



EDISON PLAZA
300 MADISON AVENUE
TOLEDO, OHIO 43652-0001

April 16, 1990

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United States Nuclear Regulatory Commission
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Gentlemen:

LER 90-005
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence - March 14, 1990

Enclosed please find Licensee Event Report 90-005 which is being written to provide 30 days notification of the subject occurrence. This report is being submitted in accordance with 10CFR50.73(a)(2)(ii).

Yours truly,

Louis F. Storz
Plant Manager
Davis-Besse Nuclear Power Station

LFS/plf

Enclosure

cc: Mr. A. Bert Davis
Regional Administrator
USNRC Region III

Mr. Paul Byron
DB-1 NRC Sr. Resident Inspector

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Davis-Besse Unit No. 1	DOCKET NUMBER (2) 0 5 0 0 0 3 4 6	PAGE (3) 1 OF 0 5
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TITLE (4)
USAR Commitment For Primary and Backup Fault Protection for Some Class 1E Circuits
Not Satisfied

EVENT DATE (6)			LER NUMBER (6)		REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 3	1 4	9 0	9 0	0 0 5	0	0 0	0 4	1 6	9 0	0 5 0 0 0

OPERATING MODE (9) 0		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)							
POWER LEVEL (10) 0 0 0	20.402(b)	20.408(e)	60.73(a)(2)(iv)	73.71(b)					
	20.408(a)(1)(i)	60.36(a)(1)	60.73(a)(2)(v)	73.71(e)					
	20.408(a)(1)(ii)	60.36(a)(2)	60.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)					
	20.408(a)(1)(iii)	60.73(a)(2)(i)	60.73(a)(2)(vii)(A)						
	20.408(a)(1)(iv)	60.73(a)(2)(ii)	60.73(a)(2)(vii)(B)						
20.408(a)(1)(v)	X 60.73(a)(2)(iii)	60.73(a)(2)(ix)							

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
NAME	AREA CODE		
Jan C. Stotz, Engineer - Maintenance Planning	4 1 9 3	2 1	- 7 5 4 4

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	0 7	0 2	9 0	

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

On March 14, 1990, during performance of Safety System Outage Modification Inspection (SSOMI) by Toledo Edison's Independent Safety Engineering Group, it was determined that some Class 1E circuits that pass through containment electrical penetrations do not have adequate backup fault protection. This conflicts with the Updated Safety Analysis Report (USAR) Section 8.3.1.2.29 which requires that both primary and backup fault protection be provided for all Class 1E circuits entering containment. This condition is applicable to three electrical penetration assemblies (EPAs) involving seventeen Class 1E circuits. Of the seventeen circuits involved, twelve are environmentally qualified under 10CFR50.49, Environmental Qualification. One circuit, per Technical Specifications, is required to be depowered while in Modes 1, 2, and 3. The remaining four circuits are installed in accordance with Class 1E requirements but in fact are non-safety-related and are not credited for mitigating any accidents.

Toledo Edison is planning to environmentally qualify these four circuits prior to entering Mode 4 following the ongoing refueling outage. In addition, Toledo Edison is further evaluating this condition. A summary of the evaluation, any corrective actions which may be deemed necessary, and a schedule for completing the corrective actions will be communicated in a timely manner.

This is reportable under 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

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TEXT (If more space is required, use additional NRC Form 308A's) (17)

Description of Occurrence:

On March 14, 1990, with the plant defueled during the Sixth Refueling Outage (6RFO), the Independent Safety Engineering Group identified that some Class 1E circuits which pass through electrical penetration assemblies (EPAs) are not provided with adequate backup fault protection, as required by USAR Section 8.3.1.2.29.

Originally, the Davis-Besse Final Safety Analysis Report (FSAR), Revision 0, did not include any information regarding the design of EPA's with respect to electrical fault conditions. Information on the EPA electrical design was first added in Rev. 10 of the FSAR. This discussion stated:

The electrical penetration assemblies are designed and tested to meet the intent of IEEE Std. 317-1971.

This revision of the FSAR committed Toledo Edison to testing of prototype low and medium voltage penetration assemblies to ensure they could withstand, without loss of mechanical integrity, the maximum possible fault current versus time conditions. A brief comparison of how the EPA's meet Reg. Guide 1.63 guidance was also included:

1. IEEE 317-1971 is used instead of IEEE 317-1972
2. Paragraph C.1 is not complied with, as the penetrations do not have self-fusing characteristics but are designed to withstand the short circuit conditions. Also, the overload protections of non-class 1E systems do not comply with IEEE 279-1971.

Several other revisions to this Section of the FSAR occurred prior to the NRC issuing the Davis-Besse Safety Evaluation Report and the Operating License. These revisions added information regarding the testing results and detail on the electrical protection coordination scheme.

The NRC's Safety Evaluation Report (SER) acknowledged the use of IEEE 317-1971 in the Davis-Besse design. Regulatory Guide 1.63 was not mentioned in the SER. The SER states that the NRC requested Toledo Edison to describe in detail the degree of protection provided for both safety and non-safety related circuits, and where [emphasis added] backup protection is used, to describe the type of devices and justify their design. Since all the test results were already included in the FSAR, no additional information was included in the FSAR in response to the SER request.

SER Supplement 1, issued in April 1977, documented the NRC acceptance of test results. The SER Supplement 1 discussion of backup protection mainly focused on the protective relays used in 13.8 KV circuits, since these devices depend upon DC power to function. The SER Supplement 1 states that the NRC

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TEXT IF more space is required, use additional NRC Form 305A's (17)

concluded, based on their "review of the test results, the analysis design modifications, and the various final design schematics, ... the design of the electrical penetration protection is acceptable."

The current Updated Safety Analysis Report (USAR) Section 8.3.1.2.29 states that the electrical system design provides both primary and backup fault protection for the circuits being fed through all electrical penetrations. Primary protection is instantaneous (typically 12 to 25 times full-load current) whereas the backup is "time delay" (inverse time). However, should the primary protection fail to act, the backup will act in sufficient time to preclude thermal and mechanical damage to the penetration assembly under fault conditions.

Therefore, it was concluded that the plant configuration does not meet the USAR requirement for some Class 1E circuits.

This is reportable under 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant.

Apparent Cause of Occurrence:

The primary cause for the difference between the plant's EPA design described in the USAR and the existing plant configuration is inadequate design control during construction in that the maximum current versus time conditions were not properly defined for all Class 1E circuits.

As stated in the USAR the maximum symmetrical short circuit current was calculated and compared against the test results for medium and low voltage penetrations. This analysis showed that for the calculated fault current the primary and backup protection would interrupt the faulted condition before the penetration would be damaged. The above analysis establishes the adequacy of the primary and backup protection of the electrical penetrations. However, the recent analysis has revealed that the maximum symmetrical short circuit current is significantly less than original calculated values.

Analysis of Occurrence:

There are three EPA's containing seventeen Class 1E circuits which do not have adequate backup protection. This means that, while backup electrical protective devices exist in the paths to the EPA's, they do not interrupt the current flow prior to the current-time relation exceeding the values included in the prototype testing described in the USAR. Of the three affected EPA's, two contain circuits which are environmentally qualified (EQ) in accordance with 10CFR50.49. The third EPA has several affected circuits which are also EQ, but it also has cables which are connected to five non-EQ loads.

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By the requirements of 10CFR50.49, Environmental Qualification, electrical equipment needed to mitigate design basis accidents needs to be environmentally qualified to assure it remains operable under the applicable post-accident environmental conditions. This is applicable to safety-related equipment (Class 1E) and nonsafety-related equipment whose failure could degrade the function of safety-related equipment.

By meeting the requirements of this regulation, it is assured that accidents and post-accident conditions will not induce electrical faults in Class 1E equipment. Since an accident will not cause a fault on Class 1E, environmentally qualified (EQ) equipment, the only fault that must be considered is an electrical fault postulated as a single failure in accordance with single failure criteria. By postulating a fault as a single failure, it is not necessary to postulate an additional failure of the electrical circuit's primary fault protection. This means that the primary fault protection will operate to interrupt the fault current, as designed, prior to any damage to the electrical penetration module. Therefore, backup fault protection is not required in order to protect electrical penetrations for Class 1E circuits, and the lack of backup protection does not pose any safety concerns.

Of the Class 1E, non-EQ circuits, one of the affected components is required by Technical Specifications to have its power removed during Mode 1, 2, and 3. Therefore, the associated EPA modules will not be subjected to any adverse over current conditions.

Toledo Edison's preliminary evaluation has concluded that there would be no significant increase in the penetration's mechanical leakage as a result of the failure of the primary protective device to operate during a faulted condition. There may be cracking of the module's epoxy due to expansion of the conductor in the EPA. However, any cracking would be expected to be minor and not result in significant increase in containment leakage.

Toledo Edison is further evaluating the effect of over current conditions on EPA mechanical integrity for the remaining Class 1E, non-EQ circuits. Any additional information regarding this evaluation will be forwarded to the NRC in a timely manner.

Therefore, no significant safety concern is believed to exist as a result of this deviation from the facility description in the USAR.

Corrective Action:

The electrical circuits for the four non-EQ circuits will be qualified to meet the requirements of 10CFR50.49, Environmental Qualification, during 6RFO. By qualifying these circuits, the lack of backup protection does not pose any safety concerns.

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Toledo Edison has also addressed the root causes of this occurrence as a part of the overall management improvement issue which grew out of the June 9, 1985 Loss of Feedwater event. Procedures which control the facility's configuration management, design process, and USAR update have been written and implemented to prevent reoccurrences.

Toledo Edison is currently evaluating the need to provide backup protection or justification that the present plant configuration provides an acceptable protection to prevent the loss of containment integrity through a failed electrical penetration assembly. This evaluation and a subsequent revision will be completed in a timely manner and will be forwarded to the NRC.

Failure Data:

The most recent report of a condition being outside the design basis was LER 89-004. This involved the possibility for a circulating water line break to cause flooding in the service water tunnel and loss of the service water pumps. The next previous report was LER 88-016 which involved circuits bridging two or more relay cabinets of different essential channels. Both were conditions that existed from original construction.

REPORT NO.: NP33-90-006PCAQ NO.: 90-0200