

*PLC* *Professional Loss Control, Inc.*

STRUCTURAL STEEL ANALYSIS  
for  
LIMERICK GENERATING STATION

Control Structure El. 200'  
West Chiller Equipment Room, Room 258  
Fire Area 1L

December 20, 1983

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## LIMERICK GENERATING STATION

### 1. AREA DESCRIPTION

The area under consideration is the West Chiller Equipment Room, Room 258, on the 200' elevation of the Control Structure (Fire Area 1L). The bounding walls of the room are of reinforced concrete and concrete masonry unit construction with an average thickness of 2.5 ft. The total surface area for heat transfer is 5944 ft<sup>2</sup> (see Attachment A for sketch and surface area calculations).

### 2. COMBUSTIBLE LOADING

Combustible loading in this area consists of cable insulation in cable trays. The total surface area of the cable trays is 195 ft<sup>2</sup> with an average combustible loading of 2 lbs/ft<sup>2</sup> of cable tray surface area. There are no combustible liquids in this area.

### 3. VENTILATION PARAMETERS

There are four doors which enter the area. Two of the doors are double doors, each measuring 8' high by 10' wide. One door is located in the west wall while the other door is located in the east wall. The remaining two doors are 3' wide by 7' high. These are both located in the north wall of the room.

### 4. CASES EXAMINED

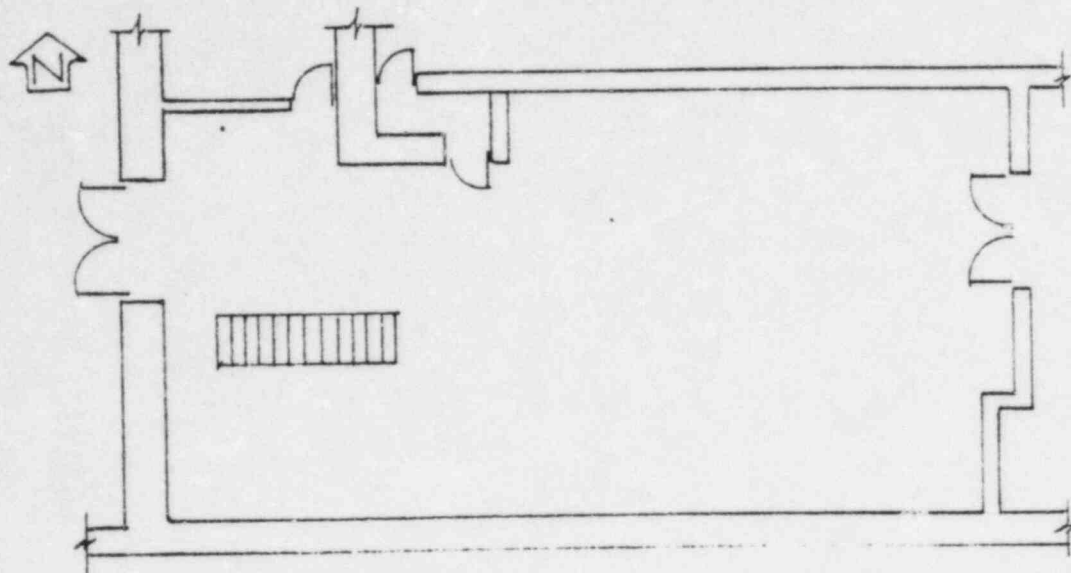
With the light combustible loading in this area, the assumption that all cables are burning simultaneously would present the worst case. With all cable trays burning, a surface area of 195 ft<sup>2</sup> would be involved. This corresponds to a heat output of approximately 3446 kW. With all cables assumed to be burning simultaneously, the duration of the fire would be  $2.0 \text{ lbs/ft}^2 \div \frac{.1 \text{ lbs}}{\text{min/ft}^2} = 20 \text{ minutes}$ .

### 5. RESULTS

With all the cable trays in the area burning simultaneously and one 3' x 7' door open, the resulting fire was fuel controlled. A gas temperature of 362°F was achieved after 20 minutes, which is below the critical temperature for the structural steel (see Attachment B). Since the fire was fuel

controlled with only one door open, the opening of additional doors into the area will not effect the burn rate or final gas temperature.

The location of 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.



Control Structure El. 200'  
West Chiller Equipment Room 258

#### Surface Area Calculation

<u>Walls</u>		
North wall	(72' x 16')	1152 ft <sup>2</sup>
East wall	(35' x 16')	560 ft <sup>2</sup>
South wall	(72' x 16')	1152 ft <sup>2</sup>
West wall	(35' x 16')	560 ft <sup>2</sup>
		<hr/>
		3424 ft <sup>2</sup>
<u>Ceiling</u>	(72' x 35')	<hr/>
		2520 ft <sup>2</sup>
Total Surface Area for Heat Transfer		<hr/>
		5944 ft <sup>2</sup>

ATTACHMENT A

CASE NUMBER: 1  
 BUILDING: CONTROL BUILDING  
 ELEVATION AND AREA DESCRIPTION: 200' WEST CHILLER EQ. RM. FIRE ZONE 1L  
 CASE DESCRIPTION: ONE DOOR OPEN ALL CABLES BURNING

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CEILING/WALL THICKNESS (ft)	CEILING/ WALL MATERIAL	Ao (ft <sup>2</sup> )	Ho (ft)	Aw (ft <sup>2</sup> )	Q (kW)
2.5	CONCRETE	21.0	7.0	5944	3446

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FIRE IS FUEL CONTROLLED

FIRE DURATION (min)	GAS TEMPERATURE (deg. F)
1	138
2	165
3	185
4	202
5	218
6	231
7	244
8	256
9	267
10	277
11	287
12	297
13	306
14	315
15	323
16	332
17	340
18	347
19	355
20	362