Iowa Electric Light and Power Company

March 12, 1992
DAEC-92-0108

Mr. A. Bert Davis
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License DPR-49
Licensee Event Report #92-003

Gentlemen:

In accordance with 10 CFR 50.73 please find attached a copy of the subject Licensee Event Report.

Very truly yours,

David L. Wilson

David L. Wilson
Plant Superintendent - Nuclear

DLW/JA/eah

cc: Director of Nuclear Reactor Regulation
Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D. C. 20555

NRC Resident Inspector - DAEC

IE22

NRC Form 366A (5-89) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO 3150-0104

EXPIRES 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530) U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1): Duane Arnold Energy Center

DOCKET NUMBER (2): 0 5 0 0 0 3 3 1

PAGE (3): 1 OF 0 6

TITLE (4): Fire Barrier Degraded as a Result of an Unsealed Penetration following a Design Modification

EVENT DATE (5)			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 2	1 1	9 2	9 2	— 0 0 3	—		0 3	1 2	9 2	None	0 5 0 0 0
											0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 0 7 8

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

20.402(b)	20.405(c)	50.73(a)(2)(iii)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(iv)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(v)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(vii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(vii)(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 AREA CODE
Jeff S. Axline, Technical Support Engineer	3 1 9 8 5 1 - 7 6 0 0

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)

[ ] YES (If yes, complete EXPECTED SUBMISSION DATE)

[X] NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

On February 11, 1992, during performance of the fire barrier penetration seal inspection surveillance test, a fire barrier cable penetration was found unsealed. Review of the analysis for the barrier in which the unsealed penetration is located determined that the open penetration made the barrier inoperable. Upon discovery of the unsealed penetration, a fire watch was initiated.

Review of plant documentation indicated that the penetration was opened and left unsealed during one of two design modifications which occurred in 1977 and 1980. It appears that procedural controls in place at the time were insufficient to ensure sealing of penetrations would occur following a design modification.

Since 1980 many improvements have been made in the fire protection program at the Duane Arnold Energy Center which will minimize the possibility of a penetration being left unsealed following a design modification.

This event had no effect on the safe operation of the plant.

I. DESCRIPTION OF EVENT

On 2/11/92, during performance of the fire barrier penetration seal inspection surveillance test, a fire barrier cable penetration was found unsealed. The penetration is rectangular in shape, approximately 4 inches tall by 6 inches wide cut through the concrete block wall which separates the open area of the third floor of the reactor building (fire zone 4A) from the Reactor Water Cleanup (RWCU) hold pump room (fire zone 4F). It is positioned directly above a ladder type steel tray penetration such that it increases the size of the original tray penetration. The tray penetration is located approximately 15 feet above the floor and is approximately 18 inches wide and 4 inches tall. Several electrical cables and one 1/2 inch conduit are run through the open penetration.

Review of the fire barrier evaluation for the barrier in which the unsealed penetration is located determined that the open penetration made the barrier inoperable. As a fire watch had not been in place to compensate for the degraded barrier, as required by Technical Specifications, a condition prohibited by Technical Specifications existed. The plant was operating at 78% power when the unsealed penetration was discovered. The unsealed penetration did not result in an adverse effect on safe shutdown equipment.

II. CAUSE OF EVENT

Review of plant documentation indicated that the penetration was opened and left unsealed during one of two design change packages. In 1977, the penetration was opened to run eight electrical cables through it as part of a modification to the RWCU system. In 1980, a 1/2 inch diameter electrical conduit was run through the penetration during installation of fire detection equipment. It could not be determined whether the penetration was sealed between 1977 and 1980. There are no physical indications that the penetration has been sealed subsequent to the conduit installation in 1980. The cause for the penetration to be left unsealed appears to have been insufficient procedural controls to ensure that penetrations are resealed following installation of design modifications.

Review of previous fire barrier penetration seal inspection surveillance tests determined that the penetration in question was inspected in 1986, however, the unsealed condition was not discovered. The cause for the inadequate inspection of this penetration was a cognitive personnel error by contract personnel. It is suspected that the physical location of this penetration was a major contributor to not detecting that it was unsealed. While viewing the penetration from the floor, only the tray portion of the penetration is visible. In addition, black penetration sealant material can be seen on the bottom and sides of the tray penetration giving the impression that the entire penetration is sealed.

III. ANALYSIS OF EVENT

This event had no effect on the safe operation of the plant. Had a fire occurred, the following discussion would apply.

The barrier in question, which the DAEC classifies as a type "C" (see note 1) fire barrier, is used to meet 10 CFR 50 Appendix R separation requirements for safe shutdown equipment. When "C" barriers are used to meet Appendix R requirements, more than one "C" barrier must be intact between the safe shutdown equipment fire zones. The fire zones which did not meet the separation requirement due to the inoperable "C" barrier caused by the unsealed fire penetration are zones 4A (reactor building third floor) and 3A (reactor building second floor), zones 4A and 2D (Residual Heat Removal (RHR) valve room), and zones 4A and 2A (first floor reactor building). The two fire zones (4F-RWCU hold pump room and 3E-spent resin tank room) which a fire must pass through to get from zone 4A to any of the above mentioned zones do not contain safe shutdown equipment. (see attached diagram)

The Duane Arnold Energy Center (DAEC) fire protection program is based on a defense in depth approach which includes prevention, detection, containment, and suppression of fires. Although the presence of the unsealed fire penetration caused a "C" barrier to be degraded, the ability of the DAEC to achieve and maintain safe shutdown was not affected for the following reasons:

1. Typical combustible loading in the fire zones (4F and 3E) which separate the safe shutdown equipment fire zones (4A,3A,2A,and 2D) is very low with the RWCU hold pump room having an equivalent class E fire severity rating of one minute and the spent resin tank room having a four minute class E rating.

2. Fire zones on both sides of the unsealed penetration are monitored by ionization smoke detectors which would ensure prompt response to a fire. Damage to the detector circuit in the conduit passing through the unsealed penetration would still provide a trouble alarm to control room personnel.

3. One "C" barrier was still intact between safe shutdown equipment zones. This along with the physical distance between the safe shutdown equipment in zone 3A and 4A,2D, or 2A would make it very unlikely that a single fire could propagate from one safe shutdown zone to another.

4. The safe shutdown equipment located in zone 4A is protected by an automatic sprinkler system.

In addition, loss of the cables passing through the unsealed penetration, as well as those in nearby cable trays would not affect any safe shutdown equipment.

IV. CORRECTIVE ACTIONS

Following discovery of the unsealed penetration, a fire watch was initiated in accordance with Technical Specifications.

Since 1980, many improvements have been made in the fire protection program which will minimize the possibility of a penetration being left unsealed following a design modification. Any changes made to a fire barrier penetration by design modifications are now controlled as part of the Fire Hazards Analysis (FHA) review. Penetration seal update forms must be completed whenever a penetration is affected and each design change is reviewed by the Fire Protection Engineer for impact on penetrations. In addition, site closure of modification packages includes submittal of penetration seal database update forms to engineering with as-built information. Penetrations through fire barriers are also tracked by a fire protection impairment form which must be issued prior to opening a penetration and cannot be closed until the penetration has been satisfactorily resealed. The use of penetration seal database update forms and fire protection impairment forms also applies to maintenance activities.

Along with improvements in monitoring the status of fire penetrations during modification/maintenance activities, the penetration inspection surveillance process has been improved to ensure fire penetrations are adequately inspected. It is now standard practice to use ladders and scaffolding so that penetrations can be thoroughly viewed when seal status is determined. To ensure thorough viewing of seals continues in future inspections, the fire penetration seal inspection surveillance will be revised to include additional guidance on the subject. In addition, the surveillance has been revised to involve an engineer with each inspection team to resolve questions as they arise.

It should also be noted that only three penetrations were found unsealed in over 1600 inspected. Of these three penetrations, only the one with the cables and conduit running through it affected the operability of its associated barrier.

V. ADDITIONAL INFORMATION

A. Previous Similar Events

A review of DAEC LERs since 1984 identified that events associated with fire protection have been reported previously, however, none of them involved the failure to seal a fire barrier penetration following modification work.

B. EIIS SYSTEM AND COMPONENT CODES

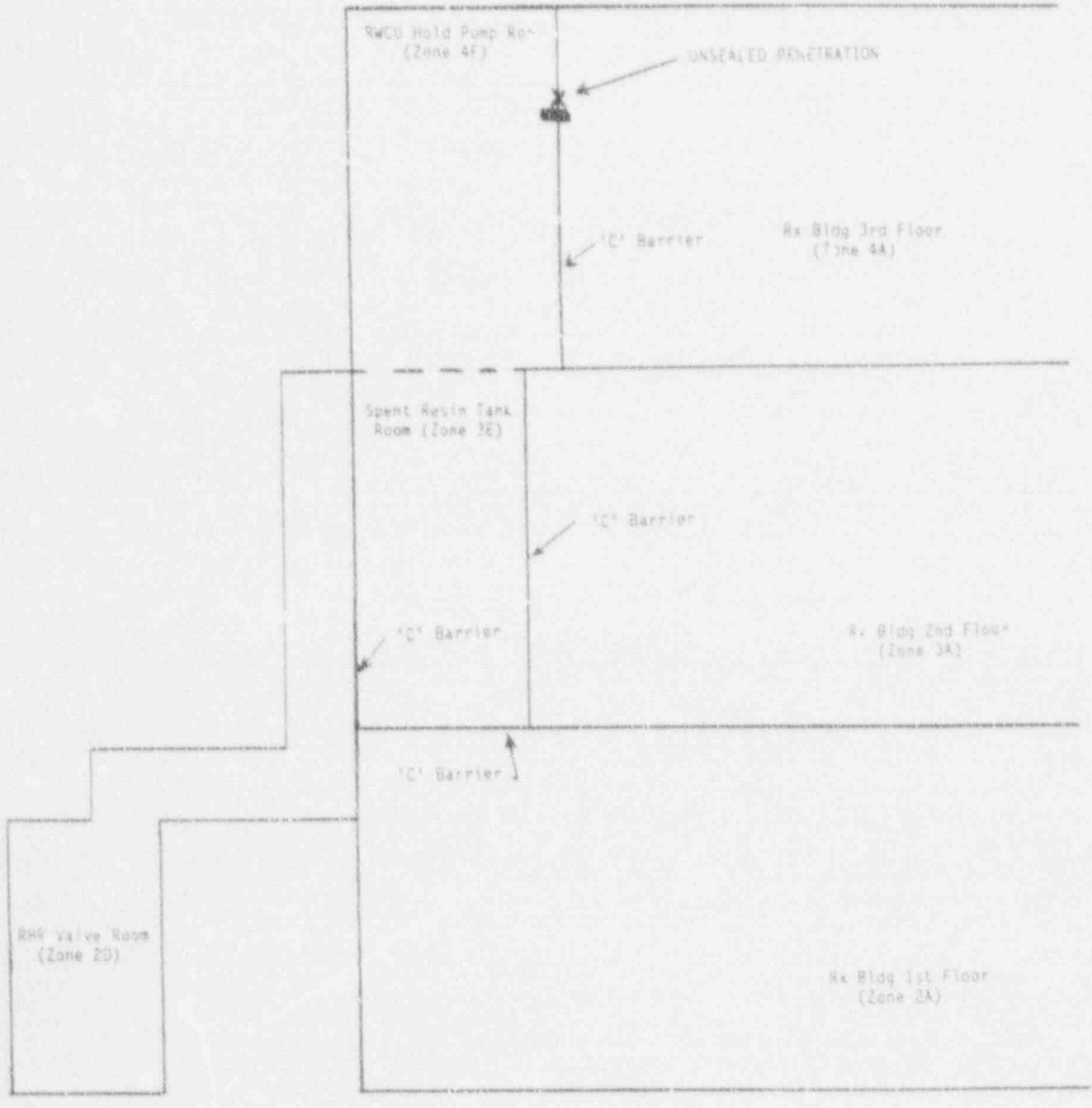
Systems:
- NG - Reactor Building (BWR)
- IC - Fire Detection System
- KP - Fire Protection System (Water)
- CE - Reactor Water Cleanup System (BWR)
- BO - Residual Heat Removal/Low Pressure Coolant Injection System (BWR)

Components: PEN - fire barrier penetration

Note 1 - When barriers are used to meet Appendix R separation requirements, a three hour rated fire barrier is required. At the DAEC this is accomplished using a type "A" rated barrier or more than one type "C" barriers. A type "C" barrier is a barrier which is not rated but is capable of being an effective fire stop.

This event is being reported pursuant to 10 CFR 50.73 (a)(2)(i).

RELATIVE POSITIONS OF APPLICABLE FIRE ZONES AND BARRIERS
(diagram does not represent actual room sizes or locations)



ELEVATION VIEW