

PLC *Professional Loss Control, Inc.*

STRUCTURAL STEEL ANALYSIS
for
LIMERICK GENERATING STATION

Control Structure El. 180'

Backwash Pump Rooms

Rooms 161, 162, & 165

Fire Area 1J

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8401090684 840104
PDR ADOCK 05000352
E PDR

P. O. Box 446 • Oak Ridge, Tennessee 37830 • (615) 482-3541

LIMERICK GENERATING STATION

1. AREA DESCRIPTION

The area under consideration is the Backwash Pump Rooms, Rooms 161, 162, and 165 on the 180' elevation of the Control Structure (Fire Area 1J) (see Attachment A for sketch of area). The bounding walls in the area are of reinforced concrete construction with an average thickness of 2.5 ft. The total surface area for heat transfer is 1684 ft² (see Attachment A for calculation of areas).

2. COMBUSTIBLE LOADING

Combustible loading in the area consists of two cable trays which run east-west across room 161. Total surface area of the cable trays is 70 ft². The average combustible loading of the trays is 2.6 lbs/ft² of tray surface area. There are no combustible liquids in this area.

3. VENTILATION PARAMETERS

One door which measures 2'8" wide by 7' high serves the area. This door opens into Corridor 164.

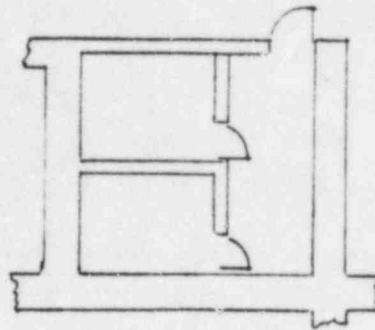
4. CASES EXAMINED

With the light combustible loading in the area, the assumption that all cables are burning simultaneously would present the worst case. With all cable trays burning, a surface area of 70 ft² would be involved. This corresponds to a heat output of approximately 1240 kW. With all cables assumed to be burning simultaneously the duration of the fire would be

$$2.6 \text{ lbs/ft}^2 \div \frac{.1 \text{ lbs}}{\text{min/ft}^2} = 26 \text{ minutes}$$

5. RESULTS

With all cable trays in the area burning simultaneously and the door entering the area open, a fire temperature of 492°F was achieved after 26 minutes, which is below the critical temperature for the structural steel (see Attachment B). The cable trays in the area were positioned so as not to present a localized heating exposure to the structural steel.



Control Structure El. 180'
Backwash Pump Rooms

Surface Area Calculation

<u>Walls</u>		
North wall	(20' x 18')	360 ft ²
South wall	(20' x 18')	360 ft ²
East wall	(19' x 18')	342 ft ²
West wall	(19' x 18')	342 ft ²
<u>Ceiling</u>	20' x 14'	<u>280 ft²</u>
Total Surface Area for Heat Transfer		1684 ft ²

CASE NUMBER: 1
 BUILDING: CONTROL STRUCTURE
 ELEVATION AND AREA DESCRIPTION: 180' BACKWASH PUMP ROOMS
 CASE DESCRIPTION: ONE DOOR OPEN ALL CABLES BURNING

CEILING/WALL THICKNESS (ft)	CEILING/ WALL MATERIAL	Ao (ft2)	Ho (ft)	Aw (ft2)	Q (kW)
2.5	CONCRETE	19.0	7.0	1684	1240

FIRE IS FUEL CONTROLLED

FIRE DURATION (min)	GAS TEMPERATURE (deg.F)
1	156
2	190
3	216
4	238
5	257
6	274
7	290
8	305
9	320
10	333
11	346
12	358
13	369
14	380
15	391
16	402
17	412
18	422
19	431
20	440
21	450
22	458
23	467
24	476
25	484
26	492