

PLC Professional Loss Control, Inc.

EEC PROLC

STRUCTURAL STEEL ANALYSIS

for

LIMERICK GENERATING STATION

Unit 1 Reactor Building El. 177'

Sump Room, Room 115

Fire Area 39

December 20, 1983

8401090485 840104
PDR ADOCK 05000352
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LIMERICK GENERATING STATION

1. AREA DESCRIPTION

The area under consideration is the Sump Room, Room 115, on the 177' elevation of the Unit 1 Reactor Building (Fire Area 39). The bounding walls of the area are of reinforced concrete construction with an average thickness of 2.5 ft. The total surface area for heat transfer is 2595 ft² (see Attachment A for sketch and calculation of surface areas).

2. COMBUSTIBLE LOADING

The combustible loading in this area consists of cable insulation in cable trays. The total surface area of the cable trays is 96 ft² with an average combustible loading of 1.5 lbs/ft² of cable tray surface area. There are no combustible liquids in the area.

3. VENTILATION PARAMETERS

This room is open to the Corridor Passageway, Room 118. There are two doors which enter into the Sump Room. One door measuring 3' wide by 5'10" high is located in the east wall, and one door measuring 3' wide by 7' high is located at the entrance to the stairwell.

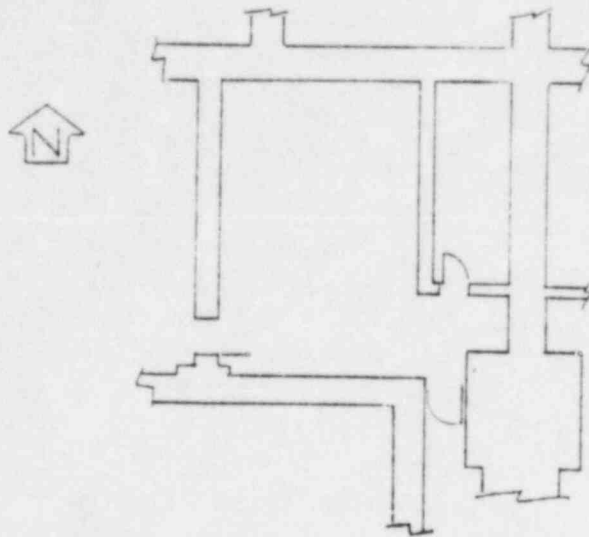
4. CASES EXAMINED

With the light combustible loading in this area, the assumption that all cables are burning simultaneously would present the worst case. With all cables burning simultaneously, a surface area of 96 ft² would be involved. This corresponds to a heat output of approximately 1700 kW. With all combustibles assumed to be burning simultaneously, the duration of the fire would be $1.5 \text{ lbs/ft}^2 \div \frac{.1 \text{ lb}}{\text{min/ft}^2} = 15 \text{ minutes}$.

5. RESULTS

With all the cable trays in the area assumed to be burning simultaneously and a 3' wide by 5'10" door open, the resulting fire was fuel controlled. A gas temperature of 356°F was achieved after 15 minutes, which is below the critical temperature for the structural steel (see Attachment B).

The location of the cable trays relative to structural steel members was examined in the area. No cable trays were positioned so as to present a localized heating exposure to the structural steel.



Unit 1 Reactor Building El. 177'
Sump Room 115

Surface Area Calculation

<u>Walls</u>		
North wall	(24' x 23')	552 ft ²
East wall	(24' x 23')	552 ft ²
South wall	(21' x 23')	483 ft ²
West wall	(24' x 23')	552 ft ²
		<hr/>
		2139 ft ²
Ceiling	(24' x 25') - (18' x 8')	456 ft ²
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Total Surface Area for Heat Transfer		2595 ft ²

CASE NUMBER: 1
 BUILDING: UNIT 1 REACTOR BUILDING
 ELEVATION AND AREA DESCRIPTION: 177' SUMP ROOM FIRE ZONE 39
 CASE DESCRIPTION: ONE DOOR OPEN ALL CABLES BURNING

CEILING/WALL THICKNESS (ft)	CEILING/ WALL MATERIAL	Ao (ft ²)	Ho (ft)	Aw (ft ²)	Q (kW)
2.5	CONCRETE	17.5	5.8	2595	1700

FIRE IS FUEL CONTROLLED

FIRE DURATION (min)	GAS TEMPERATURE (deg.F)
1	147
2	177
3	200
4	219
5	237
6	252
7	266
8	280
9	292
10	304
11	315
12	326
13	337
14	346
15	356