

ENGINEERING ASSESSMENT

TURBINE BUILDING FIRE AREA IE

JAMES A. FITZPATRICK NUCLEAR POWER PLANT
NEW YORK POWER AUTHORITY

Evaluation No: _____

Date Prepared: 7/30/91

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Full Member of Society of Fire Protection Engineers

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ENGINEERING ASSESSMENT
TURBINE BUILDING FIRE AREA IE
APPENDIX R DETECTION AND SUPPRESSION

1.0 PURPOSE

This engineering assessment will examine the adequacy of the existing fire detection and suppression capabilities in Turbine Building (Fire Area IE) necessary to assure the availability of Appendix R hot and/or cold shutdown capabilities.

2.0 REFERENCES

1. NRC Generic Letter 86-10 "Implementation of Fire Protection Requirements" dated April 24, 1986.
2. James A. FitzPatrick Nuclear Power Plant Fire Hazard Analysis revised October 1985.
3. James A. FitzPatrick Nuclear Power Plant Evaluation of the Compliance to Appendix R Section III.G. October 1985.
4. Minor Modification Package M1-91-179, "Isolation of UC-16A and 16B Fans."
5. NYPA letter, J.P. Bayne to H.R. Denton, dated July 13, 1982 (JPN-82-061) submits "A Reassessment of Conformance to Appendix R." This report supersedes Appendix II to the Safe Shutdown Analysis in its entirety.
6. NRC 2/2/83 letter (JAF-83-44) D.B. Vassallo to L.W. Sinclair, regarding draft safety evaluation on Appendix R exemption requests. Letter requests that the Authority review the draft report for technical accuracy and inform the NRC of any corrections necessary within three weeks. The draft report recommends the denial of exemptions for four zones in the reactor building while granting exemptions for five other areas.
7. NRC 7/1/83 (JAF-83-235) letter, D.B. Vassallo to J.P. Bayne, regarding exemption requests - 10 CFR 50.48 Fire Protection and Appendix R to 10 CFR 50. Transmits NRC Exemption for the Control Room and Torus Room in response to the Authority's request.

3.0 INTRODUCTION

Calculations performed to predict the temperature in the East and West Electric Bays indicate that if power to the ventilation fans is lost, temperatures could exceed 150 degrees F. However, these calculations are based on "worst-case" assumptions (i.e. hottest day, maximum solar heat load, normal "operating" heat loads, 80 degree F lake water temperature, etc.). The ability of all equipment in the electric bays to operate at these temperatures cannot be assured at this time. Calculations using more realistic assumptions may render this modification unnecessary for either hot and/or cold shutdown conformance strategies.

Equipment in the bays is required to shutdown the plant in the event of a fire. A fire in either the Control Room or Turbine Building could damage electrical cables "associated" with the electric bay fans. As a result, the Authority modified the electrical circuitry associated with these fans to assure their availability in the event of a fire.

Panels 67HV-2A and 67HV-2B provided local control of Electric Bay fans 67FN-16A1 and 67FN-16A2 and 67FN-16B1 and 67FN-16B2 respectively. In the event of a fire in Fire Area VII (Control Room, Relay Room or Cable Spreading Room) prior to the modifications, a short circuit in the annunciator and light circuit for fans 67FN-16B1, 67FN-16B2, 67FN-16A1 AND 67FN-16A2 could blow the control power fuses and cause the fan to be inoperable. Without an operable fan, the temperature in the electric bay will increase and may cause the equipment in the bay to potentially overheat and fail.

A fire in the Turbine Building (Fire Area 1E) could damage two local control panels (67HV-2A and 67HV-2B), which could result in electric bay fans 67FN-16A1, 67FN-16A2, 67FN-16B1 AND 67FN-16B2 being made inoperable and overheating electric bay equipment.

To assure that fans will function in the event of fire in either the Control Room or Turbine Building, modification M1-91-179 (Reference 4) eliminated all control of Electric Bay Ventilation fans 67FN-16B1 and 67FN-16B2 from the Control Room, and 67FN-16A1 and 67FN-16A2 from the local area.

4.0 ANALYSIS

4.1 Applicable Regulatory Criteria

Appendix R to 10CFR50

Section III.G.3 of Appendix R to 10CFR50 requires detection and fixed suppression in locations where alternate capability is provided to ensure safe shutdown capability prior to the transition to cold shutdown.

Prior to the modification of the electric bay ventilation system circuitry (Reference 4), the Authority relied upon circuit separation. With the installation of this modification, FitzPatrick now falls within the provisions of Section III.G.3 and III.L of Appendix R to 10CFR50 based on the assumption that electric bay ventilation is required prior to the transition to cold shutdown.

Section III.G.3 requires that detection and fixed suppression be installed in areas, rooms, or zones where alternate shutdown capability is required. As outlined in Generic Letter 86-10 (Reference 1), less than total detection and total suppression in the area, room, or zone can be adequate if justified by analysis; however, if either no detection or no suppression is provided in the location under consideration, an exemption is required.

4.2 Assessment of Turbine Building (Fire Area IE)

The equipment for which alternative shutdown capability is provided, given a fire in Fire Area IE, consists of local control panels 67HV-2A and 67HV-2B located along column line 19 on the outside of the north wall of the Electric Bays. The immediate vicinity of ventilation equipment between columns 19-20/A-B without detection or suppression contains negligible quantities of exposed combustible material. A small caged area is used to store radioactive materials, primarily noncombustible material. An approved flammable liquids storage cabinet is also in this location. There are no other potential sources of combustible materials within these column lines. The modifications described in Reference 4 did not introduce any additional combustible materials into the location of concern.

Therefore, the location contains minimal quantities of exposed combustible material, and the probability of damage due to a fire either starting in or spreading to this location is considered highly unlikely.

The existing configuration of fire protection features in Fire Area IE are documented in Reference 2. The immediate vicinity of ventilation equipment between column lines 19-20/A1-B contains no detection or suppression capabilities. Open areas of elevation 272'-0" which can present an exposure fire hazard to the location of concern are protected by automatic sprinklers. Automatic detection is not provided in the open areas of elevation 272'-0" which can present an exposure fire hazard to the location of concern. Potential fire scenarios involving exposed combustible materials in these adjacent locations would result in suppression system actuation. Sprinkler system water flow would result in a local alarm and an alarm in the Main Control Room, resulting in dispatch of the fire brigade. Suppression system actuation would act to control and/or extinguish the fire prior to arrival of the fire brigade.

The existing configuration of automatic detection and suppression in Turbine Building Fire Area IE in order to support conformance with Appendix R Section III.G.3 is acceptable "as is". The bases for this assessment are a combination of the fire hazards in the location of concern, existing protection provided for exposure fire hazards, and the ability to establish ventilation to the East or West Electric Bays independent of the location of concern. Even should damage occur, there will be no impact on safe shutdown capability since the modification described in Reference 4 ensures the availability of ventilation to the East Electric Bay, which is associated with the Main Control Room shutdown path.

4.3 Assessment of Control Room (Fire Area VII)

An exemption has been granted for the lack of Main Control Room detection and suppression under III.G.3 alternate shutdown criteria (Reference 5,6 and 7). Therefore, further review of the Main Control Room is not required.

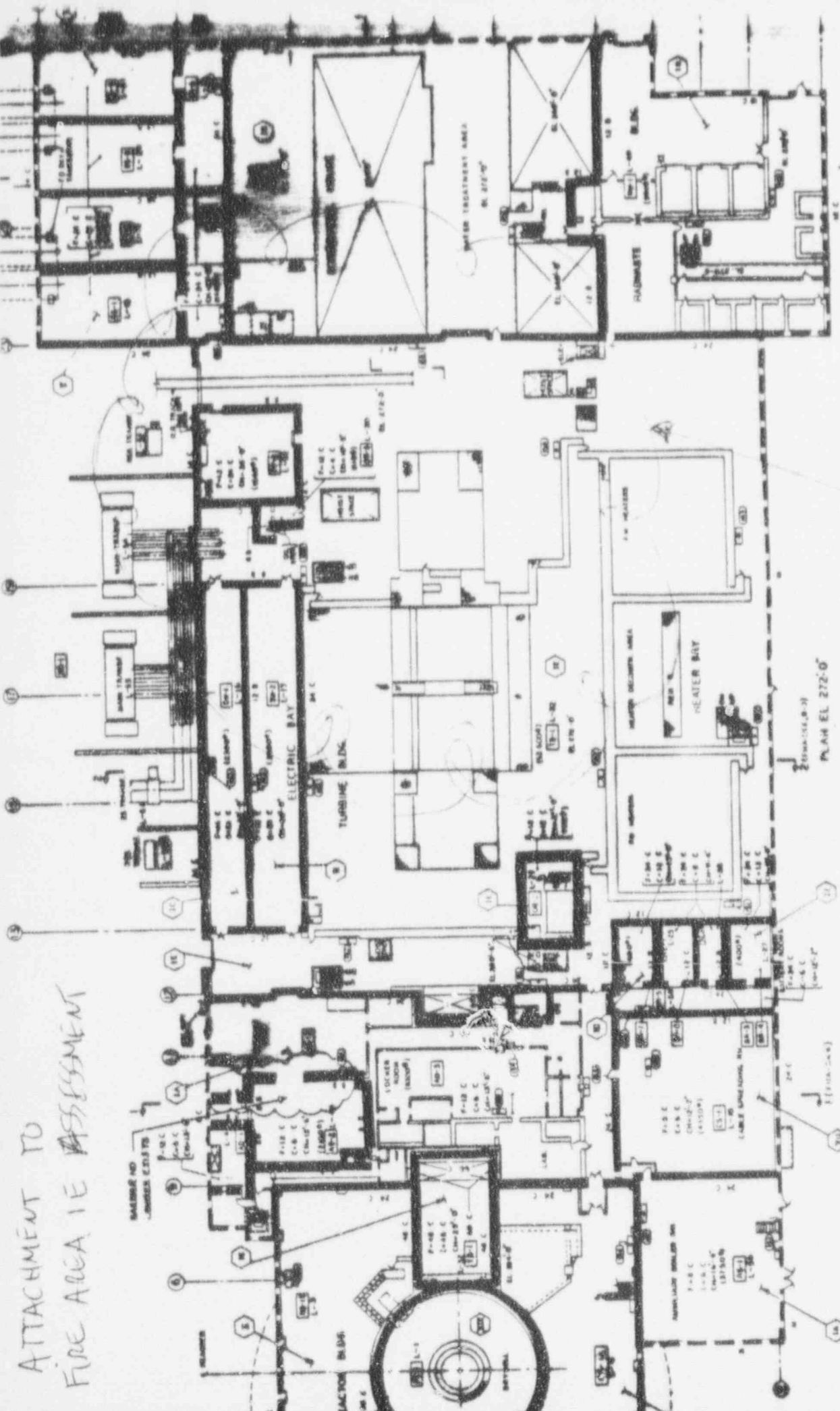
5.0 CONCLUSION

Based on the results of the preceding assessment, the existing configuration of fire protection features provides adequate protection for the location of concern. The bases for this conclusion are summarized as follows:

- There are minimal exposed combustible materials in the immediate vicinity of the location of ventilation equipment for which alternative shutdown capability is provided.
- Adjacent locations on elevation 272'-0" of Turbine Building Fire Area IE that contain significant exposure fire hazards are protected by automatic wet pipe sprinkler systems.
- Actuation of suppression systems in adjacent locations would act to control and/or extinguish postulated fires prior to arrival of the fire brigade.
- Due to the location and protection provided for exposed combustible materials, damage due to a fire occurring in or spreading to the location under consideration is considered to be highly unlikely.
- Even should fire damage occur in the location under consideration, there will be no impact on safe shutdown capability since the availability of ventilation to the East Electric Bay is provided outside of Turbine Building Fire Area IE.

- Providing additional detection and/or suppression capabilities in the location under consideration does not result in a significant improvement to existing fire protection features.

ATTACHMENT TO
FIRE AREA I.E. ASSESSMENT



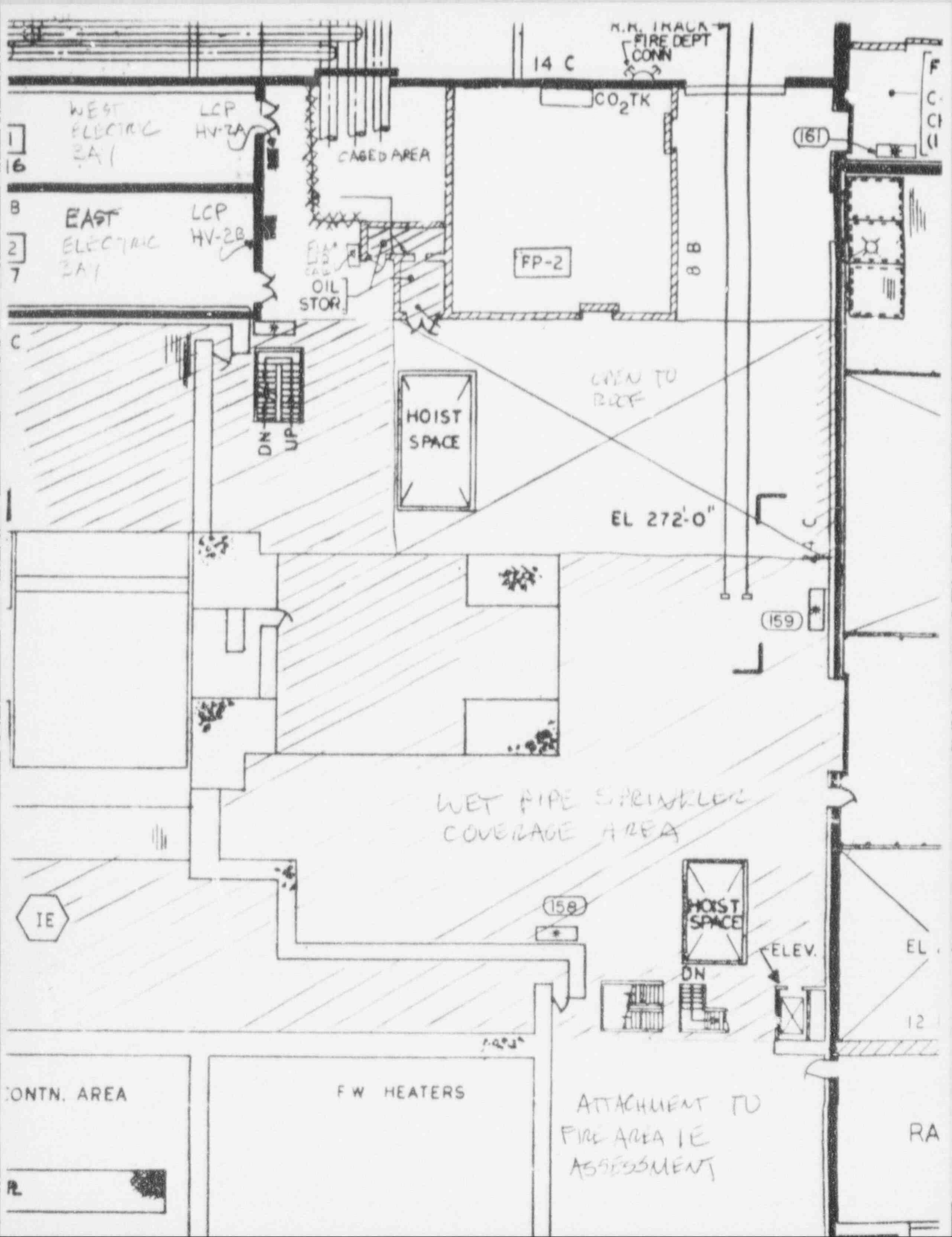
SEE ATTACHED
FIGURE FOR DETAILS

UNCONTROLLED

- NOTES:
1. DISCREPANCY No. 5 IS NOT REQUIRED SINCE DISCREPANCY NUMBERS ARE THE SAME AS THE DISCREPANCY NUMBERS IN THE FIRE AREA 9.
 2. SEE SKETCH (A) FOR NOTES AND SYMBOLS.

1	NO. 1	NO. 1	NO. 1	NO. 1
2	NO. 2	NO. 2	NO. 2	NO. 2
3	NO. 3	NO. 3	NO. 3	NO. 3
4	NO. 4	NO. 4	NO. 4	NO. 4
5	NO. 5	NO. 5	NO. 5	NO. 5
6	NO. 6	NO. 6	NO. 6	NO. 6
7	NO. 7	NO. 7	NO. 7	NO. 7
8	NO. 8	NO. 8	NO. 8	NO. 8
9	NO. 9	NO. 9	NO. 9	NO. 9
10	NO. 10	NO. 10	NO. 10	NO. 10
11	NO. 11	NO. 11	NO. 11	NO. 11
12	NO. 12	NO. 12	NO. 12	NO. 12
13	NO. 13	NO. 13	NO. 13	NO. 13
14	NO. 14	NO. 14	NO. 14	NO. 14
15	NO. 15	NO. 15	NO. 15	NO. 15
16	NO. 16	NO. 16	NO. 16	NO. 16
17	NO. 17	NO. 17	NO. 17	NO. 17
18	NO. 18	NO. 18	NO. 18	NO. 18
19	NO. 19	NO. 19	NO. 19	NO. 19
20	NO. 20	NO. 20	NO. 20	NO. 20
21	NO. 21	NO. 21	NO. 21	NO. 21
22	NO. 22	NO. 22	NO. 22	NO. 22
23	NO. 23	NO. 23	NO. 23	NO. 23
24	NO. 24	NO. 24	NO. 24	NO. 24
25	NO. 25	NO. 25	NO. 25	NO. 25
26	NO. 26	NO. 26	NO. 26	NO. 26
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71	NO. 71	NO. 71	NO. 71	NO. 71
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85	NO. 85	NO. 85	NO. 85	NO. 85
86	NO. 86	NO. 86	NO. 86	NO. 86
87	NO. 87	NO. 87	NO. 87	NO. 87
88	NO. 88	NO. 88	NO. 88	NO. 88
89	NO. 89	NO. 89	NO. 89	NO. 89
90	NO. 90	NO. 90	NO. 90	NO. 90
91	NO. 91	NO. 91	NO. 91	NO. 91
92	NO. 92	NO. 92	NO. 92	NO. 92
93	NO. 93	NO. 93	NO. 93	NO. 93
94	NO. 94	NO. 94	NO. 94	NO. 94
95	NO. 95	NO. 95	NO. 95	NO. 95
96	NO. 96	NO. 96	NO. 96	NO. 96
97	NO. 97	NO. 97	NO. 97	NO. 97
98	NO. 98	NO. 98	NO. 98	NO. 98
99	NO. 99	NO. 99	NO. 99	NO. 99
100	NO. 100	NO. 100	NO. 100	NO. 100

NEW YORK



N.M. TRUCK
FIRE DEPT
CONN

14 C

CO₂ TK

WEST
ELECTRIC
2A1

LCP
HV-2A

CAGED AREA

(161)

1
16

B
2
7

EAST
ELECTRIC
2A1

LCP
HV-2B

FP-2

8 B

F.A.
CAL.
OIL
STOR.

COPEN TO
ROOF

HOIST
SPACE

DN
UP

EL 272'-0"

(159)

WET PIPE SPRINKLER
COVERAGE AREA

IE

(158)

HOIST
SPACE

ELEV.

EL

12

DN

CONTN. AREA

FW HEATERS

ATTACHMENT TO
FIRE AREA IE
ASSESSMENT

RA

RL

ATTACHMENT TO
FIRE AREA I
ASSESSMENT

00387-146205
ATTACHMENT 1
Sheet 5 of 8

FIRE HAZARD ANALYSIS SUMMARY SHEET (Cont'd)

FHA No.	Fire Area	Fire Zone	El.	Col. Loc.	Plant Area Identification	Safety Criteria	Area Sq. Ft.	Material	Quantity Lb.	Loading Btu/Ft ²	Total Btu's	Total Btu/Ft ²	*Avail. Btu/Ft ²	Type of Fire Suppression				*Note
														Primary	Actuation	Backup	Detection	
SK2	IV	BR-4	272	12-D	Battery Charging Room	SR	400	Cable insulation	2,867	86,010	34.4x10 ⁶	86,010	153,990	Water hose station	Manual	Portable CO ₂	Ionization	10
SK1	IE	OR-1	252	13-B	Turbine Oil Room	NSR	770	Lube oil	216,000	5.72x10 ⁶	4.40x10 ⁹	5.72x10 ⁶	-0-	Wet pipe sprink.	Fusible link station	Water hose	Sprinkler alarm	6
SK2	IE	OR-2	272	13-X	Turbine Oil Room	NSR	770	Lube oil	84,000	2.23x10 ⁶	1.72x10 ⁹	2.23x10 ⁶	-0-	Wet pipe sprink.	Fusible link station	Water hose	Sprinkler alarm	6
SK2	IE	OR-3	272	22-B	Misc. Oil Storage	NSR	110	Misc. oil	400	107,368	11.8x10 ⁶	107,368	12,632	Wet pipe sprink.	Fusible link station	Water hose	Sprinkler alarm	
SK1	IE	TB-1 (TB-11)	252	16-T	Turbine Bldg	NSR	1,660 54,000 1,400 540 2,062 222 400	Resin Cable insulation Lube oil Lube oil Lube oil Lube oil Wood	14,000 57,532 944 1,080 14,400 288 32,000	232,783 12,785 13,755 40,800 142,464 26,465 640,000	391x10 ⁶ 690x10 ⁶ 19.3x10 ⁶ 22x10 ⁶ 294x10 ⁶ 5.88x10 ⁶ 256x10 ⁶	31,081	208,919	Wet pipe sprink.	Fusible link station	Water hose	Sprinkler alarm	
SK2	IE	TB-1 (TB-12)	272	16-T	Turbine Bldg	NSR	53,600 53,600 150 500 3480	Lube oil Cable Misc oil Wood Plastic	44,504 59,655 1320 3000 3000	9,964 13,356 179,520 48,000 10,345	534x10 ⁶ 716x10 ⁶ 26.9x10 ⁶ 24x10 ⁶ 36x10 ⁶	24,942	215,058	Wet pipe sprink.	Fusible link station	Water hose	Sprinkler alarm	8, 16
SK3	IE	TB-1 (TB-13)	300	16-T	Turbine Bldg Op. Floor	NSR	679 606	Lube oil Cable insulation	336 9,186	10,095 168,035	6.85x10 ⁶ 110x10 ⁶	2,184	237,816	Water spray	Manual	Water hos. sta.	Elec. HAD	7

ELEVATION OF CONCERN

ATTACHMENT TO
FIRE AREA IF
ASSESSMENT

00387-146205

ATTACHMENT 1
Sheet 6 of 8

FIRE HAZARD ANALYSIS SUMMARY SHEET (Cont'd)

Line No.	FHA Dwg No.	Fire Area	Fire Zone	El.	Col. Loc.	Plant Area Identification	Safety Criteria	Area Sq. Ft.	Material	Quantity Lb.	Loading Btu/Ft ²	Total Btu's	Total Btu/Ft ²	*Avail. Btu/Ft ²	Type of Fire Suppression				Note
															Primary	Actuation	Backup	Detection	
4	SK1	IE	TB-1 (TB-14)	244	16-T	Condenser Pit	NSR	6,600	Lube oil	108,000	333,818	2.2x10 ⁹	333,818	-0-	Air foam.	Elec. manual	HAD/ Wat. station	Foam alarm	
5	SK3	VIII	MG-1 -B	300	6-T	Motor Gen. Room	NSR	5,330	Lube oil	19,125	73,199	390x10 ⁶	73,199	166,801	Preact. sprink.	Elec. fus. link	HAD/ Water hos. sta.	Sprinkler alarm & UV	
6	SK4	XII	SP-1	255	24-A	Safety Related Pumps	SR	891	Lube oil	114	2,619	2.23x10 ⁶	7,104	232,896	Water hos. sta.	Manual	Portable CO ₂	Ionization & elect. HAD	
7	SK1	XIII	SP-2	255	26-A	Safety Related Pumps	SR	1,310	Lube oil 53 Cable insulation	114 405	1,703 91,671	2.33x10 ⁶ 4.86x10 ⁶	5,412	234,588	Water hos. sta.	Manual	Portable CO ₂	Ionization & elect. HAD	
8	SK1	IB	CR-2	284	24-C	Radwaste Control Room	NSR	1,390	Paper, etc.	250	1,439	2.0x10 ⁶	1,439	238,561	Water hos. sta.	Manual	Portable CO ₂	Ionization	
9	SK1	IB	RW-1	250	25-H	Radwaste Bldg	NSR	14,400	Cable insulation 60 Resin	6,260 500	5,217 232,783	75.1x10 ⁶ 14.0x10 ⁶	6,189	233,811	Water hos. sta.	Manual	Portable CO ₂	None	8, 16
10	SK2	IB	RW-1	272	25C	Radwaste Bldg Baler Area, Laundry Area	NSR	9,910	Cable 100 Papers, rags, etc. 1,580 Clothes 1,250 Resin 1,580 Rubber	9,152 200 10,525 500 1,600	11,082 16,000 53,291 11,174 19,595	110x10 ⁶ 1.6x10 ⁶ 84.2x10 ⁶ 14.0x10 ⁶ 31.0x10 ⁶	24,273	215,727	Wet pipe	Fusible link	Water hose station	Sprinkler alarm	9
11	SK1	IB	SH-13 (SH-11)	235	23-S	Circ. Water Pumps Pit	NSR	108	Cable insulation 990 Lube oil	3,286 1,416	365,156 29,178	39.4x10 ⁶ 28.9x10 ⁶	69,013	170,987	Water hose station	Manual	Portable CO ₂	None	
12	SK1	IB	SH-13 (SH-12)	260	27-S	Screenwell House	NSR	14,900	Cable insulation	3,150	3,812	46.9x10 ⁶	3,150	237,450	Water hose station	Manual	Portable CO ₂	None	