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FIRE PROTECTION ENGINEERS
SAFETY ENGINEERS
CODE CONSULTANTS

ANALYSIS OF FIRE DETECTOR LOCATIONS
AT
LASALLE COUNTY STATION
FOR
SARGENT & LUNDY ENGINEERS
AND
COMMONWEALTH EDISON COMPANY

INTRODUCTION

Schirmer Engineering Corporation reviewed several fire zones to determine if the fire protection systems currently installed are acceptable for the hazard. This review encompassed heat detection systems and several sprinkler systems. The purpose of the sprinkler system review was to determine if any field conditions exist that may adversely affect the sprinkler system coverage and to verify that the installation is in accordance with NFPA 13, Installation of Automatic Sprinklers. This review consisted of an analysis of installation only and did not include such items as analysis of hydraulic calculations, density requirements, etc.

The review is presented on the following pages and it encompasses the following zones:

<u>Zone No.</u>	<u>Description</u>
7B1	Unit 1, HPCS Diesel Generator Room
7B2	Unit 1, Division 2, Standby Diesel Generator Room
7B3	Unit 1, Division 1, Standby Diesel Generator Room
7B4	Unit 1, HPCS Diesel Day Tank Room
7B5	Unit 1, Division 2, Diesel Day Tank Room
7B6	Unit 1, Division 1, Diesel Day Tank Room
7C1	Unit 1, HPCS Diesel Fuel Tank Room
7C2	Unit 1, Division 2, Diesel Fuel Tank Room

May 14, 1984

-1-

SEC Project No. 83118

<u>Zone No.</u>	<u>Description</u>
7C3	Unit 1, Division 1, Diesel Fuel Tank Room
8B1	Unit 2, HPCS Diesel Generator Room
8B2	Unit 2, Division 2, Standby Diesel Generator Room
8B3	Unit 2, HPCS Diesel Day Tank Room
8B4	Unit 2, Division 2, Diesel Day Tank Room
8C1	Unit 2, HPCS Diesel Fuel Tank Room
8C2	Unit 2, Division 2, Diesel Fuel Tank Room

FIRE ZONE 7B1 - UNIT 1, HPCS DIESEL GENERATOR ROOM

Fire Zone 7B1 is the Unit 1, HPCS Diesel Generator Room. An automatic total flooding CO₂ system is provided for the zone. Actuation of the CO₂ system via a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F ± 10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 22 feet, 6 inches above the floor (2 feet, 6 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors be located at the bottom of alternate W27 beams on the east side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip. On the west side of the north/south beam, the ceiling height is lower. Due to the reduced ceiling height, two detectors should be installed in this area.

This design would require a total of 5 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of three new 190°F ± 10°F heat detectors. These detectors should be installed as indicated on Drawing 7B1-3. All heat detectors should serve to actuate the CO₂ system. By doing this, the average area per detector will be 374 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

FIRE ZONE 7B2 - UNIT 1, DIVISION 2, STANDBY DIESEL GENERATOR ROOM

Fire Zone 7B2 is the Unit 1, Division 2, Standby Diesel Generator Room. An automatic total flooding CO₂ system is provided for the zone. Actuation of the CO₂ via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F ± 10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 21 feet, 10 inches above the floor (3 feet, 1 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors, for the most part, be located at the bottom of alternate deep beams on each side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip.

This design would require a total of 6 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of four new 190°F ± 10°F heat detectors. These detectors should be installed as indicated on Drawing 7B1-3. All heat detectors should serve to actuate the CO₂ system. By doing this, the average area per detector will be 277 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

FIRE ZONE 7B3 - UNIT 1, DIVISION 1, STANDBY DIESEL GENERATOR ROOM

Fire Zone 7B3 is the Unit 1, Division 1, Standby Diesel Generator Room. An automatic total flooding CO₂ system is provided for the zone. Actuation of the CO₂ via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F ± 10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 19 feet, 7 inches above the floor (5 feet, 5 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors, for the most part, be located at the bottom of alternate deep beams on each side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip.

This design would require a total of 6 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of four new 190°F ± 10°F heat detectors. These detectors should be installed as indicated on Drawing 7B1-3. All heat detectors should serve to actuate the CO₂ system. By doing this, the average area per detector will be 289 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

FIRE ZONE 7B4 - UNIT 1, HPCS DIESEL DAY TANK ROOM

Fire Zone 7B4 is the Unit 1, HPCS Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard pendent sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 83 square feet with the deflector located 7 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 7B5- UNIT 1, DIVISION 2, DIESEL DAY TANK ROOM

Fire Zone 7B5 is the Unit 1, Division 2, Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 63 square feet with the deflector located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 7B6- UNIT 1, DIVISION 1, DIESEL DAY TANK ROOM

Fire Zone 7B6 is the Unit 1, Division 1, Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 67 square feet with the deflector located 6 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system.

The south sprinkler over the tank is located in a pocket between two beams and as such will have its discharge obstructed. It should be relocated so that the water will effectively reach the tank. It is recommended that the existing upright sprinkler be replaced with a standard pendent sprinkler.

FIRE ZONE 7C1 - UNIT 1, HPCS DIESEL FUEL TANK ROOM

Fire Zone 7C1 is the Unit 1, HPCS Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 12 sprinklers installed. This yields an average area per sprinkler of 83 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers, rated at 220°F, and the deflectors are located 9 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 7C2 - UNIT 1, DIVISION 2, DIESEL FUEL TANK ROOM

Fire Zone 7C2 is the Unit 1, Division 2, Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 13 sprinklers installed. This yields an average area per sprinkler of 78 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers, rated at 220°F, and the deflectors are located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 7C3 - UNIT 1, DIVISION 1, DIESEL FUEL TANK ROOM

Fire Zone 7C3 is the Unit 1, Division 1, Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 13 sprinklers installed. This yields an average area per sprinkler of 74 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers, rated at 220°F, and the deflectors are located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 8B1 - UNIT 2, HPCS DIESEL GENERATOR ROOM

Fire Zone 8B1 is the Unit 2, HPCS Diesel Generator Room. An automatic total flooding CO₂ system is provided for the zone. Actuation of the CO₂ via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F ± 10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 21 feet, 11 inches above the floor (3 feet, 1 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors be located at the bottom of alternate W27 beams on the east side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip. On the west side of the north/south beam, the ceiling height is lower. Due to the reduced ceiling height, two detectors should be installed in this area.

This design would require a total of 5 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of three new 190°F ± 10°F heat detectors. These detectors should be installed as indicated on Drawing 8B1-2. All heat detectors should serve to actuate the CO₂ system. By doing this, the average area per detector will be 374 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

FIRE ZONE 8B2 - UNIT 2, DIVISION 2, STANDBY DIESEL GENERATOR ROOM

Fire Zone 8B2 is the Unit 2, Division 2, Standby Diesel Generator Room. An automatic total flooding CO₂ system is provided for the zone. Actuation of the CO₂ via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F ± 10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 22 feet, 2 inches above the floor (2 feet, 10 inches below the ceiling).

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. Detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, due to the potential for activation by a heat buildup in the bays while the generator is running (e.g., a maintenance run), it is recommended that detectors, for the most part, be located at the bottom of alternate deep beams on each side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip.

This design would require a total of 6 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of four new detectors. These detectors should be installed as indicated on Drawing 8B1-2. All heat detectors should serve to actuate the CO₂ system. By doing this, the average area per detector will be 334 square feet, which is within NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

FIRE ZONE 8B3 - UNIT 2, HPCS DIESEL DAY TANK ROOM

Fire Zone 8B3 is the Unit 2 HPCS Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 83 square feet with the deflector located 4 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 8B4 - UNIT 2, DIVISION 2, DIESEL DAY TANK ROOM

Fire Zone 8B4 is the Unit 2, Division 2, Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard pendent sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 78 square feet with the deflector located 14 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 8C1 - UNIT 2, HPCS DIESEL FUEL TANK ROOM

Fire Zone 8C1 is the Unit 2, HPCS Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 13 sprinklers installed. This yields an average area per sprinkler of 77 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F and the deflectors are located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

FIRE ZONE 8C2 - UNIT 2, DIVISION 2, DIESEL FUEL TANK ROOM

Fire Zone 8C2 is the Unit 2, Division 2, Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 15 sprinklers installed. This yields an average area per sprinkler of 77 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F and the deflectors are located 8 inches below the ceiling.

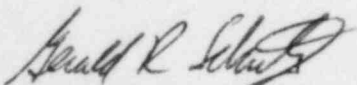
An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

SUMMARY

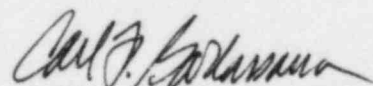
Fire Zones 7B1, 7B2, 7B3, 8B1 and 8B2 are currently provided with a spot detection system for the diesel generator. The detection system will sense a fire in the vicinity of the diesel generator, which is the most likely source of fire. Although the response time will not be as rapid as that contemplated by NFPA 72E, the detectors will eventually detect a fire and, as such, no compensatory measures are required. The new system will be a total area detection system and will provide faster response time.

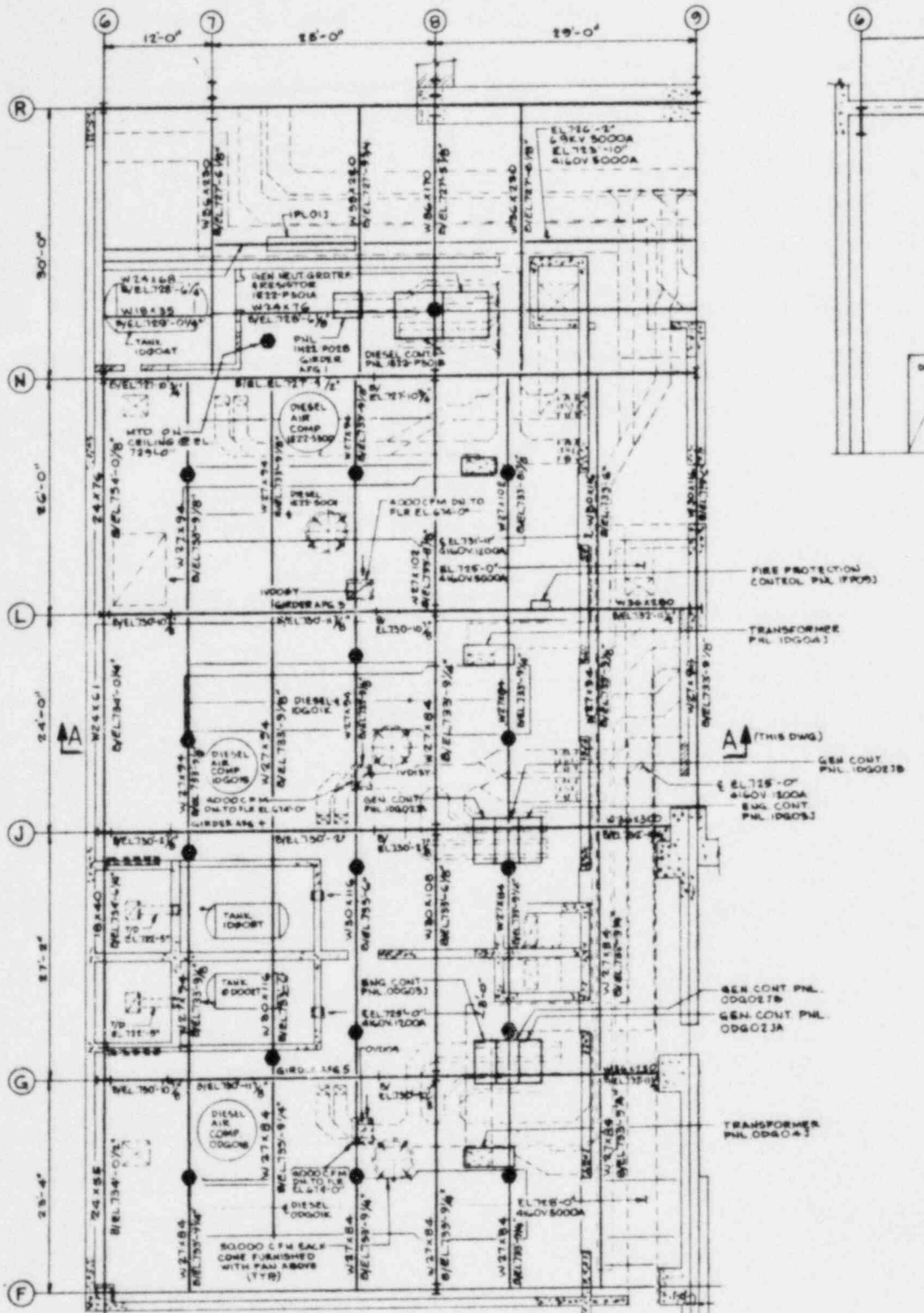
With the exception of the one sprinkler in Fire Zone 7B6, the existing sprinkler installation in Fire Zones 7B5, 7B6, 7C1, 7C2, 7C3, 8B3, 8B4, 8C1 and 8C2 meets the requirements of NFPA 13, Installation of Automatic Sprinklers. Other than the changing of the sprinkler, no corrective action is required.

PREPARED BY:

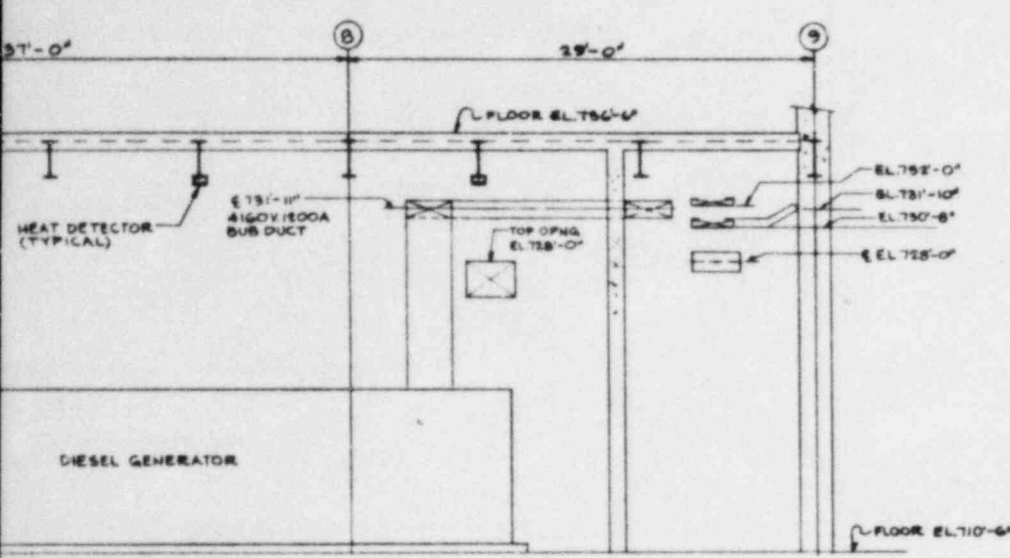

Gerald R. Schultz, P.E.

REVIEWED BY:


Carl F. Baldassarra, P.E.
Engineering Manager



UNIT-1
DIESEL GENERATOR ROOM
PLAN EL.710'-6"
FIRE ZONE 7B1-3



TI
APERTURE
CARD

SYMBOL

● = HEAT DETECTOR

NOTE: UNLESS INDICATED OTHERWISE ALL HEAT DETECTORS MOUNTED ON THE BOTTOM OF THE BEAM.

REFERENCES

- IE-1-3150 & IE-1-3155 CABLE TRAYS AUX BLDG EL. 710'-6"
- IE-1-3433 & IE-1-3450 ELECT. INSTALL. AUX BLDG EL. 710'-6"
- M-13971 & 94 AUX BLDG EL. 710'-6"
- A-276 1275 AUX BLDG GROUND FLOOR PLAN EL. 710'-6"
- S-570 & 572 AUX BLDG PRMG. PLAN EL. 750' & 756'-6"

Also Available On
Aperture Card

DRAWING RELEASE RECORD		DRAWN	CHECKED	ENGR. APPROVAL
REV.	DATE	DESCRIPTION		

HEAT DETECTOR LOCATIONS UNIT 1 DIESEL GENERATOR ROOMS

LA SALLE COUNTY STATION UNIT 1
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS

SCALE 3/16"=1'-0"

DRAWN _____

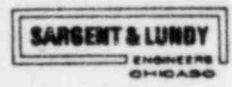
CHECKED _____

ENGINEER _____

APPROVED _____

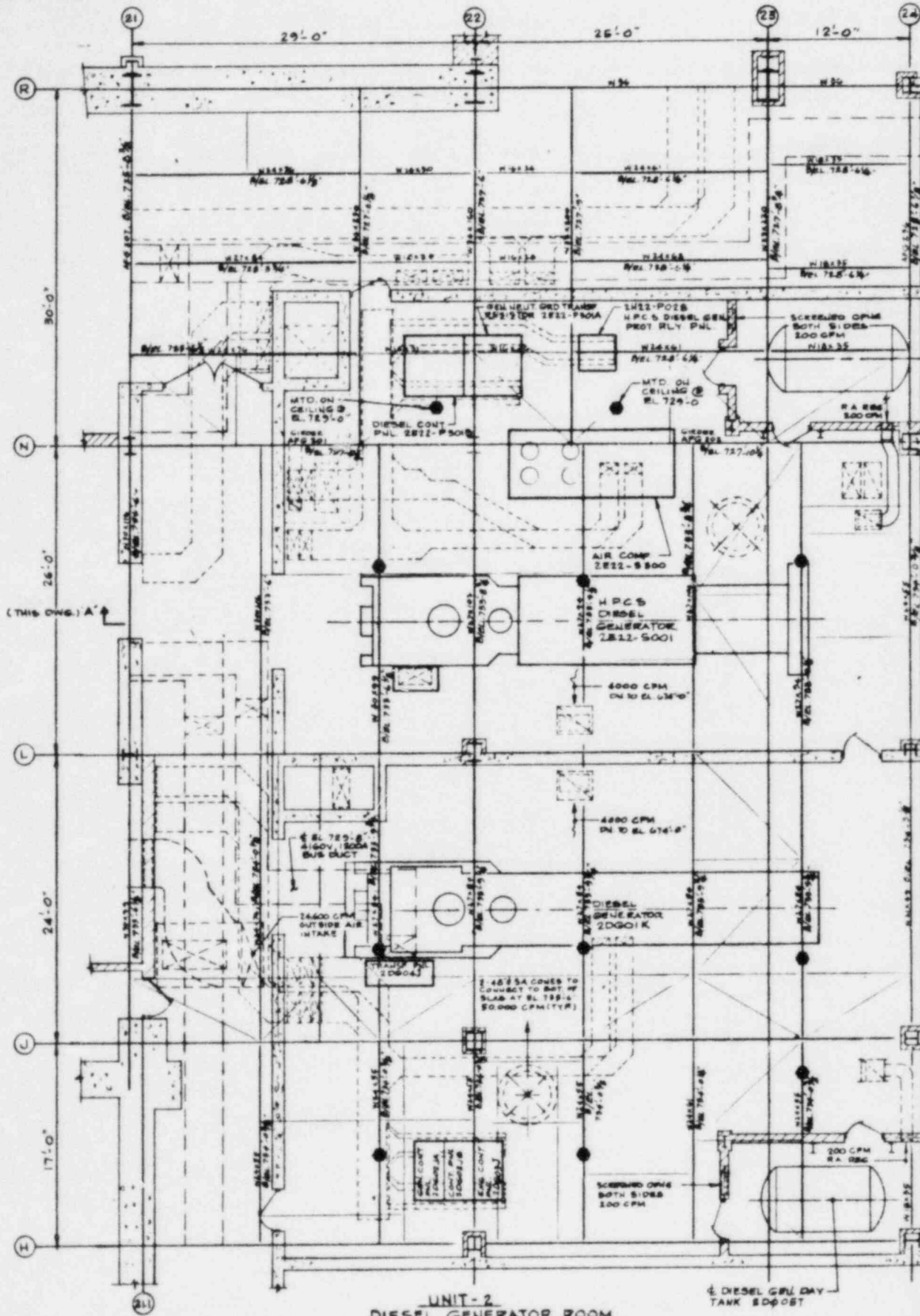
JOB NO. _____

4766

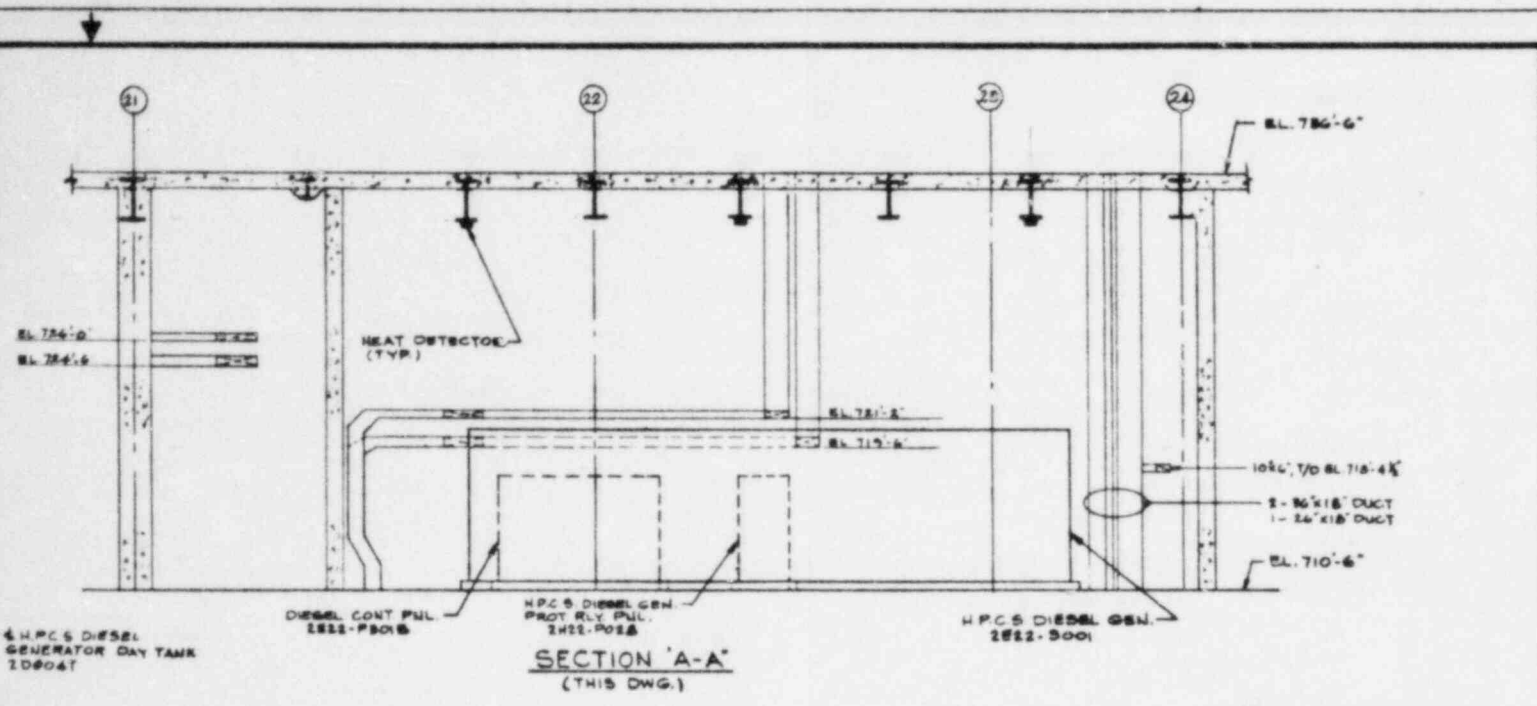


DRAWING NO.
781-3

8B-1-2



UNIT-2
 DIESEL GENERATOR ROOM
 PLAN EL. 710'-6"
 FIRE ZONE 8B1-2



TI
APERTURE
CARD

● - SYMBOL
HEAT DETECTOR

NOTE: UNLESS INDICATED OTHERWISE
ALL HEAT DETECTORS MOUNTED
ON THE BOTTOM OF THE BEAM.

REFERENCE DRAWINGS	
1E-2-5150	CABLE PANS AUX. BLDG. PLAN EL. 710'-6"
1E-2-5185	CABLE PANS AUX. BLDG. PLAN EL. 710'-6"
1E-2-5450	ELECT. INSTALL. AUX. BLDG. PLAN EL. 710'-6"
1E-2-5455	ELECT. INSTALL. AUX. BLDG. PLAN EL. 710'-6"
1E-2-5650	NON-SEG. PHASE BUS DUCT AUX. BLDG. PLAN EL. 710'-6"
1E-2-5655	NON-SEG. PHASE BUS DUCT AUX. BLDG. PLAN EL. 710'-6"
A-250	DIESEL GENERATOR RM. GED. FLOOR PLAN.
S-1069	DIESEL GENERATOR RM. FLOOR FRAMING PLAN EL. 750'-6"
S-1072	AUX. BLDG. FLOOR FRAMING PLAN EL. 781'-0"
M-1956	DIESEL GENERATOR RM. VENT. SYSTEM PLAN EL. 710'-6"

Also Available On
Aperture Card

DRAWING RELEASE RECORD			DRAWN	
REV.	DATE	DESCRIPTION	CHECKED	ENGR. APPROVAL

HEAT DETECTOR LOCATIONS UNIT 2 DIESEL GENERATOR ROOMS	
LA SALLE COUNTY STATION UNIT 2 COMMONWEALTH EDISON CO. CHICAGO, ILLINOIS	
SCALE $\frac{3/8" = 1'-0"$	SARGENT & LUNDY ENGINEERS CHICAGO
DRAWN _____	
CHECKED _____	DRAWING NO.
ENGINEER _____	851-2
APPROVED _____	
JOB NO. _____	
4267	

8406050197-02

Schirmer

SCHIRMER ENGINEERING CORPORATION

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