



A Centerior Energy Company

EDISON PLAZA
300 MADISON AVENUE
TOLEDO, OHIO 43852-0001

NP-33- 96-008
AB-96-0133

Docket No. 50-346

License No. NPF-3

December 13, 1996

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

Ladies and Gentlemen:

LER 96-008

Davis-Besse Nuclear Power Station, Unit No. 1

Date of Occurrence - November 13, 1996

Enclosed please find Licensee Event Report 96-008, 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).

Very truly yours,

A handwritten signature in dark ink, appearing to read 'JH Lash'.

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

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LICENSEE EVENT REPORT (LER)

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

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 Unit Number 1

DOCKET NUMBER (2)

05000 - 346

PAGE (3)

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TITLE (4)

Switchyard Circuit Inoperable Due To Switchyard Breaker Alignment

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
11	13	96	96	-- 008 --	00	12	13	96	FACILITY NAME	DOCKET NUMBER
										05000
										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)		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)		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: Geraid M. Wolf, Engineer - Licensing
TELEPHONE NUMBER (Include Area Code): (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)

X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
			07	30	97

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

On November 13, 1996, with the unit in Mode 1 at approximately 100 percent power, a condition was identified that could result in a complete loss of offsite power when breakers in the switchyard are in certain configurations. At the time of discovery, one of three 345 kV transmission lines was out of service for maintenance. While this transmission line was out of service, if a certain circuit breaker experienced a lockout, the remaining two transmission lines would be isolated, resulting in a loss of offsite power. Therefore only one qualified circuit existed, rather than two as required by the Technical Specifications. The appropriate actions of the Technical Specifications were not performed in the time frame allowed, so this condition is being reported in accordance with 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications. This condition would not have prevented safe shutdown of the plant because onsite power sources are unaffected by this condition. The operation of the switchyard is being re-evaluated as a result of this event.

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TEXT CONTINUATION

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

Description of Occurrence:

At 1410 on November 13, 1996, with the unit in Mode 1 at approximately 100 percent power, a condition was identified that could result in a complete loss of offsite power. When a fault is detected on a breaker, protective relays open the breaker to clear the fault. There is also protective relaying for detecting when a breaker has failed to properly isolate a circuit. This relaying initiates a lockout of the circuits adjacent to the failed breaker, which opens all breakers associated with those circuits. If this relaying fails and initiates a lockout of breaker 34562, breaker 34561 would open (34564 would also receive an open signal), as well as the breakers on the Bayshore and Ohio Edison lines (refer to Figure 1). With the Lemoyne line already out of service, this results in a loss of offsite power. A similar condition can occur if breaker 34561 is open and breaker 34564 experiences a lockout. The lockout of breakers 34562 and 34564 is discussed in Updated Safety Analysis Report (USAR) Section 8.2.1.1, Offsite Power System Reliability Considerations, but the configuration of the switchyard during maintenance is not discussed. At the time of discovery, the Lemoyne 345 kV transmission line was out of service for maintenance, and the Bayshore and Ohio Edison 345 kV transmission lines were in service. Breakers 34563 and 34564 were open to isolate the Lemoyne line from the switchyard.

Technical Specification Limiting Condition for Operation (LCO) 3.8.1.1 requires Two qualified circuits between the offsite transmission network and the onsite Class 1E A.C. electrical power distribution system shall be OPERABLE. Technical Specification 3.8.1.1 Action a. allows only one circuit operable for up to 72 hours. The Bases for Technical Specification 3/4.8 states that qualified offsite to onsite circuits are those that are described in the USAR and are part of the licensing basis for the plant."

USAR Section 3D.1.13, which references 10 CFR 50 Appendix A, Criterion 17, states "Electric power from the transmission network to the onsite electric distribution system is supplied by two physically independent circuits designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switch yard common to both circuits is acceptable." Therefore the system must minimize simultaneous failure of the offsite circuits due to a single event. This is repeated in USAR Section 8.2.1.1 which states that the possibility of power failure due to faults in the network interconnections and the associated switching is minimized by the arrangement of the switchyard. USAR Section 8.3.1.2.2 states: "Three independent circuits are provided to supply power to the onsite electrical distribution system, and with any two circuits in service the requirements of NRC General Design Criterion 17 are fulfilled."

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Description of Occurrence: (Continued)

General Design Criterion 17 further states "Each of these circuits [i.e., the two qualified circuits] is designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits is designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained." One circuit was available within a few seconds to respond to a LOCA. However, if a lockout occurs as described above, it will take approximately one hour to restore offsite power.

The Standard Review Plan (NUREG-0800), Section 8.2, Offsite Power System, Paragraph III.1 (d), (Revision 2, July 1981) states "At least one of the two required circuits can, within a few seconds, provide power to safety-related equipment following a loss-of-coolant accident. GDC 17 does not require these circuits in themselves to be single-failure-proof for this accident." Paragraph IV.2 also states "The switchyard is arranged such that single events will not cause simultaneous failure of all offsite circuits to the switchyard." These statements further clarify that although the single failure criteria does not apply within the circuit itself, the condition described previously is not in compliance with General Design Criterion 17 requirements.

Independence is defined in IEEE 308-1971, Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations definition 3.14, as "No common failure mode for any design basis event." Definition 3.12 states that a common mode failure is a mechanism by which a single design basis event can cause redundant equipment to be inoperable. By maintaining two circuits with operable components which would be available in sufficient time to address a design basis event with no resulting common failure mode, the required "qualified" circuits for LCO 3.8.1.1 are maintained.

Section 8.1 of the NRC's Safety Evaluation Report (NUREG-0136) which was issued in support of the Operating License (including the Appendix A Technical Specifications) states that General Design Criterion 17 and IEEE Standard 308-1971 were used as the primary basis for evaluating the adequacy of the electrical power systems. Therefore, for the electric power systems, the Technical Specifications were intended to reflect the minimum requirements of General Design Criterion 17 and IEEE 308-1971 as evaluated by the NRC and found acceptable. If a fault occurs as described above, this causes a loss of the "one" circuit that was OPERABLE. If the other circuit, which is out of service for maintenance, cannot be restored within a few seconds, then the LCO for

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Description of Occurrence: (Continued)

Technical Specification 3.8.1.1 is not met, and the applicable actions should be taken. These actions include a check within one hour that the remaining offsite circuit breakers are correctly aligned and that power is indicated as available.

The Lemoyne line was taken out of service at 0402 hours on 11/13/96, and the check of the remaining offsite circuit breakers was not started until 1750 hours, after the operability issue was raised. Therefore, the LCO Action Statement time was not met, so this condition is reportable under 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by the plant's Technical Specifications. In this instance, the condition was restored within the 72 hours allowed by the Technical Specification Action Statement for continued operation. In retrospect, this condition has also existed during previous similar maintenance evolutions in the switchyard. These events are also reportable, and some of these events existed longer than the 72 hours allowed by the Technical Specification Action Statement for continued operation.

Apparent Cause of Occurrence:

The apparent cause of occurrence is a misunderstanding of the design and operability requirements for the switchyard. This misunderstanding is due in part to the design of the switchyard. There are three lines connecting the switchyard to offsite sources, and the Technical Specifications require only two qualified offsite circuits to be operable. However, the Ohio Edison line is connected only to the K bus. A lockout of either breaker 34562 or 34564 de-energizes the K bus, which de-energizes the Ohio Edison line. This lockout also results in the loss of either the Bay Shore or Lemoyne line, leaving only one offsite source available. Since the loss of one circuit (the K bus) leaves only one circuit in operation (the J bus), there are effectively only two total circuits. These interconnections were not fully understood, so it was previously assumed that there were two complete circuits capable of meeting the General Design Criterion 17 requirements even if any one of the offsite lines was out of service. The connection of the Ohio Edison line only to the K bus was made originally as a temporary connection, and it would have been connected to both buses with appropriate breakers when the switchyard was finished to accommodate Davis-Besse Unit 2.

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Analysis of Occurrence:

A review of the Unit Log was performed for the last year. In addition to the event described above, four other similar events were discovered where only one circuit between the offsite transmission network and the onsite Class 1E A.C. electrical power distribution system was operable and the appropriate actions of the Technical Specifications were not performed in the allowed outage time. Three of these events were shorter than the 72 hours allowed by the TS Action Statement for continued operation. Furthermore, all diesel generators remained operable during these three events. Therefore there was sufficient capacity and capability to assure that core cooling, containment integrity, and other vital safety functions were maintained in accordance with General Design Criterion 17.

On September 30, 1996, breaker 34563 was isolated to perform preventive maintenance. The breaker was not restored until after the work was completed on October 11, 1996, so only one offsite to onsite circuit was operable for 271.5 hours. During this time, Emergency Diesel Generator 2 was briefly declared inoperable (9 minutes) for barring of the engine per the monthly surveillance test. Emergency Diesel Generator 1 and the Station Blackout Diesel Generator remained operable during the breaker maintenance, and could have provided the necessary power to safely shutdown the plant. USAR Section 15.2.9, Loss of all AC Power to the Station Auxiliaries (Station Blackout), shows that even with a loss of both Emergency Diesel Generators and all offsite power (no credit is taken for the Station Blackout Diesel Generator in the analysis), no fuel damage occurs, the Reactor Coolant System pressure does not exceed code pressure limits, and there is no radioactivity release at the exclusion area boundary. Based on this, the plant was not in an unanalyzed condition as a result of this issue.

The required entry into Technical Specification 3.8.1.1 can be avoided during the time that either the Bayshore or Lemoyne transmission lines are out of service. Before the desired offsite transmission line is isolated, the breaker separating the two remaining offsite transmission lines (34562 or 34564) would be isolated. This effectively creates two independent circuits, removing the possibility of a single fault on that breaker isolating both offsite transmission lines. However, this alignment dispatches the plant's output on only one transmission line, and may not be desirable due to the alignment of the offsite 345 kV distribution system.

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Corrective Actions:

At 1750 hours on 11/13/96, when it was realized that only one circuit existed between the offsite transmission network and the onsite Class 1E A.C. electrical power distribution, Technical Specification 3.8.1.1 was entered and the required breaker alignment checks were performed.

A Standing Order was issued on 11/21/96 to provide guidance for entering Technical Specification 3.8.1.1 and performing the appropriate actions when performing work on switchyard equipment.

This event will be discussed in the next cycle of licensed operator regualification training. This training will be completed by March 28, 1997.

A review of the design basis of the switchyard will be conducted to ensure the conclusion of this Licensee Event Report, namely the requirement to enter the Action Statement for Technical Specification 3.8.1.1 when removing the Lemoyne or Bay Shore lines from service, does not impose overly conservative restrictions on the plant. This review will be completed by June 30, 1997 and a supplement to this Licensee Event Report will be submitted by July 30, 1997 documenting the results of this review.

Procedures relating to switchyard operation and maintenance will be reviewed and revised as appropriate to include steps to alert operators of conditions that may require entry into Technical Specification 3.8.1.1, as well as the possible steps to avoid entry into the Technical Specification. The identified procedure changes will be completed by July 30, 1997.

The USAR will be reviewed and appropriate sections will be revised to clarify that while there are three circuits from offsite sources, having only two of these sources available with certain switchyard configurations does not necessarily mean that two complete circuits exist. The identified USAR changes will be completed by July 30, 1997.

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Failure Data:

There have been three Licensee Event Reports (LERs) in the past three years involving the failure of plant personnel to adequately consider all applicable TS requirements when operating in an off-normal plant line-up. LER 93-007 describes an event where the plant was operated outside its design basis due to isolation of both trains of the Auxiliary Feedwater System from a steam generator. LER 94-002 describes an event where the Anticipatory Reactor Trip System was made inoperable due to a failure to trip the Main Feedwater Pump Turbine. LER 95-003 describes an event where spent fuel assemblies were moved with the Spent Fuel Pool Emergency Ventilation System inoperable due to removal of a fan for maintenance. Corrective actions taken in response to these LERs would not have been expected to prevent this occurrence.

NP-33-96-008-0

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FIGURE 1

Davis-Besse Nuclear Power Station 345 kV Switchyard One-Line Diagram

