

Mark B. Bezilla  
Vice President - Nuclear419-321-7676  
Fax: 419-321-7582December 28, 2007  
L-07-512

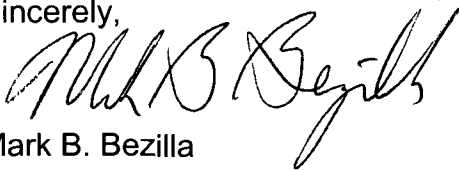
10 CFR 50.73

ATTN: Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555-0001SUBJECT:  
Davis-Besse Nuclear Power Station  
Docket Number 50-346, License Number NPF-3  
Licensee Event Report 2007-001, Station Vent Radiation Monitor in Bypass due to Faulty Optical Isolation Board

Enclosed is Licensee Event Report (LER) 2007-001. This LER is being submitted to provide written notification of the discovery that one Station Vent Normal Range Radiation Monitor was unknowingly out of service for more than seven days due to installation of a faulty optical isolation board, and the other monitor was removed from service twice during this period for routine maintenance for a few hours each time. This issue is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the Technical Specifications, and 10 CFR 50.73(a)(2)(v)(D) as conditions that could have prevented fulfillment of a safety function for systems needed to mitigate the consequences of an accident.

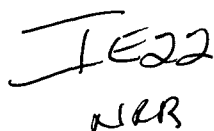
There are no regulatory commitments contained in this letter or its enclosure. If there are any questions or if additional information is required, please contact Raymond A. Hruby, Jr., Manager – Site Regulatory Compliance, at 419-321-8000.

Sincerely,



Mark B. Bezilla

Enclosure: LER 2007-001 (NP-33-07-001-00)

cc: NRC Region III Administrator  
NRC Resident Inspector  
NRR Project Manager  
Utility Radiological Safety Board

# 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: 80 hrs. 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 (3150-0104), 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.

<b>1. FACILITY NAME</b> Davis-Besse Nuclear Power Station	<b>2. DOCKET NUMBER</b> 05000346	<b>3. PAGE</b> 1 OF 6
--	-------------------------------------	--------------------------

**4. TITLE**  
Station Vent Radiation Monitor in Bypass due to Faulty Optical Isolation Board

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
10	16	2007	2007	001	00	12	28	2007	FACILITY NAME	05000
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check all that apply)										
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)							
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(a)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)							
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)							
<b>10. POWER LEVEL</b> 100	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)							
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)							
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Gerald M. Wolf, Staff Engineer, Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) (419) 321-8001
--	--

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

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

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE). <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b> MONTH: _____ DAY: _____ YEAR: _____
---	--

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

On October 30, 2007, with the plant at approximately 100 percent power, it was determined that both trains of Station Vent Normal Range Radiation Monitors were inoperable for more than one hour (on two occasions) without isolating the Control Room Normal Ventilation System as required by Technical Specification (TS) 3.7.6.1. The train 2 monitor was unknowingly inoperable due to installation of a faulty optical isolation board on October 15, 2007; which caused the monitor to be in the bypass mode for approximately 13 days. This was in excess of the seven days allowed by TS 3.7.6.1 with the ventilation not isolated. The train 1 monitor was removed from service on October 16 and 22, 2007 for routine maintenance and sampling activities. On October 23, when it was determined that train 2 monitor was in bypass mode, the monitor was declared inoperable until repairs were completed on October 25.

This issue, which is due to a faulty optical isolation board and inadequate testing specified in the Post Maintenance Test Manual and Quarterly Functional Test Procedures, is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the Technical Specifications, and 10 CFR 50.73(a)(2)(v)(D) as conditions that could have prevented fulfillment of a safety function for systems needed to mitigate the consequences of an accident.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 6
		2007	-- 001	-- 00	

**NARRATIVE**

**DESCRIPTION OF OCCURRENCE:**

**System Description:**

The Station Vent Radiation Monitors RE4598AA, RE4598AB, RE4598BA, and RE4598BB [IL-45] (manufacturer: Kaman Instrumentation Corporation) at the Davis-Besse Nuclear Power Station (DBNPS) measure Station Vent discharge [VL] during normal and accident conditions. The normal range monitor (AA, BA) sample passes through a fixed particulate filter, an iodine cartridge, and a pump. The sample then passes through the noble gas chamber and is discharged back to the Station Vent stack. The accident range monitor (AB, BB) sample is drawn from a splitter block at the inlet to the normal range skid. The normal range monitor pump is needed to be running to assist the accident range unit to draw sufficient sample from the Station Vent stack. In this mode, the particulate, iodine, and gas channels are automatically bypassed on the normal range monitor.

When the Normal Range noble gas readings reach the established setpoint, a signal is sent to the Accident Range monitor to start operation. Both the Normal and Accident Range Monitors will be running in this intermediate mode. If activity levels continue to increase, all Normal Range Monitor activity channels will turn off and be bypassed. When radiation in any normal range monitor channel reaches the high setpoint, the Control Room and Cable Spreading Room ventilation [VI] is automatically isolated. The ventilation is also automatically isolated by a signal from the Safety Features Actuation System [JE] due to high containment pressure or low reactor coolant system pressure. Once the normal ventilation has been isolated, the Control Room Emergency Ventilation System [VI] must be manually started.

DBNPS Technical Specification (TS) Limiting Condition for Operation (LCO) 3.7.6.1, "Control Room Emergency Ventilation System" requires two independent control room emergency ventilation systems be Operable while the plant is operating in Modes 1, 2, 3, and 4. With one channel of Station Vent Normal Range Radiation Monitoring instrumentation inoperable, TS LCO 3.7.6.1 Action b requires within 7 days the inoperable channel be restored to Operable status or the control room normal ventilation system be isolated and at least one control room emergency ventilation system train placed in operation. With both channels of Station Vent Normal Range Radiation Monitoring instrumentation inoperable, TS LCO 3.7.6.1 Action c requires within 1 hour the control room normal ventilation system be isolated and at least one control room emergency ventilation train placed in operation.

**Event Description:**

On October 12, 2007, with the DBNPS in Mode 1 operating at approximately 100 percent power, a Station Annunciator alarm was received indicating failure of the train 2 normal range Station Vent Radiation Monitor (RE4598BA). During troubleshooting activities, several circuit boards were replaced including the Central Processing Unit (CPU) board, system board, relay board, and optical isolation boards .

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 6
		2007	-- 001	-- 00	

**NARRATIVE**

DESCRIPTION OF OCCURRENCE: (continued)

On October 22, 2007, the weekly surveillance sampling of the train 2 normal range Station Vent Radiation Monitor (RE4598BA) was performed. When the Chemistry Tester removed the particulate filter from the monitor it appeared cleaner than normal. Also, adequate flow was not able to be established through the bubbler system used to collect a tritium sample. Investigation revealed that solenoid valve CV4598BAB was hot to the touch when compared with the valve on the train 1 monitor. The inability to establish adequate flow was reported to Operations Department personnel. After a lineup check of the monitor and verification that all other parameters were as expected, Operations declared the train 2 monitor operable and declared the train 1 monitor inoperable to complete the weekly surveillance test sampling. Tritium sampling was completed satisfactorily via the train 1 monitor (RE4598AA), and the train 1 was returned to operable status after approximately 3 hours.

The Chemistry Supervisor generated Condition Report (CR) 07-29011 to document that sample flow could not be obtained and also noted that the solenoid valve was hotter than expected. Because the technician qualified on these radiation monitors was scheduled to leave at 1400 hours, the Operations Shift Manager along with the Fix-It-Now (FIN) representative decided to wait until the next morning for the technician to walk down the system to assist with the Condition Report Operability Determination. The next morning (October 23), the qualified FIN technician walked down the train 2 normal range Station Vent Radiation Monitor (RE4598BA) and determined that the solenoid valves and motor-operated valve were in the bypass mode, RE4598BA was declared inoperable, and the station entered the seven day action statement for TS 3.7.6.1 Action b. Following troubleshooting activities, RE4598BA was declared Operable at 0118 hours on October 25, 2007. Also on October 25, 2007, Condition Report 07-29202 was initiated to document the two optical isolation boards received from the warehouse did not function as required during troubleshooting activities.

On October 30, 2007, as documented in CR 07-29410, during review of CRs 07-29011 and 07-29202 it was discovered that because of the issue documented in CR 07-29011, RE4598BA was inoperable on October 22, 2007, due to energization of the solenoid valve CV4598BAB, which resulted in sample flow bypassing the normal detectors. When RE4598AA was removed from service for routine sampling activities, both detectors were inoperable for approximately 3.6 hours, which is longer than the one hour permitted by TS 3.7.6.1 Action c without isolating the control room normal ventilation system and placing at least one control room emergency ventilation train in operation. Further investigation into this issue determined that RE4598BA most likely remained inoperable when it was returned to service on October 16, 2007, due to installation of a faulty optical isolation board on October 15, 2007, and was not returned to service until repairs were completed on October 25, 2007, resulting in RE4598BA being inoperable for approximately 13 days. This is longer than the 7 days permitted by TS 3.7.6.1 Action b. Additionally, when RE4598AA was removed from service for routine sampling activities on October 16, 2007 following RE4598BA being returned to service, both detectors were also inoperable for approximately two hours, which is longer than the one hour permitted by TS 3.7.6.1 Action c. The event date for this issue (October 16, 2007) was not determined until after it was discovered on October 30, 2007, that both detectors were inoperable at the same time on October 22, 2007, and the subsequent investigation determined that RE4598BA was not operable when returned to service on October 16, 2007. Accordingly, the discovery date for this reportable event is October 30, 2007, with the Licensee Event Report due within the next 60 days in accordance with 10 CFR 50.73.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 6
		2007	-- 001	-- 00	

**NARRATIVE**

**APPARENT CAUSE OF OCCURRENCE:**

The Radiation Monitor optical isolation boards are input/output cards that provide electrical separation between the microprocessor and its input and output signals. Through these boards, external monitor status bits are read and made available to the CPU. Also, control bits are transferred from the CPU to external devices such as relays or solenoids. Although the boards were tested at the vendor facility using DBNPS software, the boards would not function as desired when installed in the system. The new optical isolation board installed for the iodine channel on October 15, 2007, resulted in repositioning of three valves to their bypass positions, rendering monitor RE4598BA inoperable.

When the optical isolation boards were replaced and RE4598BA was returned to service on October 16, 2007, inadequate Post Maintenance Testing of the circuit function was performed. The Post Maintenance Test Manual does not include additional requirements for testing the unique functions associated with the radiation monitor electronic isolator and relay boards.

Procedure DB-SC-03218, "Quarterly Functional Test of RE4598BA, Station Vent Normal Range Radiation Monitor" (Revision 07), did not adequately test the system to validate that it was capable of performing its designated function. When the normal range monitor is in the bypass mode, the three radiation detector channels do not see flow and cannot sense increasing Station Vent radiation levels. A separate verification of the required flow path was not considered necessary due to the perception that it was verified indirectly using the low flow check and by observing normal flow through the monitor on available indicators.

A contributing cause to the events was less than adequate work practices in that the Shift Senior Reactor Operators (SROs) did not thoroughly challenge assumptions and unexpected conditions, or confirm details when uncertainty existed. The mindset that the low flow condition was limited to a sampling problem was non-conservative and influenced follow-up decisions that could have identified the condition that RE4598BA was in bypass and inoperable before releasing the opposite train monitor for work.

**ANALYSIS OF OCCURRENCE:**

Following failure of the normal range Station Vent Radiation Monitor RE4598BA on October 12, 2007, the installation of a faulty optical isolation board during maintenance on October 15, 2007 resulted in the monitor being inoperable until repairs were completed October 25, 2007. This 13-day period is in excess of the allowable seven day LCO time of TS 3.7.6.1.b with the control room normal ventilation system not isolated. Furthermore, when the normal range Station Vent Radiation Monitor in the opposite train (RE4598AA) was removed from service for planned maintenance on October 16, 2007, for approximately two hours, and on October 22, 2007, for approximately 3.6 hours, these times were in excess of the one hour LCO time of TS 3.7.6.1.c with the control room normal ventilation system not isolated. Therefore, the plant was operated in conditions prohibited by the Technical Specifications, which is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

The Station Vent Radiation Monitors send a signal to automatically isolate the control room ventilation system dampers that penetrate the control room pressure boundary in the event of high radiation. Per the DBNPS Updated Safety Analysis Report (USAR), the Station Vent Radiation Monitors automatically isolate the control room in the event of a loss of coolant accident, a fuel handling accident, or a rupture of a Waste Gas Decay Tank [WE-Tk]. During the brief periods of time that both monitors were out of

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 6
		2007	-- 001	-- 00	

**NARRATIVE**

**ANALYSIS OF OCCURRENCE: (continued)**

service, the safety function of mitigating dose to the control room operators may have been prevented during these postulated events, which is reportable per 10 CFR 50.73(a)(2)(v)(D).

In addition to the isolation signal from the Station Vent Radiation Monitors, the control room pressure boundary dampers also receive an isolation signal from the Safety Features Actuation System upon an Incident Level 1 signal, which is initiated as a result of low reactor coolant system pressure or high pressure within the containment building. Therefore, in the event of a loss of coolant accident, the unavailability of the Station Vent Radiation Monitors as described above would not have prevented automatic isolation of the control room.

During the two brief periods of time that both monitors were out of service, no fuel handling activities took place in the Spent Fuel Pool [DB], so there was no potential for a fuel handling accident where control room isolation would have been required. An analysis has been performed to show that with Reactor Coolant System [AB] specific activity less than that specified by Technical Specification 3.4.8 for continued operation (1.0 micro-curies per gram dose equivalent I-131), the dose received by the operators in the control room will not exceed the values specified in the USAR if the control room is not isolated on a rupture of a Waste Gas Decay Tank. During October 2007, when both monitors were out of service, Reactor Coolant System specific activity was only approximately one percent of the value specified by TS 3.4.8 for continued operation, further minimizing the dose control room operators may have received in the event of a Waste Gas Decay Tank rupture with no closure of the control room pressure boundary dampers. Therefore, this event had very low safety significance.

**CORRECTIVE ACTIONS:**

Station Vent Normal Range Radiation Monitor RE4598BA was returned to operable status on October 25, 2007, following troubleshooting and repair activities.

The spare qualified optical isolation boards located in the DBNPS warehouse will be installed into a Station Vent Radiation Monitor Iodine Channel to test the bypass function while the system is out of service. Replacement Optical Isolation Boards will be purchased as necessary to replenish warehouse stock.

The Post Maintenance Test Manual will be revised to include a note applicable to all radiation monitors manufactured by Kaman. The note will alert station personnel when generating orders for circuit board replacements that each final device must be verified to operate as a result of change to each input to the circuit board that was replaced.

The functional test procedures for the Station Vent Normal Range Radiation Monitors (DB-SC-03216 and -03218) and the Containment Normal Range Radiation Monitors (DB-SC-03212 and -03213) will be revised to more adequately test the flow path of the monitor to ensure it is in the normal range configuration.

The actions described above represent intended or planned actions, and completion of these actions is being tracked through the DBNPS corrective action program. These actions are described for the NRC's information and are not regulatory commitments.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Davis-Besse Unit Number 1	05000346	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 6
		2007	-- 001	-- 00	

**NARRATIVE**

**FAILURE DATA:**

There have been no Licensee Event Reports submitted for the DBNPS in the past three years regarding the Station Vent Radiation Monitors, or where one train of equipment was removed from service while the opposite train was inoperable.

Energy Industry Identification System (EIIIS) codes are identified in the text as [XX].

NP-33-07-001-00

CRs 2007-29011, 2007-29202, 2007-29410