



A Centerior Energy Company

EDISON PLAZA  
300 MADISON AVENUE  
TOLEDO, OHIO 43652-0001

AB-94-0034  
NP-33-93-008, R1

Docket No. 50-346

License No. NPF-3

United States Nuclear Regulatory Commission  
Document Control Desk  
Washington, D. C. 20555

Gentlemen:

LER 93-008, Revision 1  
Davis-Besse Nuclear Power Station, Unit No. 1  
Date of Occurrence - December 21, 1993

Enclosed please find Revision 1 to Licensee Event Report 93-008, which is being submitted to document completion of investigations relevant to the apparent cause of this event and update corrective actions taken. The changes are marked with a revision bar in the margin. Please destroy or mark superseded any previous copies of this LER.

Very truly yours,

John K. Wood  
Plant Manager  
Davis-Besse Nuclear Power Station

JKW/lkg

Enclosure

cc: Mr. John B. Martin  
Regional Administrator  
USNRC Region III

Mr. Stan Stasek  
DB-1 NRC Sr. Resident Inspector

Utility Radiological Safety Board

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## LICENSEE EVENT REPORT (LER)

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Davis-Besse Nuclear Power Station, Unit No. 1

DOCKET NUMBER (2)

05000-346

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TITLE (4)

Manual Initiation of Emergency Ventilation Due to High Airborne Activity

EVENT DATE (5)			LER NUMBER (5)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	21	93	93	008	01	09	30	94		05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		100	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		<input checked="" type="checkbox"/> OTHER	
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)	
			20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)			
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		Voluntary Report	

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Dale L. Miller, Senior Engineer - Licensing

TELEPHONE NUMBER (Include Area Code)

(419) 321-7264

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs

## SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE)

X

NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On December 21, 1993, at 1315 hours, with the Reactor operating at approximately 100 percent Rated Thermal Power, Chemistry personnel initiated a sample of the Make-up Tank (MUT) gas space. Plant Engineering and Chemistry personnel were evaluating the correlation between the concentration of dissolved gases contained in the reactor coolant and the concentration of hydrogen and nitrogen in the MUT gas space. At 1319 hours a high alarm signal was received in the control room from the Radioactive Waste Area Ventilation Exhaust Radiation Monitor RE5405. The Radwaste Area Supply and Exhaust fans automatically stopped and ventilation dampers changed position as designed. Emergency Ventilation System (EVS) Trains 1 and 2 were manually started. Initial notification to the NRC of the manual initiation of an Engineered Safety Feature was made on December 21, 1993 at 1737 hours. Starting the EVS in a non-ESF mode in accordance with regular reactor operating procedures has since been evaluated as non-reportable. This LER is therefore redispositioned as a voluntary report due to the number of diverse aspects of the event which generated significant generic interest. This event had no direct impact on the health and safety of the public or plant personnel. The dose due to the release was a very small fraction of the regulatory limits.

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

Description of Occurrence:

On December 21, 1993, at 1315 hours, with the Reactor operating at approximately 100 percent Rated Thermal Power, Chemistry personnel initiated a sample of the Make-up Tank (MUT-CB) gas space. The MUT gas space is regularly maintained with a 25 to 45 PSIG overpressure of hydrogen when the reactor is critical. Plant Engineering and Chemistry personnel were evaluating the correlation between the concentration of dissolved gases contained in the reactor coolant and the concentration of hydrogen and nitrogen in the MUT gas space. Chemistry personnel decided to obtain a MUT gas space sample from the Reactor Sample System (RSS-KN) located on the Auxiliary Building 545 foot elevation to gather data for this investigation.

The MUT gas sample, which is infrequently obtained, was collected in accordance with Davis-Besse procedure DB-CH-06002, Sampling System Nuclear Areas. The RSS valve alignment was performed to route the MUT gas through the sample sink to the Reactor Coolant Drain Tank (RCDT) and a required sample purge was initiated at 1315 hours at an indicated rate of approximately 700 cubic centimeters per minute. During the first two minutes of the sample line purge, a sample valve to the sample sink was intermittently cycled open to remove water from the gas sample flow path. At 1319 hours an alarm signal was received in the control room from the Radioactive Waste Area Ventilation Exhaust Radiation Monitor (IL), RE5405, which monitors particulate, iodine and noble gas activity. In response to the signal for RE5405, the Radwaste Area Supply and Exhaust fans automatically stopped and ventilation dampers changed position as designed. Operations personnel referred to off normal procedure HS-EP-02861, Radiological Incidents and requested Radiation Protection (RP) personnel to investigate the possibility of high airborne activity. The MUT gas sample purge was completed, the sample was collected and the RSS was isolated at approximately 1340 hours. Upon verification of higher than normal airborne activity levels within the 545 foot elevation of the Auxiliary Building, Operations personnel implemented HS-EP-02861 at 1400 hours.

Emergency Ventilation System (EVS-VF) Train 1 was aligned to draw suction from the Radwaste Area Ventilation ductwork and started

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at approximately 1406 hours to reduce Auxiliary Building airborne activity levels. The RP supervisor requested that the Auxiliary Building Radiologically Restricted Area (RRA-NF) be evacuated of non-essential personnel as a precautionary measure due to high airborne activity at 1420 hours. At 1514 hours, EVS Train 2 was also put in service. At 1700 hours Radiation Protection personnel reported that airborne activity levels in the Auxiliary Building were returning to normal. The EVS was maintained in operation until 1931 hours to ensure Auxiliary Building airborne activity levels remained below detectable levels. At 1931 hours, EVS Trains 1 and 2 were shut down and at 1936 hours the normal Radwaste Area Ventilation System was restarted.

At 0813 hours on the morning of this event, the Station Vent Normal Range Monitor, RE4598BA was declared inoperable because the Radiation Indicating Controller locked up and could not be reset. At 1300 hours the parallel Station Vent Monitor RE4598AA was declared inoperable to facilitate setup of temporary continuous sampling in preparation for the weekly change of the iodine and particulate filters as required by the Davis-Besse Offsite Dose Calculation Manual (ODCM). This compensatory action was initiated as required by the ODCM. The elapsed time in which both RE4598BA and RE4598AA were out of service was approximately 30 minutes.

Initial notification to the NRC of the manual initiation of the EVS Engineered Safety Feature (ESF) was made on December 21, 1993 at 1737 hours, in accordance with 10 CFR 50.72(b)(2)(ii). Due to the conservative action of making an Emergency Notification System telephone call, this LER was submitted in accordance with 10 CFR 50.73(a)(2)(iv). Starting the EVS in a non-ESF mode in accordance with regular reactor operating procedures has since been evaluated as non-reportable. This LER is therefore redispositioned as a voluntary report due to the number of diverse aspects of the event which generated significant generic interest.

## Designation of Apparent Cause:

Leakage testing of the RCDT supported the initial conclusion that the most probable sources were initial cycling of the sample valve to remove water from the MUT sample line and the downstream flow path of the MUT gaseous sample point.

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A design modification (87-1193) completed in July of 1990 replaced the RSS Sample Sink. Supplement 5 of this modification changed the MUT gas space sample purge line discharge destination from the Waste Gas System (WE) to the RCDT. This design modification also routed the MUT gas space sample and the liquid space sample through the same flow indicator. However, the flow indicator is designed and calibrated to measure liquid flow. This caused an unnecessarily high purge rate and contributed to an excessively long purge time which allowed an excess of radioactive gas to be discharged.

Prior to the RSS modification, in October of 1986, the nitrogen regulator for the RCDT was replaced under a Facility Change Request (86-0098) to improve nitrogen cover gas pressure control. The regulator valve installed was a Nullmatic Pressure Regulator Model 42E15 manufactured by the Moore Products Company. The new pressure regulator can bleed RCDT cover gas to the Radioactive Waste Area Ventilation System.

The plant configuration after the implementation of these two modifications provides a flow path from the RSS to the RCDT and then to the Radioactive Waste Area Ventilation System exhaust which is monitored by RE5405. Design reviews for modification 86-0098 recognized that contaminated cover gas from the RCDT could cause a local airborne radiation problem. However, when the RSS modification (87-1193) was implemented, the gas sample discharge flow path was not adequately evaluated. As a result, purging the MUT gas space to the RCDT has the potential for increasing RCDT pressure. Increasing RCDT pressure above the regulator PCV1776 setpoint, will cause tank cover gas to be bled to the Radwaste Exhaust Ventilation System.

Reviews conducted for procedure development and planning of this sampling activity did not adequately account for and create a sensitivity to the possibility of producing airborne activity. In addition, a recent reduction of radiation monitor alarm setpoints resulted in early, conservative identification of airborne activity.

Procedure DB-OP-06101, Clean Liquid Radwaste System, Attachment 4 identified the normal position for the RCDT Nitrogen Regulator isolation valves (NN95 and NN96) as closed. RCDT pressure indication periodically recorded by Operations personnel suggests that valves NN95 and NN96 have been open since exiting the eighth refueling outage in May, 1993. The position of the valves NN95 and NN96 are not checked by Operations Procedures after completion of the RCS drain



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operation. Furthermore, the RCDT System Leak Test (DB-SP-03364) does not restore NN95 and NN96 to a closed position at the conclusion of the test. Both of these evolutions could have caused the valves to be in an open position.

In conclusion, the apparent causes of this event were due to design and configuration control deficiencies with the procedural errors discussed above as contributing factors. Investigation of the possible leakage paths was finalized with the completion of a leakage test of the RCDT.

#### Analysis of Occurrence:

This event had no direct impact on the health and safety of the public or plant personnel. The amount of radioactivity released was calculated based on the analysis of the actual gas sample taken and a volume of 50 cubic feet released. The calculation indicates that the maximum possible radiation dose due to the release is a very small fraction of the regulatory limits. Actual dose contribution was reported as an abnormal release in the Annual Radioactive Effluent and Waste Disposal Report submitted on August 26, 1994. This event did not entail high radiation levels or the spread of any surface contamination.

Six personnel who were in the Auxiliary Building during the event had Whole Body counts with no individual having any activity detected as a result of this event.

The response of Operations and Radiation Protection personnel to the event was appropriate and their actions mitigated the event. Plant radiation monitoring equipment performed satisfactorily. The Station Vent Radiation Monitors being out of service for approximately 30 minutes during the event had minimal impact on the ability to monitor and quantify the release. The Radwaste Area Ventilation Supply and Exhaust Fans automatically stopped and ventilation system dampers automatically repositioned as designed. The Engineered Safety Features Emergency Ventilation Systems which were manually initiated in their non-ESF lineup also performed as designed.

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During this event, the reactor continued to operate at 100% power since there was neither any indication of any leakage of reactor coolant nor any indication of reactor operation problems.

During the course of the event, a superseded procedure was used while responding to the event. Revision 0 of HS-EP-02861, Radiological Incidents, was used instead of the current Revision 1. This was because this procedure had not been formally requested to be included as part of the Abnormal Procedure Control Copy file. This had no impact on the response to this event because the changes made in revision 1 were administrative in nature and transferred responsibility for performing calculations of release magnitude to RP.

Corrective Actions:

The procedure DB-CH-06002 was revised to preclude MUT gas space sampling, unless approved by the Superintendent - Chemistry and the Shift Supervisor. Procedure DB-SP-03364, Reactor Coolant Drain Tank System Leak Test, was utilized to verify the flow path postulated as the cause of this event. This testing was completed on January 24, 1994, and verified the RCDT system met leakage acceptance criteria and that the RCDT nitrogen regulator bleed port provided the previously postulated flow path to the Radwaste Area Ventilation System.

The Radiation Work Permit utilized during performance of RSS activities has been upgraded to require notification of RP prior to initiating sampling activities.

A review of the Abnormal Procedure Control Copy file was performed. HS-EP-02861 was the only document found that was not on the controlled distribution list and an incorrect revision. This procedure was added to standard distribution for the Abnormal Procedure Control Copy.

Design and configuration controls were evaluated under Management Corrective Action Report (MCAR) 93-002. An MCAR is the highest level corrective action document used at Davis-Besse to provide corrective actions for significant conditions adverse to quality. Actions identified to prevent recurrence of this event are provided in Toledo Edison's Response to Notice of Violation and Proposed Imposition of Civil Penalty (Serial 1-1036) dated March 14, 1994.

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The design of the MUT Sample flow path was evaluated. As a result of this evaluation, DB-CH-06002 was revised to limit sample purge time and a design enhancement was recommended to replace the RCDT nitrogen cover gas regulator.

Failure Data:

There have been no LERs in the last five years for manual initiation of the Engineered Safety Feature Emergency Ventilation System to mitigate high airborne activity conditions.

NP-33-93-08

PCAQ No. 93-0603

PCAQ No. 93-0613

PCAQ No. 94-0003

PCAQ No. 94-0029

MCAR No. 93-0002