insulating sheet of 'fish paper' on the circuit board mounting panel. All these factors would minimize the likelihood of the circuit board becoming grounded and failing. Additionally this specific failure mode of the standoffs resulted in the neoprene part of the standoff remaining attached to the mounting plate and the circuit board being held firmly suspended by the two wire harnesses and one mounting post. This configuration only allowed the printed circuit board limited movement within the enclosure (which further improved the likelihood that the circuit board would have functioned if called upon).

As discussed above, the redundant (B) train of SBV had been removed from service to perform routine activities on two occasions during the period when "A" train SBV was inoperable. This condition constituted a safety system functional failure. However, based on the limited impact that these two activities had on the operational status of "B" train SBV, it could have been restored to service expeditiously if it had been needed to respond to a postulated event. During the remainder of the time when "A" train SBV was inoperable due to the unsecured circuit board, "B" train SBV would likely have been capable of performing its safety function.

If the standoffs on both SBV trains had failed as a result of a seismic event, the printed circuit boards for both trains would likely have functioned if called upon for the same reasons as discussed above for the "A" train SBV standoff failure (i.e., the circuit cards would likely have remained electrically connected and function properly to control the system).

Additionally, the reactor coolant system activity that existed during these periods was significantly below the values assumed at the start of a design basis accident. This would have resulted in significantly lower site boundary doses than postulated in the accident analysis.

The SBV system has no effect on core damage frequency because it has no capability to either cause or mitigate core damage. Large early release results from either a failure of containment isolation or a containment bypass event (steam generator tube rupture or interfacing systems LOCA). Neither of these events are associated with the shield building; so it has no effect on large early release frequency.

Based on the above, the safety significance of this condition was minimal.

The guidance in NUREG-1022, Section 3.2.2 states that "technical specifications contain LCO statements

that include action statements... to provide constraints on the length of time components or systems may remain inoperable or out of service before the plant must shut down or other compensatory measures must be taken." This guidance then states "An LER is required if a condition existed for a time longer than permitted by the technical specifications [i.e., greater than the allowed outage time (or completion time in ISTS)] even if the condition was not discovered until after the allowable time had elapsed and the condition was rectified immediately upon discovery."

Therefore, this condition is being reported in accordance with this guidance as a condition prohibited by TS.

Cause

The mounting post failure was caused by the combination of an inadequate evaluation of the mounting standoff extension that resulted in use of a neoprene mounting standoff, coupled with an installation procedure that did not contain sufficient controls to assure that the neoprene was not overtorqued when placed in service. Station personnel did not identify this condition prior to installation of the components in a plant system because an equivalency evaluation was not properly performed to determine adequacy of a commercial grade product for use in a safety related environment. A subsequent evaluation determined that the design sheer rates of the standoff connectors (1 pound static and 28 pounds spring) may have been unduly low for the installation process employed.

The vendor-recommended torque value for these standoff extensions was 13 in-lbs. However, testing of the torque necessary to cause the standoff extensions to fail revealed that the torque necessary to shear them was only 3.5 in-lbs. Such a low torque value could easily be achieved with a standard screwdriver. Additionally, no torque specifications were listed in the work orders used to install them. Consequently, the standoff extensions were apparently overtorqued during installation, which likely initiated the failures.

The deficient equivalency evaluation contributed to the lack of torque specifications in the work order.

Corrective Actions

As immediate corrective action, the failed standoff extensions on SBV "A" train were removed and the printed circuit board was reinstalled with its original mounting bolts. This restored the SBV system to operable status. As a precaution, the standoff connectors on the SBV "B" train circuit board were also removed.

An evaluation of the failure mechanism that caused the standoff mount separation was initiated.

As longer term action, activities were initiated with the printed circuit board vendor to develop an improved mounting method for these circuit boards. This activity was entered into the KPS corrective action process as CR 434839.

Operability and reportability procedures were reviewed to determine whether enhancements were needed.

Similar Events

A review of Licensee Event Reports covering the last three years did not identify any similar events.