TOLEDO EDISON
A Centerior Energy Company

EDISON PLAZA
300 MADISON AVENUE
TOLEDO, OHIO 43652-0001

NP-33-96-007
AB-96-0034

Docket No. 50-346

License No. NPF-3

November 4, 1996

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

Ladies and Gentlemen:

LER 96-007
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence - October 3, 1996

Enclosed please find Licensee Event Report 96-007, which is being submitted to provide 30 days written notification of the subject occurrence. This LER is being submitted in accordance with 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(ii)(B).

Very truly yours,

James H. Lash
Plant Manager
Davis-Besse Nuclear Power Station

GMW/dlc

Enclosure

cc: Mr. A. B. Beach
Regional Administrator
USNRC Region III

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

Utility Radiological Safety Board

IE22

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Davis-Besse Unit Number 1	05000 - 346	1 OF 7

TITLE (4)
Control Room Emergency Ventilation System Design Bases Calculation Error

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	03	96	96	-- 007 --	00	11	04	96		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	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)		OTHER
	20.405(a)(1)(iii)	X	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)	X	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)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Gerald M. Wolf, Engineer - Licensing	(419) 321-8114

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

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

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

At 1045 hours on October 3, 1996, with the unit in Mode 1 at approximately 100 percent power, a condition was identified that potentially was outside of the design basis. While reviewing a calculation supporting review of the Updated Safety Analysis Report, an error was discovered which impacted the total allowable opening in the Control Room Boundary. At the time of discovery, maintenance was in progress on the Control Room Normal Ventilation System humidifier, resulting in an opening greater than a newly calculated allowable 40 square inches. Therefore both Control Room Emergency Ventilation Systems were considered inoperable, and TS 3.0.3 was entered. At 1125 hours on October 3, 1996, the total opening was reduced to 15.4 square inches, and TS 3.0.3 was exited. Further evaluation completed on October 22, 1996, revealed that the allowed opening size between the Control Room and the Control Room Ventilation Equipment Room during the first four days of a Loss of Coolant Accident is only three square inches. However, the logged opening size at that time was below the new limit. The NRC was notified of the initial condition at 1144 hours on October 3, 1996, via the Emergency Notification System in accordance with 10CFR50.72(b)(1)(ii)(B). Both conditions are being reported in accordance with 10CFR50.73(a)(2)(ii)(B) as conditions outside the plant design basis. These conditions would not have prevented the Control Room operators from responding to emergencies. The CREVS design basis is being re-evaluated as a result of these events.

Description of Occurrence:

At 1045 hours on October 3, 1996, with the unit in Mode 1 at approximately 100 percent power, a condition was identified during review of the Updated Safety Analysis Report (USAR) that potentially was outside of the design basis. Review of the calculations for USAR Figure 9.4-13, Relationship of Measured Pressure vs. Leakage Area in the Control Room, revealed that the total Control Room Emergency Ventilation System (CREVS) flowrate of 3,300 cubic feet per minute (cfm) was erroneously used to evaluate the leakage through the Control Room boundary. The correct value is 300 cfm. This is the amount of makeup flow that is brought into the Control Room from the outside during the pressurization mode. A preliminary calculation indicated that in order to achieve the required one-eighth inch of water positive pressure in the Control Room, the opening in the Control Room boundary cannot exceed 40 square inches. Previous calculations had indicated that the opening in the Control Room boundary could be as much as 216 square inches (1.5 square feet) and the required positive pressure could still be obtained. At the time of the discovery, maintenance was in progress on the Control Room Normal Ventilation System humidifier, which caused the total opening in the Control Room boundary being tracked in the Inoperable Equipment Tracking Log to be greater than 83 square inches. Therefore, both CREVS trains were declared inoperable and Technical Specification (TS) 3.0.3 was entered. At 1125 hours on October 3, 1996, the total opening was reduced to approximately 15.4 square inches by closing the humidifier opening, and TS 3.0.3 was exited. The NRC was notified of this condition at 1144 hours on October 3, 1996, via the Emergency Notification System in accordance with 10CFR50.72(b)(1)(ii)(B). This condition is being reported in accordance with 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant and 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications.

CREVS is operated in the recirculation mode for approximately the first four days following a Loss of Coolant Accident (LOCA). Since no outside air is brought into the Control Room, there is no pressurization of the Control Room during this time period. During this time frame the USAR assumes an unfiltered in-leakage of 25 cfm. An evaluation completed on October 22, 1996, revealed that, depending on the size and location of the opening in the Control Room boundary, the unfiltered leak rate into the Control Room during these first four days could possibly violate the 25 cfm basis. During recirculation mode, the Control Room Ventilation Equipment Room will be at a positive pressure with respect to Control Room because the equipment room ventilation supply fan is not turned off as a result of accident initiation.

Description of Occurrence (continued):

Based on the calculated pressure in the equipment room, the allowable hole size between the equipment room and the Control Room should be maintained less than approximately three square inches. There is no potential for pressurization of other surrounding areas of the Control Room. When this new three square inch limit was determined, the amount of opening that existed between the Control Room and the Equipment Room was less than one square inch. This condition is being reported in accordance with 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant and 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications, as the total opening between the Control Room and the Control Room Ventilation Equipment Room had been greater than three square inches during past operation.

Apparent Cause of Occurrence:

The apparent cause for the condition discovered on October 3, 1996, was an error in Bechtel Calculation 26.003, Control Room Pressurization System, which was performed in 1973. Based on an assumed opening size of 1.5 square feet, this calculation determined that a flowrate of 3290 cfm makeup flow was necessary to pressurize the Control Room to 0.15 inches of water positive pressure. The calculation then erroneously concluded that CREVS should be sized for a total system capacity of 3300 cfm, even though CREVS is limited to 300 cfm of outside air intake. The 3300 cfm was used in Bechtel Calculation 26.006, Analysis Of Control Room Air Leakage Area vs. Pressure During CREVS Operation, performed in May, 1984, as the basis for USAR Figure 9.4-13, Relationship of Measured Pressure vs. Leakage Area in the Control Room during CREVS Operation. This USAR Figure shows that the openings in the Control Room boundary to facilitate maintenance could be as large as 216 square inches (1.5 square feet) and the required positive pressure could still be maintained. This is based on being able to pressurize the Control Room with 3300 cfm of outside air, and not 300 cfm as CREVS is actually designed.

The apparent cause of the condition discovered on October 22, 1996, was that the size of the allowable opening between the Control Room Ventilation Equipment Room and the Control Room had not been previously evaluated specifically for the conditions assumed when CREVS is operating in the recirculation mode.

Analysis of Occurrence:

During the first four days of a LOCA, with the CREVS in recirculation mode, the primary leakage path into the Control Room boundary is through the Control Room Ventilation Equipment Room located above the Control Room. This room, which houses the Control Room ventilation equipment, has its own non-safety related ventilation system which keeps the room slightly pressurized. The majority of maintenance openings in the Control Room boundary occur between the Control Room and the ventilation equipment room. Therefore any release could be brought into this room, where it could then infiltrate into the Control Room through any opening in the Control Room ceiling or in the ventilation system. The most susceptible leakage point of the system is the CREVS ductwork between the fan and the filter housing, where CREVS is at the lowest pressure with respect to the Control Room Ventilation Equipment Room.

The secondary leakage path is through the Cable Spread Room located below the Control Room. The Control Room normal ventilation system provides ventilation to the Cable Spread Room. However, when the normal ventilation system is shut down by the Safety Features Actuation System, there is no ventilation supply to the Cable Spread Room. The Cable Spread Room does not communicate directly with the outside, therefore any openings to the Cable Spread Room would not represent a direct path to the environment. An opening in the walls of the Control Room could lead to the environment either directly through the Turbine Building, or indirectly, through the Auxiliary Building. However, openings in these walls due to maintenance are infrequent and it is unlikely any release could enter the Control Room via the walls.

A larger opening in the Control Room boundary affects only calculated thyroid doses and does not have any impact on whole body or skin doses in the Control Room. Only if the Control Room leakage exceeds twice the USAR assumed limit of 25 cfm, or approximately 50 cfm, the preliminary thyroid doses calculated using the design basis source terms and atmospheric conditions will exceed the 30 REM General Design Criteria (GDC) 19 guide value for thyroid dose. These evaluations assume that the Control Room Operators manually start the CREVS in recirculation mode at 10 minutes following a LOCA. Therefore, significant margin exists between the previously assumed 25 cfm leakage in the USAR and the leakage required to exceed the 30 REM GDC value.

The original analyses assumed that CREVS is transferred from the recirculation mode to the pressurization mode four days after a LOCA. For Control Room boundary openings that result in an unfiltered in-leakage rate greater than 50 cfm, the calculated doses would exceed the GDC 19 guideline values if CREVS is operated in the recirculation mode for the first four days of a LOCA. Based on

Analysis of Occurrence (continued):

the previous administrative limits on opening size and the maintenance history involving the Control Room boundary, this 50 cfm limit has been previously exceeded at Davis-Besse.

The CREVS is equipped with radiation monitors which will alert the Control Room Operators on increasing radiation levels in the Control Room. This allows the operators to take actions, such as closing openings, to reduce the radiation levels and inhalation dose received. The above assumptions are very conservative based upon the following:

1) The accident source terms are based on Regulatory Guide 1.4. Recent studies (NUREG-1465, Accident Source Terms for Light-Water Nuclear Power Plants), show that iodine activity in containment available for leakage is well below Regulatory Guide 1.4 assumptions.

2) Credit for Station Emergency Ventilation System (EVS) filters is not considered for the first 13 minutes of a LOCA, even though the Station EVS is automatically started following a LOCA (TS Table 3.3-5 response time is </= 25 seconds). Furthermore, the Station EVS filter efficiency is assumed at only 95 percent. These filters contain two 2-inch filters in series, which have an efficiency of 99 percent.

3) Conservative atmospheric dispersion factors are used.

If realistic assumptions are used for any of these parameters, the calculated thyroid doses will be less than the 30 REM value even if the in-leakage exceeds 50 cfm. Therefore it is concluded that the condition reported would not have impacted the ability of Control Room Operators to respond to emergencies.

Until 1987, the Davis-Besse Nuclear Power Station (DBNPS) used gaseous chlorine for chlorination of raw water systems. Chlorine detectors were installed at the chlorine tank car to isolate the Control Room in the event of a chlorine tank car rupture. The original licensing analysis showed that the Control Room operators have more than two minutes to don self-contained breathing apparatus. This analysis was not invalidated by a larger opening in the Control Room boundary. Based on the height of the equipment room intake (25 meters above the ground), significant amounts of chlorine would not have entered the Control Room even if a leak path existed between the Control Room Ventilation Equipment Room and the Control Room.

Corrective Actions:

At 1125 hours on October 3, 1996, the Control Room boundary openings of 83 square inches were reduced to approximately 15.4 square inches so the openings were below the calculated limit of 40 square inches.

On October 22, 1996, the Control Room boundary openings were verified to be less than the allowable three square inches determined by the further evaluation. Control Room personnel were advised to keep the Control Room boundary openings to less than three square inches and to ensure no unattended openings existed between the CREVS fan and the filter housing.

The assumptions used in the analysis for CREVS operation following a LOCA will be re-evaluated. The USAR and affected procedures will be revised accordingly. Required calculations will be completed by November 30, 1996, and subsequent USAR and procedures revisions will be completed by March 1, 1997.

Administrative requirements to facilitate maintenance based on the re-evaluations of the CREVS design basis will be developed. These requirements will be completed by March 1, 1997, and will provide guidance on minimizing the leakage into the Control Room, utilization of temporary seal materials, and management expectations.

Failure Data:

There have been no LERs in the previous three years involving the Control Room Emergency Ventilation System that are considered to be potentially outside the design basis of the DBNPS. There have been four LERs regarding design basis issues. These LERs are as follows:

LER 93-007, Plant Operated Outside Design Basis Due to Isolation of No. 1 Steam Generator
LER 95-001, Potentially Non-Conservative LOCA Analysis due to Modeling Errors
LER 96-002, Potential Loss of Remote Shutdown Capability due to MOV Fire Induced Damage
LER 96-004, Inadequate Compensatory Actions for Thermo-Lag for Radiant Energy Shields

Failure Data (continued):

There have been two LERs in the past three years involving the Control Room Emergency Ventilation System:

LER 93-009, Entry into T.S. 3.0.3 due to Inoperable Control Room Emergency Ventilation System

LER 96-003, Discrepancy in Surveillance Requirements for the Testing of Absorbent Material in the EVS

NP-33-96-007-0 PCAQR 96-1293