AEP

AMERICAN ELECTRIC POWER

Date May 20, 1988

Subject Cook Nuclear Plant
NFPA Code Compliance
Impell Contract C-6945

BJG JDG

From B.J. Gerwe/J.D. Grier

To A.B. Auvil (Copy #2)
P.H. Jacques - Bridgman (Copy #3)

Attached is your copy of Impell's final NFPA Code Compliance Report performed under Contract C-6945. Please advise if you have any comments on the report.

Copy #2 - 5 volumes, including: Technical Report, applicable NFPA Standards and Code Compliance Verification Checklists

Copy #3 - 1 volume, Technical Report

Receipt of this report completes audit preparation task B.13A.

BJG/gf

Attachment

cc: S.H. Steinhart/P.G. Schoepf (MED 88 0020 03)
J.A. Kobyra/J.D. Grier/B.J. Gerwe
File: Appendix R Audit Preparation
Contract C-6945

IMPELL CORPORATION

May 18, 1988
0120-108-021

American Electric Power Service Corporation
One Riverside Plaza
Columbus, OH 43216-6631

ATTENTION: Mr. James A. Kobyra, P.E.
Manager - Piping, HVAC, and Fire Protection Section

SUBJECT: D. C. Cook Plant NFPA Code Compliance Evaluation
Impell Report #09-0120-0123 Rev. 0
"NFPA Code Compliance Evaluation"
Indiana Michigan Electric Company - Contract C-6945
Impell Job No. 0120-108

Dear Mr. Kobyra:

Please find enclosed the subject report. Per your request, four separate copies of the main section and two separate copies of the appendices have been provided.

System maintenance recommendations and recommendations for AEP resolution of outstanding code open items/deviations will be provided in separate letters by May 31, 1988.

Should you have any questions about the report, please call Dave Kipley or me.

Very truly yours,

Gary A. Weber

Gary A. Weber, P.E.
Project Manager

GAW:br

Enclosure

IMPELL CORPORATION

REPORT APPROVAL COVERSHEET

Report Title: NFPA CODE COMPLIANCE EVALUATION

Report Number: 09-0120-0123 **Revision:** 0

Client: AEPSC **Job Number:** 0120-108

Project: INDIANA MICHIGAN POWER COMPANY - D. C. COOK NUCLEAR PLANT

RECORD OF REVISION

REVISION	DATE	PREPARED	REVEWED	APPROVED
0	5/16/88	[signature]	David Hoover	E.A. Kaiser

NFPA CODE COMPLIANCE EVALUATION
DONALD C. COOK NUCLEAR PLANT

PREPARED FOR:

AMERICAN ELECTRIC POWER SERVICE CORPORATION
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INDIANA MICHIGAN POWER COMPANY
FORT WAYNE, INDIANA 46801

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IMPELL JOB NO. 0120-108

IMPELL REPORT NO. 09-0120-0123

REVISION 0

MAY, 1988

TABLE OF CONTENTS

TABLE OF CONTENTS
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TABLE OF CONTENTS
(Continued)

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LIST OF TABLES AND FIGURES

RECORD OF REVISIONS

Revision	Page	Description of Revision
A	--	Issued For Comment
0	--	Original Issue

1.0 EXECUTIVE SUMMARY

1.1 Project Overview

This report documents the methodology, assumptions and results for the NFPA code compliance evaluation of the fire protection systems in the Auxiliary Building, the Auxiliary Feedwater Pump rooms in the Turbine Building, the Essential Service Water Pump rooms in the Screen House and the Unit 1 and Unit 2 Control Rooms at the Donald C. Cook Nuclear Plant. The fire protection systems in these areas were evaluated against the following NFPA codes: 10, 12, 12A, 13, 14, 15, 72D and 72E.

1.2 Conclusions

The evaluation concluded that the fire protection systems in these areas of the Donald C. Cook Power Plant are generally in compliance with the NFPA codes reviewed. The systems were evaluated against the code requirements for each NFPA code edition to determine compliance, noncompliance, and open items, as shown in Appendix B1 through B8 of this report. Noncompliance and open items identified for each code edition are identified in Sections 3.1 through 3.8 of this report. Deviations were reevaluated to determine whether each item could be deemed acceptable "as installed" based upon credited plant procedures or past practices at the station. Deviations and open items which could not be justified are identified below, by specific code:

NFPA 10 - Portable Fire Extinguishers

1. Several areas have Class A combustibles without having extinguishers suitable for these Class A hazards.

2. Many locations exceed the maximum travel distances from the area to an extinguisher.

3. The fire facilities drawings which identify the location of fire extinguishers do not depict the actual installed conditions.

NFPA 12 - Carbon Dioxide Extinguishing Systems

1. Potential for personnel safety hazards associated with leakage of CO_2 from inside the protected space exists at some pilot cabinet locations.

2. No documentation was available to verify that the liquid level gage on the tank is checked at least annually for accuracy.

3. Vent lines from the electro-pneumatic cabinets are disconnected which may cause excessive quantities of CO_2 to be discharged into the tank room.

4. No hydraulic calculations or test data was available for the control room cable vault systems utilizing the new Halon/Co_2 nozzles to verify their acceptability.

5. The manual pull stations could not be verified to have a pull of less than 40 lbs. nor movement less than 14 inches.

6. No documentation was found to verify the hydrostatic test pressures or the equivalent lengths of the valves used in the system.

NFPA 12A - Halon 1301 Fire Extinguishing Systems

1. Results of the original concentration tests in the computer rooms were unsatisfactory indicating that insufficient quantity of Halon is provided or inadequate sealing of the rooms exists.

2. Manual operation of the extended discharge cylinders, in the absence of electricity, could not be verified.

3. A system nameplate for each protected area was not provided.

NFPA 13 - Installation of Sprinkler Systems

1. Documentation to show the water supply graphs with the hydraulic calculations was not provided.

2. Unlisted valves and waterflow indicator switches are provided on the sprinkler risers.

3. Improper procedures were used when performing hydraulic calculations on the sprinkler systems. An outside hose demand was not added into calculation.

4. Sprinkler spray patterns in several areas were obstructed.

5. The hydraulic design data is not provided on the sprinkler drawings.

6. Various sprinklers under ductwork are not provided with mechanical guards.

7. Sprinklers are improperly spaced in Contractors' Access Area.

8. Sprinklers are not provided as required under all ducts.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

9. Sprinklers which are 12 inches apart are not provided with baffles, as required.

10. Documentation to verify the water tight capabilities of the floor was not available for review.

11. Due to the lack of accessibility and documentation, it could not be verified that all sprinklers are free of paint and ornamental finishes.

12. The control room cable vault's sprinkler riser retard chamber may discharge onto the floor which contains numerous unsealed penetrations.

NFPA 14 - Installation of Standpipe and Hose Systems

1. Hydraulic calculations are not available to verify that flow and pressure requirements are met for Class II and III standpipe systems.

2. Hose lengths specified by the code cannot reach all areas.

3. A pressure gage is not installed at the top of each standpipe.

4. The valve in the main standpipe supply connection from Turbine Building is not approved for fire service use and is improperly located.

5. Pipe and fittings are not included in Table of Acceptable Materials and are only listed for ambient pressure of 150 psi instead of 175 psi required by code.

6. Hangers to securely restrain piping are inadequate.

7. Waterflow alarms on the standpipe system are not provided.

NFPA 15 - Water Spray Fixed Systems

1. Discharge patterns from nozzles protecting charcoal filters are obstructed.

2. Documentation showing working drawings, specifications, and testing results for all the systems was not available for review.

3. One charcoal filter spray system contains piping with an inadequate support.

4. Hydraulic calculations to verify the adequacy of the systems protecting the charcoal filter units was not available for review.

5. One filter has improperly sized pipe.

6. No pressure gages are installed on the water spray systems.

NFPA 72D - Installation, Maintenance and Use of Proprietary Protective Signaling Systems

1. Unapproved equipment is used in the installation.

2. Surveillance tests do not verify receipt or resetting of alarm and supervisory signals, in control room, from sprinkler systems, fire pumps and manual hose stations.

3. Protection of manual alarm stations and detection devices to prevent accidental operation is not provided.

4. Power cables between the ACI A924 panels and the power panel are undersized.

5. Class B electrical supervision for the alarm initiating circuits from the "EF" panels is not provided.

6. Waterflow alarm devices for the Auxiliary Building hose standpipe system controlled by valves ZMO-10 and ZMO-20 are not provided.

7. Detectors are inaccessible for maintenance and testing due to equipment obstructions.

8. Indication by the "EF" panels for trouble conditions is not provided.

9. Procedures do not require that the appropriate individuals be informed of alarm system impairments.

10. Data is not available to confirm fault and overcurrent compliance for the cables used.

NFPA 72E - Automatic Fire Detectors

1. Several detectors are exposed to mechanical damage.

2. The placement of detectors with respect to equipment, beam construction, and below ceilings in many areas is improper.

3. The field of vision for the infrared detectors is obstructed by conduit/cable trays, other equipment or structure in many areas.

4. Many detectors were found obstructed or misaligned.

5. Surveillance testing is not in accordance with the code.

6. Improper spacing of detectors was found in several areas.

7. A smoke detector is placed too close to air supply diffusers.

Specific details, including the actual code sections, describing these deviations and open items are presented in Sections 3.1 through 3.8 of this report. These sections also provide the justifications presented for the deviations and open items.

2.0 INTRODUCTION

Impell Corporation was contracted by American Electric Power Service Corporation, Indiana-Michigan Power Company, under Contract No. C-6945, to perform an NFPA code compliance evaluation of the fire protection systems in selected areas of the D.C. Cook Nuclear Plant.

D.C. Cook in their January 31, 1977 Response to Appendix A to BTP APCSB 9.5-1 stated that: "All fire suppression systems have been designed and installed in accordance with the applicable NFPA Codes as follows: 12, 12A, 13, 14, 15 and 17." This document also states, in Section E, Fire Detection and Suppression, that: "Fire detection systems at the Cook Plant conform to the applicable portions of NFPA 72D except for the testing frequency specified in Paragraph 1232."

Although D.C. Cook did not commit to NFPA 10 and 72E, Impell was requested by AEP to include these codes as part of the review.

2.1 Scope of Work

Impell's scope of work was to determine the compliance, or noncompliance, of the fire protection systems installed in the selected areas to the specific NFPA code requirements (edition years identified by the utility) which were in effect at the time the fire protection systems were designed and/or installed.

The areas of the plant, that were reviewed, included:

- The Auxiliary Building
- The Auxiliary Feedwater Pump Rooms in the Turbine Building
- The Essential Service Water Pump Rooms in the Screen House
- The Unit 1 and Unit 2 Control Rooms

The NFPA Codes used for the evaluation included:

10	-	Portable Fire Extinguishers; 1970 and 1984 Editions
12	-	Carbon Dioxide Extinguishing Systems; 1968 Edition
12A	-	Halon 1301 Fire Extinguishing Systems; 1977 Edition
13	-	Installation of Sprinkler Systems; 1971 and 1983 Editions
14	-	Installation of Standpipe and Hose Systems; 1971, 1978, 1980 and 1986 Editions
15	-	Water Spray Fixed Systems; 1973 Edition
72D	-	Installation, Maintenance and Use of Proprietary Protective Signaling Systems; 1967 and 1979 Editions
72E	-	Automatic Fire Detectors; 1974, 1978, 1982 and 1984 Editions

2.2 Methodology

Impell conducted the code compliance evaluations in two phases. Phase I identified the fire areas/zones containing safety-related/safe shutdown equipment and also selected the relevant code sections governing the functional aspects of the fire protection systems in these areas. The Phase II portion of the work consisted of the actual code verification effort.

The identification of the fire areas/zones in the Phase I task was accomplished by reviewing the D.C. Cook Plant's Fire Hazards Analysis which described the fire areas/zones containing safety-related/safe shutdown equipment. Each of the identified NFPA codes were reviewed in depth to determine which sections specifically addressed the ability of the system to operate. Code sections covering topics, such as: information only, references to other NFPA codes, construction or equipment arrangement and nonrelevant types of occupancies were not included in the evaluations as these subjects do not affect the ability of the systems to function.

Each of the codes and their respective sections were developed into a matrix, entitled Code Compliance Verification Checklist (CCVC) and shown in Appendix B1 through B8 in this report. This matrix identifies each code section to be verified, the verification method to be used (walkdown, document search or both) and a summary of the results of the evaluation.

To facilitate the verification process, two additional matrices were developed, a Walkdown Verification Checklist (WVC) and a Document Verification Checklist (DVC). These checklists list the applicable code sections; whether the installed systems did/did not comply or if the code sections were not applicable to the installed system; and comments for each noncomplying/not applicable section. The DVC had an additional column to identify the documents reviewed for verification of the specific code sections.

In Phase II, walkdowns were conducted to verify each of the code sections. The walkdowns were conducted by four teams of two engineers each. Each team was assigned two of the eight codes to be verified. This effort was conducted at the D.C. Cook Plant during the period of November 9 through December 1, 1987.

Upon completion of the walkdowns the teams returned to their respective home offices to complete the document search portion of the code verification process.

2.3 General Assumptions

This report utilized the following general assumptions shown below and the additional assumptions identified in Sections 3.1 through 3.8 of this report.

1. All drawings, procedures, design specifications and other documentation provided to Impell for use on this project are the latest revision, most current, available.

2. Specifications and drawings were used to evaluate the piping, fittings and miscellaneous hardware used in the fire protection systems to confirm compliance with the requirements of the appropriate NFPA codes in effect at the time of installation.

3. Workmanship and construction practices during installation of the systems complied with the code requirements in effect at the time.

4. Engineering evaluations to provide justifications for the partial detection/suppression coverages are outside the scope of this contract.

5. It is assumed that all Surveillance Tests and Procedures are properly implemented.

3.0 CODE COMPLIANCE EVALUATIONS

This section provides a detailed review of each specific NFPA code evaluated. This review includes: the scope of work for each evaluation, what assumptions were made, and a table listing the deviations/open items from the specific code sections and the recommendations/justifications for each deviation or open item.

3.1 NFPA 10 - Portable Fire Extinguishers

3.1.1 Scope of Evaluation

The evaluation of the portable fire extinguisher system was reviewed under the 1984 edition of the code. Although the system was installed under different edition years from 1970 to 1984, the difference in the edition requirements were minimal and the 1984 edition year was deemed to be more applicable to the installed system.

The evaluation of the portable fire extinguisher system verified the following features:

1. Proper types of fire extinguishers have been provided based upon the characteristics of the anticipated fires.
2. Fire extinguishers have been properly distributed throughout the plant.
3. Procedures for the Inspection, Maintenance and Recharging of fire extinguishers are satisfactory.

3.1.2 Assumptions

The following assumption has been made for the evaluation of NFPA 10.

1. Service activities performed on the fire extinguisher by all outside service companies are performed in accordance with the appropriate sections of the code.

3.1.3 Deviations and Recommendations/Justifications

In several areas of the plant it has been recognized that Class A extinguishers are not provided for the protection of Class A combustibles. In many of these instances, the FHA has taken credit for the NFPA 10 code section that permits small hose stations, for use by building occupants, to be used as a replacement for every other extinguisher required for Class A protection.

As brought out in Section 3.5 of this report, the hose stations that are provided in this plant for use by "trained individuals only" and, as such, cannot be used to offset the requirement for Class A extinguishers.

The portable fire extinguisher system at the plant is in compliance with NFPA 10 except as identified by the open items and deviations in Table 3.1-1. The table also provides recommendations/justifications for these items.

3.1.4 References

Ref. No.	Document Number	Title	Revision No./Date
3.1.4.1		Walkdown Verification Checklists	
1	0120-108-001A	Deficiency Matrix	0 12/10/87
2	0120-108-001B	Walkdown Verification Checklist	0 12/10/87
3	0120-108-001C	Walkdown Verification Checklist	0 12/10/87
4	0120-108-001D	Walkdown Verification Checklist	0 12/10/87
5	0120-108-001E	Walkdown Verification Checklist	0 12/10/87
6	0120-108-001F	Walkdown Verification Checklist	0 12/10/87
7	0120-108-001G	Walkdown Verification Checklist	0 12/10/87
3.1.4.2		Procedures	
1	12QHP2270 Fire.001	Portable Fire Extinguisher Inspections	9 09/21/87
2	PMI-2270	Fire Protection	16 07/09/87
3.1.4.3		Technical Data	
1	January 1985	Underwriter's Laboratories Fire Protection Equipment Directory	- 12/31/84
2	ROC dated from A. Hall to Don Elston, Ansul Co.	New Fire Extinguishers	- 01/11/88
3	NFPA 22, 1984 Edition Fig. 10-1.4	Water Tanks Isothermal Lines-Lowest One-Day Mean Temperatures	- 07/05/84
4	FP-STD-101	Approved List of Fire Protection Equipment	0 01/15/82
5	UL 711	UL Standard for Safety, Fire Extinguishers, Rating and Fire Testing of	3rd ed. 10/22/79

.1.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
6	UL 154	UL Standard for Safety, Carbon Dioxide Fire Extinguishers	6th ed. 03/08/84
7	UL 299	UL Standard for Safety, Dry Chemical Fire Extinguishers	6th ed. 10/77
8	Form No. F-76176-4	Ansul Dry Chemical Extinguisher Data Sheet	- 1978
9	Page 47	Fire End E - Series CO^2 Fire Extinguisher Data Catalog	- -
10	ROC dated 12/03/87 B. Gerwe from D. Kipley	Ambient Plant Conditions	- 12/03/87
11	ROC dated 04/25/88 P. Jaques from D. Kipley	Extinguisher Service Agreement	- 04/25/88
3.1.4.4		Licensing Documents	
1	Docket #50-315 & 316 DPR 58 & 74	Fire Hazards Analysis D.C. Cook Units 1 & 2	1 01/30/87
3.1.4.5		Drawings	
1	12-5266	Fire Facilities Plan Below Basement - El. 573'	2 08/17/87
2	12-5267	Fire Facilities Plan Basement El. 591'-0" & 587'-0"	3 08/17/87
3	12-5268	Fire Facilities Plan Mezzanine Floor El. 609'	2 08/17/87
4	12-5268A	Fire Facilities Plan Cable Vaults El. 620'-6" & 625-10"	2 08/17/87
5	12-5269	Fire Facilities Plan Main Floor El. 633'-0"	2 08/17/87
6	12-5270	Fire Facilities Reactor Building El. 650'-0"	2 08/17/87

TABLE 3.1-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 10 - Portable Fire Extinguishers

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3-1.2 3-1.2.2	1984	Deviation: Several fire zones in building have Class A occupancies and are not provided with extinguishers suitable for Class A hazards. These zones are:	AEP to provide justification.

ZONE	ELEV	ZONE	ELEV
112	573'	40A	609'
113	573'	40B	609'
29G	573'	41	609'
22	591&587'	42A	609'
12	591&587'	42B	609'
*111	591&587'	42C	609'
18	591&587'	42D	609'
19	591&587'	45	609'
20	591&587'	46A	609'
21	591&587'	46B	609'
13	591&587'	46C	609'
14	591&587'	46D	609'
15	591&587'	47A	609'
*110	591&587'	47B	609'
64A	591&587'	*108	633'
64B	591&587'	109	633'
6N	591&587'	* 53	633'
17A-17G	591&587'	* 54	633'
29A-29F	591&587'	* 70	650'
		* 71	650'
		* 72	650'
		* 73	650'

* These fire zones have been identified in the fire hazards analysis as needing improvement in the form of additional ABC extinguishers.

TABLE 3.1-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 10 - Portable Fire Extinguishers

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3-2.1 3-3.1 3-3.3	1984	Deviation: Several fire zones have areas which are not within 75 feet of a Class A extinguisher or 50 feet of a Class B extinguisher.	AEP to provide justification.
4-3.2	1984	Deviation: The extinguisher locations are not properly identified on the fire facility drawings and procedure.	AEP to provide justification.
4-3.4.2 4-4.3	1984	Deviation: The date of inspection and the initials of the inspector are not recorded.	Justification: Fire extinguishers inspections are only performed by the safety and assessment department. All extinguishers have tags which indicate the month the inspection was performed by a hole being punched in the card. This satisfies the intent of the code requirement.
1-6.2	1984	Deviation: Several extinguishers are not located in their designated locations as shown on the fire facilities drawings.	AEP to provide justification.

3.2 NFPA 12 - Carbon Dioxide Extinguishing Systems

3.2.1 Scope of Evaluation

This analysis evaluates the automatic carbon dioxide fire suppression systems installed in the following fire area/zones to the requirements of NFPA 12. The 1968 edition of NFPA 12 was the edition under which the systems were installed and evaluated.

Fire Area	Fire Zone	Unit	Description
F	7	1	Quadrant 1 Cable Tunnel
G	8	1	Quadrant 4 Cable Tunnel
H	9	1	Quadrant 3N Cable Tunnel
H	10	1	Quadrant 3M Cable Tunnel
I	11	1	Quadrant 3S Cable Tunnel
K	13	1	Diesel Oil Pump Room
M	15	1	1 CD Diesel Generator Room
N	16	1	1 AB Diesel Generator Room
V	18	2	2 CD Diesel Generator Room
W	19	2	2 AB Diesel Generator Room
Y	21	2	Diesel Oil Pump Room
AA	23	2	Quadrant 3N Cable Tunnel
BB	24	2	Quadrant 3M Cable Tunnel
BB	25	2	Quadrant 3S Cable Tunnel
CC	26	2	Quadrant 4 Cable Tunnel
DD	27	2	Quadrant 1 Cable Tunnel
II	38	1	Quadrant 2 Penetration Cable Tunnel
JJ	39	1	Quadrant 2 Penetration Cable Tunnel
KK	40A	1	4kv AB Switchgear Room
KK	40B	1	4kv CD Switchgear Room
LL	41	1	Eng. Safety Syst. & MCC Room
MM	42A	1	EPS Transformer Room
MM	42B	1	EPS Control Rod Drive Room
MM	42C	1	EPS Motor Control Room
NN	45	2	Eng. Safety Syst. & MCC Room
OO	46A	2	EPS Transformer Room
OO	46B	2	EPS Control Rod Drive Room
OO	46C	2	EPS Motor Control Room
PP	47A	2	4kv AB Switchgear Room
PP	47B	2	4kv CD Switchgear Room
SS	55	1	Switchgear Room Cable Vault
TT	56	1	Auxiliary Cable Vault
UU	57	1	Control Room Cable Vault
VV	58	2	Control Room Cable Vault

Fire Area	Fire Zone	Unit	Description
WW	59	2	Auxiliary Cable Vault
XX	60	2	Switchgear Room Cable Vault
BBB	71	1	Unit 1 Computer Room
BBB	72	2	Unit 2 Computer Room

Chapter 4 of this code applies to hand hose line systems. Twenty one hand hose lines are installed in the area/zones evaluated to the requirements of this code. The reels are located as follows:

Fire Area	Fire Zone	Description	HR No.
A	1	North wall of East/West corridor	12-ZCH-1
E	5	On wall beside Waste Evap. Condensate Tanks	12-ZCH-2
E	5	On wall across from the freight elevator	12-ZCH-3
E	6N	On North wall by MCC	12-ZCH-7
E	6S	On East wall by MCC's	12-ZCH-4
B	79	On North wall of corridor between DG's	12-ZCH-6
B	85	On South wall of corridor between DG's	12-ZCH-5
C	32	Behind elevator across from roll-up door	12-ZCH-21
HH	44N	On North wall of corridor across from stair	12-ZCH-8
HH	44N	On East wall by ramp	12-ZCH-12
HH	44S	On East wall by ramp	12-ZCH-9
LL	41	On East wall by MCC's	12-ZCH-18
NN	45	On East wall by MCC's	12-ZCH-15
B	90	On East wall - outside 4kv	12-ZCH-11
B	96	On East wall - outside 4kv	12-ZCH-10
C	52	On East wall by ltg. cabinet	12-ZCH-19
C	51	On West wall by elevator	12-ZCH-13
C	52	On East wall by MCC	12-ZCH-14
B	129	Outside door of U1CR	12-ZCH-17
B	130	Outside door of U2CR	12-ZCH-16
C	69	On wall by stairs	12-ZCH-20

Some code sections were not applicable, and therefore were not evaluated. These code sections specifically provide requirements for the following:

1. CO_2 systems protecting flammable/combustible materials such as chemicals containing their own source of oxygen, reactive chemicals, etc.

2. Packaged (pre-engineered) systems.

3. Systems (and systems components) for high pressure CO_2 protection.

4. Fixed, local application systems.

5. Systems designed for protection of process and storage tanks or combustible dust areas.

6. Areas where free-flow of the agent occurs.

7. Ventilation systems which do not shutdown (or close).

8. Systems for enclosed electrical equipment with run-down times.

9. Hazard whose ambient temperatures are below 0°F or above 200°F.

3.2.2 Assumptions

The following assumptions have been made in the evaluation of NFPA 12.

1. Vendor documents describing listing/approval of system components are accurate.

2. The material/grade of pipe and fittings specified was used in the system installation.

3. Documents reviewed are the latest available revisions and reflect "as-built" conditions of the plant.

4. In addition to American Electric Power Service Corporation, the authority having jurisdiction for Unit 1 is NELPIA and for Unit 2 is IRI.

3.2.3 Deviations and Recommendations/Justifications

The carbon dioxide fire suppression systems evaluated meet the requirements of NFPA 12 except as identified by the open items and deviations in Table 3.2-1. The table also provides recommendations/justifications for these items.

3.2.4 References

Ref No.	Document Number	Title	Rev. No.	Date
3.2.4.1		Walkdown Verification Checklists		
1	0120-108-002A	Impell Calculation, NFPA 12 - Code Compliance Walkdown Verification Checklist	0	01/26/88
3.2.4.2		Procedures		
1	PMI-2270	Fire Protection	16	07/09/87
2	12-PMP-2070-TRN-108	Maintenance Skills Training Program	1	04/23/87
3	12-PMP-2070-TRN-115	Fire Brigade Training Program	2	05/09/87
4	PO-050-506-CO_2	Initial Start-Up Test Results	--	04/30/74
5	12-THP4030 STP.225.010	Control Room Cable Vault CO_2 Fire Suppression Test	1	05/29/87
6	12-THP4030 STP.225.020	Auxiliary Cable Vault CO_2 Fire Suppression Test	1	08/07/87
7	12-THP4030 STP.225.030	Reactor Cable Tunnel Quad 1 CO_2 Fire Suppression Test	1	08/07/87
8	12-THP4030 STP.225.031	Reactor Cable Tunnel Quad 2 CO_2 Fire Suppression Test	1	07/19/87
9	12-THP4030 STP.225.032	Reactor Cable Tunnel Quad 3S CO_2 Fire Suppression Test	1	09/11/87
10	12-THP4030 STP.225.033	Reactor Cable Tunnel Quad 3M CO_2 Fire Suppression Test	1	07/02/87
11	12-THP4030 STP.225.034	Reactor Cable Tunnel Quad 3N CO_2 Fire Suppression Test	1	09/11/87
12	12-THP4030 STP.225.035	Reactor Cable Tunnel Quad 4 CO_2 Fire Suppression Test	1	06/26/87
13	12-THP4030 STP.225.040	Unit 1 AB Diesels CO_2 Fire Suppression Test	1	06/12/87

3.2.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
14	12-THP4030 STP.225.041	Unit 1 CD Diesels CO_2 Fire Suppression Test	1	06/05/87
15	12-THP4030 STP.225.042	DG Oil Pump & Valve Rooms CO_2 Fire Suppression Test	1	06/05/87
16	12-THP4030 STP.225.050	4KV Switchgear Room CO_2 Fire Suppression Test	1	06/23/87
17	12-THP4030 STP.225.051	Emerg. Safety Switchgear Room CO_2 Fire Suppression Test	1	06/25/87
18	12-THP4030 STP.225.052	CRD Trans. Swgr. Room CO_2 Fire Suppression Test	1	07/02/87
19	12-THP4030 STP.225.053	Switchgear Cable Vault CO_2 Fire Suppression Test	1	09/04/87
20	12-THP6040 PER.105HR	Hose Reel Stations CO_2 Fire Suppression Test	0	04/25/86
21	12-THP6030 IMP.142	Fire Detection Instrumentation and Cardox System Surveillance Testing (6 month)	10	05/09/87
3.2.4.3		Technical Data		
1	0120-108-007	Impell Calculation, NFPA 72D Code Compliance Verification Checklist	0	05/16/88
2	0120-108-008	Impell Calculation, NFPA 72E Code Compliance Verification Checklist	0	05/16/88
3	SD-DCC-FP102	Low Pressure Carbon Dioxide Fire Fighting Systems	2	Draft
4	SD-DCC-FP103	Fire Protection Systems - Miscellaneous	3	Draft
5		Cardox Fire Extinguishing Equipment - Manual		

3.2.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
6	Specification DCC PM104QCS	Material Specification	4	11/09/72
7		Cardox Carbon Dioxide Calculations - Cardox Corporation		10/08/71 02/16/71
8	ROC from D. Kipley to B. Gerwe	Ambient Conditions of Plant		12/03/87
9		Original Fire Protection Specification	0	04/02/71
10	90871-040-7X	Purchase Order for Carbon Dioxide Replenishment		12/08/87
11	0120-108-002	Impell Calculation, NFPA 12 - Code Compliance Verification Checklist	0	04/18/88
3.2.4.4		Licensing Documents		
1	DRP No. 74	Donald C. Cook, FHA, Docket No. 50-316	1	01/30/87
3.2.4.5		Drawings		
1	FL-15771	Cardox Corporation Drawings FL-15771		
1A	SHEET 1	CO_2 Tank Room	F	06/28/74
1B	SHEET 2	Auxiliary Building CO_2 Piping	E	02/10/72
1C	SHEET 3	Auxiliary Building CO_2 Piping	C	02/15/72
1D	SHEET 4	Electric Switchgear Area	G	09/28/72
1E	SHEET 5	Diesel Generator Rooms	E	09/28/72
1F	SHEET 5	Diesel Generator Rooms	F	06/28/74
1G	SHEET 6	Diesel Generator Rooms	E	06/28/76
1H	SHEET 7	Electric Switchgear Area	F	09/28/72

3.2.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
1I	SHEET 8	Reactor Cable Tunnels	C	11/10/71
1J	SHEET 9	Lube Oil Rooms, Turbine Oil Tank Rooms	D	11/10/71
1K	SHEET 10	Switchgear Cable Vault	E	02/11/72
1L	SHEET 11	Switchgear and Control Room Cable Vaults	E	09/28/72
1M	SHEET 12	Details (Bleeder Valve, Booster Pilot Valve, Hosereel, Controls Arrangement)	D	02/15/72
1N	SHEET 13	Control Room Area	D	02/15/72
1O	SHEET 14	Service Building and Record Storage	B	07/12/71
1P	SHEET 15	Service Building Second Floor	D	11/10/71
1Q	SHEET 16	Computer Rooms	B	11/10/71
1R	SHEET 16	Computer Rooms	C	09/16/82
1S	SHEET 17	7.5 Ton Storage Unit	B	04/21/72
1T	SHEET 18	17 Ton Storage Unit	B	04/21/72
1U	SHEET 19	Electrical Control Cabinet with Wired Panel	A	05/07/71
1V	SHEET 20	Control Cabinet and Panel Drilling	A	05/07/71
1W	SHEET 21	Alarm System Elementary Line	--	03/25/71
2		Flow Diagrams, Fire Protection - CO_2		
2A	OP-12-5153	17 Ton System Key Plan	0	10/02/87
2B	OP-12-5153A	Cardox Valve Details and Hose Reel Header Schematic Unit 1 & 2	0	10/02/87
2C	OP-12-5153B	Cardox Valve Details Unit 1 & 2	0	10/02/87

2.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
2D	OP-12-5153C	Reactor Cable Tunnel	0	10/02/87
2E	OP-12-5153D	Reactor Cable Tunnel	0	10/02/87
2F	OP-12-5153E	Lower 4KV Areas Unit 1	0	10/02/87
2G	OP-12-5153F	Upper 4KV (Switchgear Cable Vault) Unit 1	0	10/02/87
2H	OP-12-5153G	Lower 4KV Areas Unit 2	0	10/02/87
2I	OP-12-5153H	Upper 4KV (Switchgear Cable Vault) Unit 2	0	10/02/87
2J	OP-12-5153J	Computer Room, I&M Security & 7 & One Half Ton CO_2 Tank System Unit 1 & 2	0	10/02/87
2K	OP-12-5153K	Emergency Diesel and Fuel Oil Transfer Pump Rm. Unit 1 & 2	0	10/02/87
2L	OP-12-5153L	Control Room and Auxiliary Cable Vaults Unit 1 & 2	0	10/02/87

TABLE 3.2-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12 - CO_2 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
122	1968	Open Item: Locations of the pilot cabinets are such that except for zones 55, 56 57, 58, 59, 60, 7, 27, 38, and 39 leakage of CO_2 from the protected areas may cause the oxygen concentration to fall below acceptable limits.	AEP to provide justification.
122	1968	Deviation: The pressure vent lines from the electro-pneumatic cabinets for the 4 main header valves and zones 55 - 60 is disconnected so that excess CO_2 vents into the tank room.	AEP to provide justification.
1311 1312 1313 1314 133	1968	Open Item: Documentation to verify the authority having jurisdiction was indicated and the authorities requirements was not available for review. The requirements for testing and listing of equipment is included in this documentation. Documentation to verify that plans and calculations were approved prior to work starting was also not available for review.	Justification: The systems were under the authority of AEPSC. Plans, calculations, etc. were reviewed and approved. Additionally, acceptance tests were performed and and the systems were found to be satisfactory. Although after the fact, the approval, testing, etc. serves to meet the intent of this code requirement.
1322	1968	Deviation: The plans do not contain sufficient detail to determine the hazards in the area and the effectiveness of the system.	Justification: The FHA, schematic drawings, vendor calculations and test results provide sufficient detail to determine the area hazards and the effectiveness of the system.

TABLE 3.2-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12 - CO_2 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1331 1332	1968	Open Item: No documentation was available to verify that material changes necessitated by field conditions were approved or "as-built" drawings provided.	Justification: Walkdowns did not identify any obvious deviations from specified materials. AEPSC has also created schematic flow diagrams which accurately reflect "as-built" conditions.
134 165 254 255	1968	Open Item: No hydraulic calculations or test data were available for review for the new halon/CO_2 nozzles in the control room cable vaults.	AEP to provide justification.
1341	1968	Open Item: The documentation which details that tightness to the selector valve, etc. was verified was not available for review.	Justification: The systems are tested on a 6 month basis (detection) and 18 month basis for "puff tests". The piping tightness, leaks, etc. are verified via these tests.
1422	1968	Deviation: The NFPA 72E Code Compliance evaluation concluded that detector spacing was not adequate in several zones.	Justification: Refer to the NFPA 72E Code Compliance Summary - Code Section 2-6.5.
1423	1968	Deviation: The connections of the panels to power sources are not in compliance with NFPA 72D.	Justification: Refer to the NFPA 72D Code Compliance Summary - Code Section 2221.
1431	1968	Deviation: The ACI A909 panels are not listed by an independent testing laboratory. The Pyra-larm "EFR" and "GRC" panels are also not in compliance with NFPA 72D.	Justification: Refer to the NFPA 72D Code Compliance Summary - Code Section 2032.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12 - CO_2 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1434	1968	Deviation: The manual pull stations for zones 7 and 27 are not conveniently located and easily accessible.	Justification: Since plant procedure PMI-2270 requires the CO_2 systems to be isolated and returned to service by by security for normal entry, a guard must be called to the area prior to system actuation when a fire is discovered. This will allow sufficient time to get to the manual station.
1434	1968	Deviation: The manual pull stations for zones 56 and 57 are not conveniently located and easily accessible.	Justification: Manual actuation stations are available on the "EF" panel which is a short distance from the hazard. The short delay involved would not impact fire growth.
1435	1968	Deviation: The manual emergency operation is not located close to the automatically controlled valves for zones 56 and 57.	Justification: The actual location of the valves and manual release is not an issue since the carbon dioxide system is used as a back-up to the halon system in these two fire zones. The intent of this requirement is to ensure that the automatic valves can be observed for emergency operation. Since the system is a back-up to the halon this degree of assurance is not necessary.
1436	1968	Open Item: Documentation to verify that manual controls shall not require a pull of more than 40 lbs. nor movement of more than 14 inches was not available for review.	AEP to provide justification.
144	1968	Deviation: Remote signals from the CO_2 panels to the control room are not electrically supervised.	Justification: Refer to the NFPA 72D Code Compliance Summary - Code Sections 2411 and 2422.

TABLE 3.2-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12 - CO_2 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1623	1968	Open Item: The specifications did not specifically require that the pipe be reamed and cleaned before assembly and the entire piping was blown out prior to the nozzles being installed.	Justification: The intent of this requirement is to ensure that the pipe of nozzles are not blocked by foreign material. The systems were all tested and are tested on an 18 month basis. These tests include agent flow which assures that the piping network and nozzles are not blocked by foreign materials.
163	1968	Open Item: No documentation could be found which adequately addresses the acceptability of the in-line check valves installed to isolate the halon system from the CO_2 system in the cable vaults. This is specifically true for these valves in a carbon dioxide use.	Justification: A full discharge acceptance test was performed on the halon system. There were no problems or concerns with the check valves during performance of this test.
1632 1634	1968	Open Item: No documentation was available to verify the hydrostatic test pressure or equivalent length of the valves used in the system.	AEP to provide justification.
171	1968	Deviation: The systems evaluated were tested on an 18 month basis rather than annually.	Justification: The intent of the code is to verify system operability on a regular basis. The "puff tests" are an acceptable alternative since the systems are subject to specific procedures governing their impairment.
1712	1968	Open Item: No documentation was provided which showed that system discharge tests shall be made when inspection indicates their advisability.	Justification: The system undergoes a "puff test" on an 18 month interval. This is an acceptable time interval for system discharge testing.

TABLE 3.2-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12 - CO_2 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1716	1968	Open Item: No documentation was available to verify that the liquid level gages are checked annually.	AEP to provide justification.
1721	1968	Open Item: No documentation was provided which specifically discusses the corrections of system impairments.	Justification: The plant procedures provide for mitigating measures to be taken when systems are impaired. Also, the systems evaluated are technical specification. This indicates that their impairment is to be corrected in a timely manner.
2212 2213 2221 2441	1968	Deviation: Two reactor cable quadrants (zones 8 and 26) contain curtain dampers in the ceiling which are not closed upon system actuation. Additional gas is not provided to compensate for this leakage.	Justification: The system discharge tests indicate that since the openings are in the ceiling an acceptable level of CO_2 concentration was reached and maintained.
2212 2213 2441	1968	Deviation: Small openings are found in the walls constructed in zones 55 and 60 which permit the escape of carbon dioxide to the corridor which does not contain CO_2 discharge nozzles. Additional gas is not provided to compensate for this leakage.	Justification: A discharge test was performed for the zones. The only open item was a fan without a damper. This has been compensated for by dampers and/or fan interlocks. Therefore, the installation is acceptable.
2221 2441	1968	Deviation: Door 332 in fire zone 18 is not provided with a device to close upon system actuation. Additional gas is not provided to compensate for this leakage.	Justification: This door is not a normal path of travel and is provided with a self closer. Additionally, it is not a common practice to breach doors by barring them open in the plant. The intent of this code requirement is therefore met.

TABLE 3.2-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12 - CO_2 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
243	1968	Open Item: The method of volume determination by the vendor was not available for review for this code requirement.	Justification: System discharge tests were performed which determined the quantities of CO_2 to be acceptable.
2521	1968	Deviation: The discharge times for the zones designed for flash fire protection (zones 13, 15, 16 18, 19 and 21) are in excess of 1 minute.	Justification: This fast discharge time is designed to provide suppression prior to metal surfaces being heated. The discharge times are under 2 minutes and the concentration held for a sufficient period of time. This should prevent re-ignition of the fuels by the hot surfaces. Additionally, manual CO_2 hose reels are provided for use.

3.3 NFPA 12A-Halon Fire Suppression Systems

3.3.1 Scope of Evaluation

This analysis evaluates the automatic Halon 1301 fire suppression systems installed in the following fire area/zones to the requirements of NFPA 12A - 1977 Edition. The 1977 edition was the edition under which the systems were installed.

Fire Area	Fire Zone	Unit	Description
UU	57	1	Control Room Cable Vault and Hot Shutdown Panel Cable Area
VV	58	2	Control Room Cable Vault and Hot Shutdown Panel Cable Area
BBB	71	1	Computer Room
BBB	72	2	Computer Room

Some code sections were not applicable, and therefore, were not evaluated. These code sections specifically provide requirements for the following:

1. Local application Halon fire suppression systems.
2. Halon systems protecting multiple hazards by the use of directional valves.
3. Halon systems/components installed at altitudes in excess of 3,300 ft.
4. Halon systems actuated by heat detectors.
5. Halon systems utilizing factory charged nonrefillable containers.
6. Halon systems providing protection of hazards containing flammable liquids and/or gases.
7. Halon systems providing protection of hazards containing exotic flammable/combustible materials.

3.3.2 Assumptions

The following assumptions have been made for the evaluation of NFPA 12A:

1. Vendor documents describing listing/approval of system components are accurate.
2. The material/grade of pipe and fittings specified was used in the system installation.

3. Documents reviewed are the latest available revisions and reflect "as-built" conditions of the plant.

4. The authority having jurisdiction for Units 1 and 2 is American Electric Power Service Corporation.

3.3.3 Deviations and Recommendations/Justifications

The Halon 1301 fire suppression systems evaluated meet the requirements of NFPA 12A except as identified by the open items and deviations in Table 3.3-1. The table also provides recommendations/justifications for these items.

3.3.4 References

Ref No.	Document Number	Title	Rev. No.	Date
3.3.4.1		Walkdown Verification Checklists		
1	0120-108-003A	Impell Calculation, NFPA 12A - Code Compliance Walkdown Verification Checklist	0	11/19/87
3.3.4.2		Procedures		
1	PMI-2270	Fire Protection	16	07/09/87
2	12-PMP-2070-TRN-115	Fire Brigade Training Program	2	05/09/87
3	12-PMP-2070-TRN-108	Maintenance Skills Training Program	1	04/23/87
4	12THP4030.STP.224	"Control Room Cable Vault Halon Fire Suppression System Surveillance Test."	4	01/15/87
5	12MHP4030.STP.019	"Halon 1301 Tank Weight and Pressure for the Control Room Cable Vault Halon System."	1	09/12/85
3.3.4.3		Technical Data		
1		Pyr-A-Lon 1301-Application Installation, Operation, and Maintenace Manual H-8, H-15, H-30, H-125, and H-250 Automatic Pre-Engineered Modular Fire Extinguishing Systems. UL EX3140, November, 1980.		11/80

3.3.4 References (Continued)

2		ABCO Fire Protection, Inc. - "Halon 1301 Fire Protection System Located at Donald Cook Nuclear Power Plant," Vendor Calculations and Cutsheets."		07/16/84
3		Design Change Summary Report - RFC-12-2624, Revision 0-3 Attachment - letter dated 2/25/87 from W.R. Pauls to RFC.		02/25/87
4		Letter from ABCO to AEPSC Atten. Terry Cooper, dated 1/23/85.		01/23/85
5	0120-108-008	Impell Calculation NFPA 72E Code Compliance Verification Checklist 1974/1978/1982/1984	0	05/16/88
6	0120-108-007	Impell Calculation NFPA 72D Code Compliance Verification Checklist 1967/1979	0	05/16/88
7	RFC 2624	Control Rm. Cable Vault Modification Packet	0-3	
8	ROC from Dave Kipley to Bruce Gerwe	Ambient Conditions of Plant		12/03/87
9	RFC 2624	Drawing approval package from J. D. Grier to W. R. Pauls, Jr.		05/31/85
10	RFC 12-2149	P-250 Comp. Room Halon System Modification Packet		
11	SPECIFICATION DCCPM104QCS	Material Specification	4	11/09/72
12	SD-DCC-FP103	Fire Protection Systems - Miscellaneous	3	Draft
13	0120-108-003	Impell Calculation, NFPA 12A - Code Compliance Verification Checklist	0	04/18/88

3.3.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
14	90072-040-8X	Purchase Order (Halon)		02/10/88
15		Letter from B. J. Gerwe to Mr. David Kipley		03/09/88
3.3.4.4		Licensing Documents		
1	DRP NO. 74	Donald C. Cook, FHA, Docket No. 50-316	1	01/30/87
3.3.4.5		Drawings		
1	DK-NY-1433	Pytrotronics Drawing "Pipe Layout at I&M Power Co., Donald C. Cook Plant Computer Room, Unit 1 & 2."	1	01/26/79

TABLE 3.3-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-5.4 1-7.4	1977	Deviation: The original test results for the computer rooms (zones 71 and 72 were unsatisfactory. This indicates that the hazard areas may not contain a sufficient quantity of Halon 1301 for a sufficient period of time.	AEP to provide justification.
1-7.2.4 1-10.6.1 1-10.6.2 1-10.6.3	1977	Open Item: Calculations for the extended discharge cylinders installed for the protection of the control room cable vaults (zones 57 and 58) were not available for review.	Justification: References provided indicate that discharge tests for the control room cable vaults were satisfactory The availability of calculations for these cylinders is not an issue since the Halon concentration is maintained for a sufficient period of time. The placement of the test probes was sufficient to verify a good distribution of Halon.
1-7.3.2	1977	Open Item: Documentation of any material changes required by field conditions was not available for review.	Justification: The plant specifications comply with the requirements of this code. Walkdowns did not identify any obvious deviation from the specification requirements pertaining to material.

TABLE 3.3-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-7.3.3	1977	Open Item: Documentation of submittal of "As-Built" plans was not available for review.	Justification: The computer room systems (zones 71 and 72) are very small and their pipe routing is consistent with the UL listed design manual. The drawings submitted for review were also within a reasonable tolerance of the installed system. The control room cable vault systems (zones 57 and 58) are adequately shown in schematic drawings produced by AEPSC. Any future changes in system layout may be easily accomplished by reviewing these drawings.
1-8.2.3	1977	Open Item: The NFPA 72E Code Compliance Evaluation indicates that the smoke detectors installed in the control room cable vaults are spaced in accordance with NFPA 72E for signaling. However, the Halon system actuation is accomplished by signals from cross zoned detection circuits and not every ceiling bay in the vaults is provided with cross zoned detectors. This may result in delayed response for system actuation, which is in conflict with the intent of the code requirements.	Justification: Every bay in the area is provided with a detector which will alarm in the control room. Plant operators will immediately respond and can initiate the system manually.
1-8.3.2	1977	Deviation: The ACI 2035 panels used for the Control Room cable vault halon systems are not listed.	Justification: Refer to the NFPA 72D Code Compliance Summary - Code Section 2032.

TABLE 3.3-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-8.3.5	1977	Deviation: The manual actuation for the Control Room cable vaults (zones 57 and 58) are not located conveniently and easily accessible.	Justification: Manual actuation stations are available on the "EF" panel which is a short travel distance from the hazard. The short delay involved would not impact fire growth.
1-8.3.6	1977	Open Item: Operation of the extended discharge cylinders protecting the Control Room cable vaults (zone 57 and 58) via the Ansul Automan could not be verified in the absence of electricity. The main cylinders contain manual releases at the "master" cylinder which could potentially discharge the mainbank but not the extended discharge cylinders.	AEP to provide justification.
1-8.3.7	1977	Open Item: Documentation to verify that manual controls shall not have a pull of more than 40 pounds nor movement of more than 14 inches to secure operation could not be found.	Justification: The manual pull stations for the halon systems evaluated are listed for this service. They are intended for this service and are therefore acceptable.
1-8.5.1	1977	Open Item: The NFPA 72D Code Compliance Evaluation could not find documentation to verify that alarms for the Control Room cable vault (zones 57 and 58) are provided in the hazard to indicate system alarm, pre-discharge and discharge.	AEP to provide justification.

TABLE 3.3-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-9.2	1977	Open Item: No documentation could be found to verify that the Halon used for the systems complies with Military Specification MIL-M-12218B.	Justification: The agent and equipment is purchased from a fire protection contractor. It is specified in the P.O. that all equipment is for use as part of a Fire Protection QA program and each item (or package) must be UL listed or FM approved. For the computer rooms, the systems are pre-engineered and therefore acceptable since they are approved or listed as a package. In the case of the agent for the control room cable vaults, in order to meet UL listing requirements, the fill stations must be UL listed. Therefore, these systems are also acceptable.
1-9.5.6	1977	Deviation: A system nameplate is not provided for any of the areas/systems which were evaluated.	AEP to provide justification.
1-10.2.4	1977	Open Item: Documentation to verify that joint compound, tape or thread lubricant shall be applied to only the male threads of the joint was not available for review.	Justification: The systems were acceptance tested and have been discharged on an 18 month interval as a part of their testing. The intent of this code requirement is to ensure the piping network is not blocked and to ensure a tight fit in the piping network. The discharge tests have verified these items. Therefore, the intent of this requirement is met.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-10.2.5	1977	Open Item: Documentation to verify that welding and brazing alloys have a melting point greater than 1000°F could not be located.	Justification: The integrity of the piping networks were tested by initial system discharge tests and the 18 month testing which has been completed. Any failure of piping networks would have appeared during these tests. Additionally, the systems are not installed in area/zones where a quick build-up of heat from a fire may cause damage to system piping prior to detection.
1-10.3.3	1977	Open Item: No documentation could be found which verifies that the piping was blown out before the nozzles were attached.	Justification The systems have been discharge tested on an 18 month basis. This assured that no blockage occurred in the piping network.
1-10.4.1	1977	Open Item: No documentation could be found to verify that the inline check valves installed in the Control Room cable vault systems to isolate the CO_2 system from the Halon system are listed/intended for this specific service.	Justification: A full discharge acceptance test was performed on the halon system. There were no problems or concerns with the check valves during the performance of this test.
1-11.1.1	1977	Deviation: The systems are not thoroughly inspected and tested at least annually. A full discharge test is performed on an 18 month basis.	Justification: The systems should not be subject to hazards which could render them inoperable or adversely affect their functionality. Strict procedures are in place to ensure their operation following maintenance. The 18 month testing addresses the full operability of the system and is therefore acceptable.

TABLE 3.3-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-11.1.3	1977	Open Item: No documentation was found which indicates that discharge tests will be performed when inspection indicates their advisability.	Justification: The systems evaluated are tested on an 18 month interval as a part of their testing/inspection. Deficiencies identified from the testing/inspections should be recorded for corrective actions. This is a sufficient criteria to meet the intent of this code requirement.
1-11.1.4	1977	Open Item: No documentation was found which indicates that inspection reports for the Computer Rooms (zones 71 and 72) are filed with the owner.	Justification: Procedures are in place at installations such as this for system inspections. This requirement is more applicable to installations where inspection/testing reports are not maintained in general.
1-11.1.5	1977	Open Item: No documentation was found which indicates that the system(s) are inspected visually following an approved schedule and procedure between annual tests.	Justification: The systems are tested on an 18 month basis. This detail of inspection/test is adequate. Additionally, the weights and pressures are verified and recorded on a 6 month basis.
1-11.8	1977	Deviation: The weight and pressure of the container is not recorded on an attached tag.	Justification: The intent of this requirement is to provide an easy means of reviewing weight and pressure for inspections. The cylinder weights and pressures are identified on a cylinder nameplate. Therefore, the intent of this requirement is met. Additionally, the weights and pressures are verified and recorded on a 6 month basis.

TABLE 3.3-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 12A - Halon 1301 Extinguishment Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2-6.2.2 2-6.3.3	1977	Deviation: The initial discharge of the Halon systems in the Control Room cable vaults (zones 57 and 58) is in excess of 45 seconds. The code requirement is less than 10 seconds.	Justification: This requirements is in place due to the toxic by-products of Halon 1301 and its effect on personnel as it decomposes in the presence of high temperatures. The shorter discharge time permits the agent to react faster, not permitting the time exposure of the agent to the high temperatures. The cable vaults are not normally occupied areas and the Halon systems are isolated from automatic actuation when personnel are in the vaults. For these reasons, the discharge time is acceptable.

3.4A NFPA 13-1971 Sprinkler Systems

3.4A.1 Scope of Evaluation

This analysis is to verify that the sprinkler systems in the Drumming Area, Aux. Bldg. Crane Bay (High Roof) Area, and the Control Room Cable Vault Area are in compliance with the standards of NFPA 13 - 1971 edition. The systems at D.C. Cook were originally designed under the jurisdiction of the 1971 Edition of NFPA 13. Over the course of D.C. Cook's history, modifications to the sprinkler systems were performed. The last of these modifications were completed under the jurisdiction of the 1983 Edition of NFPA 13. For the purpose of this evaluation only the original (1971) and last (1983) Editions of NFPA 13 in effect during the system design/installation phase were utilized. Systems which had no modifications following the initial design were evaluated against the requirements of the 1971 Edition. Systems which were modified following the initial design, or designed after the initial design, regardless of what year, were evaluated against the requirements of the 1983 Edition. Changes in the code editions between 1971 and 1983 were not substantial to warrant a separate evaluation for each edition. Additionally, the deviations/open items identified in the evaluation could not be fully addressed by utilizing interim code editions. The following areas contain systems not modified following the initial design and which were evaluated under the 1971 edition:

System	Zone	Area Protected
Pre-Action	3	Drum Storage Area
Pre-Action	32	Aux. Bldg. Crane Bay (High Roof) Area
Wet-Pipe	58	Unit 2 Control Room Cable Vault

3.4A.2 Assumptions

The following assumptions have been made for the evaluation of NFPA 13.

1. The fire protection systems at the D. C. Cook Plant are not "subject to earthquakes" as it pertains to NFPA codes.

2. The wet-pipe sprinkler system in the control room cable vault was installed per 1971 specifications.

3. The High Roof Area and the Drumming Area are assumed to have smooth ceiling construction.

3.4A.3 Deviations and Recommendations/Justifications

The sprinkler systems evaluated are in compliance with NFPA 13 - 1971 except as identified by the open items and deviations in Table 3.4A-1. The table also provides recommendations/justifications for these items.

3.4A.4 References

Ref No.	Document Number	Title	Rev. No.	Date
3.4A.4.1		Walkdown Verification Checklists		
1	0120-108-004D	Impell Calculation, NFPA 13, 1971 Code Compliance Walkdown Verification Checklist (Pre-Action/High Roof Area, Zone 32)	0	11/17/87
2	0120-108-004E	Impell Calculation, NFPA 13, 1971 Code Compliance Walkdown Verification Checklist (Pre-Action/Drumming Area, Zone 3)	0	11/17/87
3	0120-108-004F	Impell Calculation, NFPA 13, 1971 Code Compliance Walkdown Verification Checklist (Wet Pipe/C.R. Cable Vault, Zone 58)	0	11/17/87
3.4A.4.2		Procedures		
1	PO-050-508	Fire Protection-Water Preoperational Test Procedure	0	07/03/74
2	12 MHP 4030.STP.020	Inspection of the Fire Protection System Deluge and Preaction Spray Headers in the Auxiliary Building	3	03/06/86
3	12 THP 4030.STP.223	Fire Protection Water System Test	6	09/11/87
4	12 OHP 4030.STP.120	Fire Protection System - Water and Carbon Dioxide	11	01/30/87

3.4A.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
3.4A.4.3		Technical Data		
1		Letter From: R.J. Daley To: R.W. Jurgensen Instruction Book, "Grinnel and Star Fire Systems Equipment"		07/15/74
2	SD-DCC-FP101	System Description, Fire Protection System-Water	2	Draft
3		Specification for Fire Protection Systems of D.C. Cook Nuclear Plant	0	04/02/71
4	DCCPM104QCS	Piping Specification	4	11/09/72
5	DCCPM102QCS	Shop and Field Fabrication and Erection	4	05/24/73
6	RFC DC-01-2680	Appendix R Sprinkler System Modification Packet	0	09/17/85
7		Instruction Manual for Appendix "R" Sprinkler Additions - RFC's 01-2680 and 02-2695 (Phoenix Contractors)		
8	DCCFP109QCS	Fabrication and Installation of App. R Sprinkler Systems, Specification for RFC's DC-02-2695 and DC-01-2680 PSI (Power Systems Inc.)	0	02/10/84
9	RFC #02-2695 RFCDL REF #52	Hydraulic Calculations (Phoenix Contractors)		08/--/84
10	DCCFP108QCS	Design of App. R Sprinkler Systems, Specification for RFC's DC-02-2695 and DC-01-2680 (Phoenix Contractors)	2	02/10/84
11	0120-108-007	Impell Calculation, NFPA 72D Code Compliance Verification Checklist	0	05/16/84

3.4A.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
12	0120-108-008	Impell Calculation, NFPA 72E Code Compliance Verification Checklist	0	05/16/88
13		Telecopy from Al Hall to D. Hoover		12/14/87
14		ANI's Recommendations for Carbon Filters		09/--/77
15	ROC from D. Kipley to B. Gerwe	Ambient Conditions of Plant		12/03/87
16		Hydraulic Calculation for "The Hydrogen Bulk Storage Tanks" (Grinnell)	1	12/18/71
17	RFC #12-2231 RFCDL REF #53	Hydraulic Calculations (Phoenix Contractors)		04/26/79
18	0120-108-004	Impell Calculation, NFPA 13 Code Compliance Verification Checklist	0	04/25/88
19	DCC-FP-103	Fire Protection Systems - Miscellaneous	3	08/26/87
3.4A.4.4		Licensing Documents		
1	DRP No. 74	Donald C. Cook, FHA Docket No. 50-316	1	01/30/87
3.4A.4.5		Drawings		
1	Hodgman DWG 127-1	Control Room Cable Vault Sprinkler Piping Planview	2	06/18/75
2	DWG 46-032-71M-18	High Roof Area Sprinkler Piping Planview (Grinnell)	5	03/03/72
3	DWG 46-032-71M-16	Drumming Area Sprinkler Piping Planview (Grinnell)	5	02/28/72
4	DWG 12-5152N-2	Flow Diagram Fire Protection - Water System Details - Yard Piping	2	07/01/87

3.4A.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
5	12-5152L	Flow Diagram Fire Protection - Water System Details - Turbine Bldg.	2	02/25/87
6	12-5152A	Flow Diagram Fire Protection - Water Piping at Pumps	1	01/22/87
7	HB-1181	Filter Unit Fire Hose Connection RFC-12-2463, 2465	A	08/20/81
8	46-032-71M-17	"Hydrogen Storage Tanks and Valve Header for High Roof, Drumming Area, and Outside Tanks" (Grinnell)	4	12/17/71
9	DC 1 & 2-MFP-PHX-FILE-015000	DWG DC 1 & 2-MFP-PHX-FILE-015000 Contractor's Access Sprinkler Drawing from RFC-12-1437	2	12/07/81
10	DC-2-MFP-RD22695-009-002 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. East Piping Corridor (Phoenix DWG)	7	06/19/84
11	DC-2-MFP-RD22695-010-002 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. North Piping Corridor (Phoenix DWG)	8	06/19/84
12	DC-2-MFP-RD22695-008-001 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. South Piping Corridor (Phoenix DWG)	8	06/11/84
13	DC-2-MFP-RD22695-025-000 (AEPSC No.)	Inspectors Test Detail Elev. 633'-0 Aux. Bldg. N. Corridor (Phoenix DWG)	2	06/13/84
14	DC-2-MFP-RD22695-017-001 (AEPSC No.)	Details & Sections Elev. 633'-0 Bldg N. Corridor (Phoenix DWG)	2	06/14/84
15	DC-2-MFP-RD22695-007-001 (AEPSC No.)	Elev. 633'-0 Turbine Bldg. Supply Piping Details (Phoenix DWG)	2	06/04/84
16	DC-2-MFP-RD22695-023-001 (AEPSC No.)	Elev. 620'-6 Aux. Bldg. HVAC Room Unit #1 (Phoenix DWG)	2	06/13/84
17	DC-2-MFP-RD22695-022-002 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - Fire Protection Piping	8	07/02/86
18	DC-2-MFP-RD22695-022-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - Fire Protection Piping (Phoenix DWG)	6	06/19/84

3.4A.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
19	DC-2-MFP-RD22695-024-001 (AEPSC No.)	RFC-02-2695 Elevation 609 Turbine Bldg. Riser Diagram (Phoenix DWG)	3	06/15/84
20	DC-2-MFP-RD22695-020-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. Section Views (Phoenix DWG)	6	06/19/84
21	DC-2-MFP-RD22695-006-002 (AEPSC No.)	Elev. 609'-0 Turbine Bldg. Supply Piping Details (Phoenix DWG)	4	06/05/84
22	DC-1 & 2-MFP-RFC-RFC-2621-001-001 (AEPSC No.)	As-Built for Aux. Bldg. 587' & 609'	2	-----
23	DC-2-MFP-RD22695-021-002 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. East/West Piping Corridors (Phoenix DWG)	3	07/02/86
24	DC-2-MFP-RD22695-019-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - CCW Fire Protection - Sidewall Sprinklers (Phoenix DWG)	7	06/19/84
25	DC-2-MFP-RD22695-005-004 (AEPSC No.)	Units 1 & 2 Aux. Feed Pump Corridor Sprinkler System (Phoenix DWG)	6	06/13/84
26	DC-2-MFP-RD22695-004-004 (AEPSC No.)	Unit 2 Emerg. DG Pump/Corridor Sprinkler System (Phoenix DWG)	6	06/13/84
27	DC-2-MFP-RD22695-003-004 (AEPSC No.)	South Stair of Aux. Bldg. Elev. 587'-0 Sprinkler Water Curtain (Phoenix DWG)	4	05/14/84
28	DC-2-MFP-RD22695-016-003 (AEPSC No.)	RFC-02-2695 Elev. 587'-Inspection Test Conn. (Phoenix DWG)	4	06/13/84
29	DC-2-MFP-RD22695-002-004 (AEPSC No.)	North Stair of Aux. Bldg. Elev. 587'-0 Sprinkler Water Curtain (Phoenix DWG)	6	06/10/84
30	DC-1 & 2-MFP-RFC-2621-002-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	3	-----
31	DC-1 & 2-MFP-RFC-2621-003-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	2	-----

3.4A.4 References (Continued)

Ref No.	Document Number	Title	Rev. No.	Date
32	DC-1 & 2-MFP-RFC-2621-004-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	2	-----
33	DC-1 & 2-MFP-RFC-2621-005-001 (AEPSC No.)	As-Builts fo Aux. Bldg. 537' & 609' (Phoenix DWG)	4	06/01/84
34	DC-2-MFP-RD22695-001-004 (AEPSC No.)	East Stair of Aux. Bldg. Elev. 573'-0 & 587'-0 Sprinkler Water Curtain (Phoenix DWG)	6	06/13/84
35	2-5152K	Flow Diagram, Fire Protection - Water System Details - Turbine Bldg. & Screen House	1	02/25/87
36	12-5152E	Flow Diagram, Fire Protection - Water Charcoal Filters	2	07/07/87
37	12-5401	Aux. Bldg. Fire Protection Piping to Charcoal Filters	6	01/22/86
38	12-5401A	Aux. Bldg. Fire Protection Piping to Charcoal Filters	5	01/10/78
39	1-5152J	Flow Diagram, Fire Protection - Water System Details - Turbine Bldg. & Screen House	0	10/06/86
40	46-032-71M-15	Grinnell Sprinkler Drawing for Unit 1 Auxiliary Feed Pump Room	0	09/24/71
41	Phoenix T-591-M	Unit 1 Emergency DG Ramp	0	03/08/84
42	Hodgman DWG 121-15	Unit 2 AFW Pump Initial Installation DWG	1	05/01/75
43	12-5152D	Flow Diagram, Fire Protection - Water Aux. and Containment Buildings	0	10/06/86

TABLE 3.4A-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1971)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1041	1971	Deviation: There are no checklists for any test procedures regarding the control room cable vault sprinkler system.	Justification: The fire hazards analysis does not rely upon the wet-pipe sprinkler system for controlling fires in the C.R. cable vault. Although the sprinkler system is still functional, any deviations from the code do not impact the safety features of the area since both halon and CO_2 systems are also provided.
1042	1971	Open Item: The instructions charts or care maintenance pamphlets (NFPA 13A) are not provided for the C.R. cable vault.	Justification: See response to code section 1041.
1141	1971	Open Item: Documentation could not be found to verify if the flooring is watertight.	AEP to provide justification. The criteria used in an 83-41 study is more applicable to D.C. Cook.
1412	1971	Open Item: No documents stating that all materials and devices installed for the sprinkler systems were new or considered satisfactory for reuse.	Justification: The materials and devices specified in the 1971 piping and installation specification are in accordance with this standard and therefore acceptable.
1511 1631 1632 1700	1971	Open Item: There are no documents stating that the installation and testing of the sprinkler systems have been completed.	Justification: See response to code section 1412.
1611	1971	Deviation: There are no certificates of acceptance for all systems.	Justification: Test procedures show that the systems are operable. Also, see response to code section 1041.
1620	1971	Deviation: Installation specifications do not require lead-in connections to be flushed.	Justification: No action is required since the test procedure (12 OHP 4030.STP.120) requires periodic flushing of all systems.

TABLE 3.4A-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1971)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2822 5393	1971	Deviation: The lower riser gage for the high roof area has an upper limit that is not compatible with the normal working pressure. Presently, the gage limit is 200 psi while the system working pressure is 150 psi.	Justification: The intent of this code requirement is to establish gage accuracy on systems which are normally installed on systems subject to large fluctuations in pressure. The water system at D.C Cook is not subject to large pressure surges and therefore the gage is acceptable.
3051	1971	Deviation: The drumming area drawing (46-032-71M-16) shows 8 sprinklers on one branch line where only 6 are allowed.	Justification: The maximum of 6 sprinklers is contained in the code section. The pipe schedule table; however, indicated that up to 8 sprinklers may be supplied by 2" pipe in the hazard classification. The pipe supplying the 8 sprinklers is 2" size and the plant has an adequate water supply. Therefore, this installation is acceptable.
3091 3092 3093 3094 3095	1971	Open Item: There are no documents to verify proper installation of pipe fittings and joints.	Justification: See response to code section 1412.
3211 3213	1971	Open Item: There are no documents to verify whether the piping for the C.R. Cable Vault is properly pitched to drain.	Justification: See response to code section 1041.
3212	1971	Open Item: There are no documents to verify all piping installed were straight.	Justification: See response to code section 3091.
3241 3783	1971	Deviation: At the C.R. Cable Vault Riser, the retard chamber discharges to the floor containing numerous unsealed penetrations.	AEP to provide justification.

TABLE 3.4A-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1971)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3562	1971	Deviation: Numerous hangers in the C.R. Cable Vault are too close to the sprinkler heads.	Justification: See response to code section 1041.
3653	1971	Deviation: Drawings show that 250°F rated sprinklers are used for the high roof and drumming areas where 175°F to 225°F sprinklers should be used.	Justification: Code section 3654 allows using high temperature rated sprinklers for special hazards.
3681 3682 3683	1971	Open Item: Due to the congestion and lack of accessibility, sprinklers could not be verified to be free of paint and ornamental finishes.	AEP to provide justification.
3691	1971	Open Item: There are numerous obstacles under sprinklers in the C.R. Cable Vault.	Justification: See response to code section 1041.
3761	1971	Deviation: The electrically operated attachments do not meet all of the referenced NFPA codes.	Justification: Refer to NFPA 72D (1967) Code Compliance Summary-Code Section 2032.
3762	1971	Deviation: The procedures do not verify all of the necessary testing steps for the water flow alarms.	Justification: Refer to NFPA 72D (1967) Code Compliance Summary-Code Section 2034.
4011 4032	1971	Open Item: There are no documents to show whether the authority having jurisdiction was contacted for the C.R. Cable Vault (4011) and the drumming area (4032).	Justification: See response to code section 1041 for the control room cable vault. See response to code section 1412 for the drumming area.

TABLE 3.4A-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1971)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4133 5341 5343	1971	Deviation: The 130 ft^2/pilot head spacing indicated by drawings and the 100 ft^2/sprinkler spacing indicated by specifications exceed the 90 ft^2/ sprinkler spacing required for extra hazard occupancy.	Justification: There is no action required since a review of the drawings show that the sprinkler spacing does not exceed the 90 ft^2/sprinkler criteria.
4143	1971	Deviation: Branch lines are not placed midway in each bay or space in the C.R. Cable Vault.	Justification: See response to code section 1041.
4156 4211 4231 4316	1971	Deviation: There are numerous sprinkler deflectors which are too close to beams in the C.R. Cable Vault.	Justification: See response to code section 1041.
4221	1971	Deviation: The sprinkler nozzles for all three systems evaluated under this code edition are in excess of 12" from the ceiling.	Justification: The control room cable vault justification is identified in the response to code section 1041. Justification: The ceiling in the high roof area is so high that a thermal effect may occur. Additionally, smoke detectors are installed which provide alarm in the control room for response to fires in the area. Justification: The pilot lines in the drumming area are located such that the pilot nozzles are placed in accordance with this code section. Their actuation causes alarm in the control room for response. Therefore, the installation is acceptable.

TABLE 3.4A-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1971)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4319	1971	Open Item: Due to congestion and lack of accessibility, the impact of lighting fixtures on the sprinkler systems could not be assessed.	Justification: The control room cable vault justification is identified in the response to code section 1041. Justification: The remaining 2 zones have high roof areas. The location of the lights could not seriously affect the pattern of spray from nozzles.
5352	1971	Deviation: The actual pre-action piping for the systems protecting the high roof and drumming area are not supervised and N.E.P.I.A. has not approved the systems.	Justification: The intent of this code section is to provide a means of alarm in the event of damaged system piping/ nozzles. The systems in the high roof and drumming area are high enough and located such that they are not easily damaged. Therefore, the installations are acceptable.

3.4B NFPA 13-1983 Sprinkler Systems

3.4B.1 Scope of Evaluation

The systems at D. C. Cook were originally designed under the jurisdiction of the 1971 Edition of NFPA 13. Over the course of D. C. Cook's history, modifications to the sprinkler systems were performed. The last of these modifications were completed under the jurisdiction of the 1983 Edition of NFPA 13. For the purpose of this evaluation only the original (1971) and last (1983) Editions of NFPA 13 in effect during the system design/installation phase were utilized. Systems which had no modifications following the initial design were evaluated against the requirements of the 1971 Edition. Systems which were modified following the initial design, or designed after the initial design, regardless of what year, were evaluated against the requirements of the 1983 Edition. Changes in the code editions between 1971 and 1983 were not substantial to warrant a separate evaluation for each edition. Additionally, the deviations/open items identified in the evaluation could not be fully addressed by utilizing interim code editions. The systems specifically evaluated against the 1983 Edition protect the following areas:

System	Zone	Area Protected
Wet-Pipe	17C, 17E, 17F	Unit 1 and Unit 2 TDAFW Pump and AFW Pump Corridor
Wet-Pipe	79	Unit #1 Emergency Diesel Generator Ramp and Corridor
Wet-Pipe	85	Unit #2 Emergency Diesel Generator Ramp and Corridor
Wet-Pipe	105	Contractor's Access Control Building
Pre-Action	1,5,6M,6N,6S 62A,62B,62C, 63A,63B,63C 64A,64B,65A & 65B	Elevations 570'-0" and 587'-0"
Pre-Action	44N, 44S	Elevation 609'-0"
Pre-Action	51, 52	Elevation 633'-0"

3.4B.2 Assumptions

The following assumptions have been made for the evaluation of NFPA 13.

1. The referenced drawings, documents, and hydraulic calculations are the latest revisions and they they reflect the as-built condition of the plant.

2. The sprinkler piping for systems protecting safety-related areas except the Contractor's Access is seismically supported. Evaluation of the seismic hanger system is outside the scope of NFPA criteria.

3.4B.3 Deviations and Recommendations/Justifications

The sprinkler systems evaluated under this report comply with the requirements of NFPA 13 - 1983 except as identified by the open items and deviations in Table 3.4B-1. The table also provides recommendations/justifications for these items.

3.4B.4 References

Ref. No.	Document Number	Title	Revision No./Date	
3.4B.4.1	Walkdown Verification Checklists			
1	0120-108-004G	Impell Calculation, NFPA 13, 1983 Code Compliance Walkdown Verification Checklist (Wet Pipe Systems)	0	11/13/87
2	0120-108-004H	Impell Calculation, NFPA 13, 1983 Code Compliance Walkdown Verification Checklist (Pre-Action-Pilot Actuated Sprinkler Systems)	0	11/13/87
3.4B.4.2		Procedures		
1	PO-050-508	Fire Protection-Water Preoperational Test Procedure	0	07/03/74
2	12 MHP 4030.STP.020	Inspection of the Fire Protection System Deluge and Preaction Spray Headers in the Auxiliary Building	3	03/06/86

3.4B.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
3	12 THP 4030.STP.223	Fire Protection Water System Test	6	09/11/87
4	12 OHP 4030.STP.120	Fire Protection System - Water and Carbon Dioxide	11	01/30/87
3.4B.4.3		Technical Data		
1		Letter From: R.J. Daley To: R.W. Jurgensen Instruction Book, "Grinnel and Star Fire Systems Equipment"		07/15/74
2	SD-DCC-FP101	System Description, Fire Protection System-Water	2	Draft
3		Specification for Fire Protection Systems of D.C. Cook Nuclear Plant	0	04/02/71
4	DCCPM104QCS	Piping Specification	4	11/09/72
5	DCCPM102QCS	Shop and Field Fabrication and Erection	4	05/24/73
6	RFC DC-01-2680	Appendix R Sprinkler System Modification Packet	0	09/17/85
7		Instruction Manual for Appendix "R" Sprinkler Additions - RFC's 01-2680 and 02-2695	-	
8	DCCFP109QCS	Fabrication and Installation of Appendix R Sprinkler Systems, Specification for RFC's DC-02-2695 and DC-01-2680 PSI (Power Systems Inc.)	0	02/10/84
9	RFC #02-2695 RFCDL REF #52	Hydraulic Calculations (Phoenix Contractors)		08/84
10	DCCFP108QCS	Design of App. R Sprinkler Specification for RFC's DC-02-2695 and DC-01-2680 Phoenix Contractors	2	02/10/84

3.4B.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
11	0120-108-007	Impell Calculation, NFPA 72D Code Compliance Verification Checklist	0	
12	0120-108-008	Impell Calculation, NFPA 72E Code Compliance Verification Checklist	0	
13		Telecopy from Al Hall to D. Hoover		12/14/87
14		ANI's Recommendations for Carbon Filters		09/--/77
15	ROC from D. Kipley to B. Gerwe	Ambient Conditions of Plant		12/03/87
16		Hydraulic Calculation for "The Hydrogen Bulk Storage Tanks" (Grinnell)	1	12/18/71
17	RFC #12-2231 RFCDL REF #53	Hydraulic Calculations (Phoenix Contractors)		04/26/79
18	0120-108-004	Impell Calculation, NFPA 13 Code Compliance Verification Checklist	0	04/28/88
19	DCC-FP-103	Fire Protection Systems - Miscellaneous	3	08/26/87
3.4B.4.4		Licensing Documents		
1	DRP No. 74	Donald C. Cook, FHA Docket No. 50-316	1	01/30/87
3.4B.4.5		Drawings		
1	Hodgman DWG 127-1	Control Room Cable Vault Sprinkler Piping Planview	2	06/18/75
2	46-032-71M-18	High Roof Area Sprinkler Piping Planview (Grinnell)	5	03/03/72

3.4B.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
3	46-032-71M-16	Drumming Area Sprinkler Piping Planview (Grinnell)	5	02/28/72
4	12-5152N-2	Flow Diagram Fire Protection - Water System Details - Yard Piping	2	07/01/87
5	12-5152L-2	Flow Diagram Fire Protection - Water System Details - Turbine Bldg.	2	02/25/87
6	12-5152A-1	Flow Diagram Fire Protection - Water Piping at Pumps	1	01/22/87
7	HB-1181	Filter Unit Fire Hose Connection RFC-12-2463, 2465	A	08/20/81
8	46-032-71M-17	"Hydrogen Storage Tanks and Valve Header for High Roof, Drumming Area, and Outside Tanks" (Grinnell)	4	12/17/71
9	DC 1 & 2-MFP-PHX-FILE-015000	DWG DC 1 & 2-MFP-PHX-FILE-015000 Contractor's Access Sprinkler Drawing from RFC-12-1437	2	12/07/81
10	DC-2-MFP-RD22695-009-002 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. East Piping Corridor (Phoenix DWG)	7	06/19/84
11	DC-2-MFP-RD22695-010-002 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. North Piping Corridor (Phoenix DWG)	8	06/19/84
12	DC-2-MFP-RD22695-008-001 (AEPSC No.	Elev. 633'-0 Aux. Bldg. South Piping Corridor (Phoenix DWG)	8	06/11/84
13	DC-2-MFP-RD22695-025-000 (AEPSC No.)	Inspectors Test Detail Elev. 633'-0 Aux. Bldg. N. Corridor (Phoenix DWG)	2	06/13/84
14	DC-2-MFP-RD22695-017-001 (AEPSC No.)	Details & Sections Elev. 633'-0 Bldg N. Corridor (Phoenix DWG)	2	06/14/84
15	DC-2-MFP-RD22695-007-001 (AEPSC No.)	Elev. 633'-0 Turbine Bldg. Supply Piping Details (Phoenix DWG)	2	06/04/84

3.4B.4 References (Continued)

Ref. No.	Document Number	Title	Revision No.	Date
16	DC-2-MFP-RD22695-023-001 (AEPSC No.)	Elev. 620'-6 Aux. Bldg. HVAC Room Unit #1 (Phoenix DWG)	2	06/13/84
17	DC-2-MFP-RD22695-022-002 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - Fire Protection Piping	8	07/02/86
18	DC-2-MFP-RD22695-022-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - Fire Protection Piping (Phoenix DWG)	6	06/19/84
19	DC-2-MFP-RD22695-024-001 (AEPSC No.)	RFC-02-2695 Elevation 609 Turbine Bldg. Riser Diagram (Phoenix DWG)	3	06/15/84
20	DC-2-MFP-RD22695-020-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. Section Views (Phoenix DWG)	6	06/19/84
21	DC-2-MFP-RD22695-006-002 (AEPSC No.)	Elev. 609'-0 Turbine Bldg. Supply Piping Details (Phoenix DWG)	4	06/05/84
22	DC-1 & 2-MFP-RFC-RFC-2621-001-001 (AEPSC No.)	As-Built for Aux. Bldg. 587' & 609'	2	-----
23	DC-2-MFP-RD22695-021-002 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. East/West Piping Corridors (Phoenix DWG)	3	07/02/86
24	DC-2-MFP-RD22695-019-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - CCW Fire Protection - Sidewall Sprinklers (Phoenix DWG)	7	06/19/84
25	DC-2-MFP-RD22695-005-004 (AEPSC No.)	Units 1 & 2 Aux. Feed Pump Corridor Sprinkler System (Phoenix DWG)	6	06/13/84
26	DC-2-MFP-RD22695-004-004 (AEPSC No.)	Unit 2 Emerg. DG Pump/Corridor Sprinkler System (Phoenix DWG)	6	06/13/84
27	DC-2-MFP-RD22695-003-004 (AEPSC No.)	South Stair of Aux. Bldg. Elev. 587'-0 Sprinkler Water Curtain (Phoenix DWG)	4	05/14/84
28	DC-2-MFP-RD22695-016-003 (AEPSC No.)	RFC-02-2695 Elev. 587'-Inspection Test Conn. (Phoenix DWG)	4	06/13/84
29	DC-2-MFP-RD22695-002-004 (AEPSC No.)	North Stair of Aux. Bldg. Elev. 587'-0 Sprinkler Water Curtain (Phoenix DWG)	6	06/10/84

3.4B.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
30	DC-1 & 2-MFP-RFC-2621-002-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	3	-----
31	DC-1 & 2-MFP-RFC-2621-003-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	2	-----
32	DC-1 & 2-MFP-RFC-2621-004-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	2	-----
33	DC-1 & 2-MFP-RFC-2621-005-001 (AEPSC No.)	As-Builts fo Aux. Bldg. 537' & 609' (Phoenix DWG)	4	06/01/84
34	DC-2-MFP-RD22695-001-004 (AEPSC No.)	East Stair of Aux. Bldg. Elev. 573'-0 & 587'-0 Sprinkler Water Curtain (Phoenix DWG)	6	06/13/84
35	2-5152K-1	Flow Diagram, Fire Protection - Water System Details - Turbine Bldg. & Screen House	1	02/25/87
36	12-5152E-2	Flow.Diagram, Fire Protection - Water Charcoal Filters	2	07/07/87
37	12-5401-7	Aux. Bldg. Fire Protection Piping to Charcoal Filters	6	01/22/86
38	12-5401A-6	Aux. Bldg. Fire Protection Piping to Charcoal Filters	5	01/10/78
39	1-5152J	Flow Diagram, Fire Protection - Water System Details - Turbine Bldg. & Screen House	0	10/06/86
40	46-032-71M-15	Grinnell Sprinkler Drawing for Unit 1 Auxiliary Feed Pump Room	0	09/24/71
41	Phoenix T-591-M	Unit 1 Emergency DG Ramp	0	03/08/84

3.4B.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
42	Hodgman DWG 121-15	Unit 2 AFW Pump Initial Installation DWG	1	05/01/75
43	12-5152D	Flow Diagram, Fire Protection Water Aux. and Containment Buildings	0	10/06/86

TABLE 3.4B-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1983)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-5.2 1-8.1.3 1-9.1 1-10.2	1983	Open Item: Documentation for the contractor's access area is unavailable for review.	Justification: This system is sized in accordance with ordinary hazard pipe schedule system, uses the appropriate type of material and sprinklers, and is properly supported based on a walkdown review. The information from the system drawings shows the system to be adequate with the noted exceptions in other code requirements.
1-8.1.2 3-14.2.1 3-14.2.2 3-17.3.1 3-17.3.3	1983	Deviation: Jamesbury butterfly isolation valves for wet pipe systems and the Mercoid pressure switches on all systems are not U.L. listed for fire service use.	Justification: The Jamesbury butterfly valve, although not listed, is adequate for the intended service. Valve position is indicated by an arrow on the valve body and is cast of the appropriate materials for the class of service. The Mercoid pressure switch will be evaluated under NFPA 72D - Code Section 2032.
1-9.2	1983	Deviation: Hydraulic design data is not provided on the sprinkler drawings.	AEP to provide justification.
1-11.1.1 1-11.1.2 1-11.1.3	1983	Open Item: Test certificates or documentation that lead in mains had been flushed at the proper flow rates was not available.	Justification: Plant procedures (STP.120) requires a 2-inch main drain flush of all the fire systems. In addition, strainers are provided on the fire pump discharge outlets to prevent debris and silt build-up.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1983)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1-11.2.1 1-11.2.2 1-11.2.5	1983	Open Item: Test certificates or documentation of system hydrostatic tests was not available for review.	Justification: Although test certificates were not available for the hydrostatic test of the given systems, the Request For Change (RFC) packages for the sprinkler modifications evaluated contained either pre-operational test procedures or references to work orders requiring hydrostatic testing. It is assumed that those tests were conducted.
2-2.1.2.4 2-2.1.2.5	1983	Deviation: Exterior fire hose demands were not added to the hydraulic sprinkler system calculations.	AEP to provide justification.
3-8.2	1983	Deviation: Cross mains at El. 633' have welded caps on them which prohibit flushing.	Justification: Current plant surveillance procedures and system pre-operational procedures require that a 2-inch main drain test be performed for the preaction sprinkler system. This flushing coupled with the strainers provided on the plant fire pumps ensure that any debris or silt is removed from the lead-ins to the system prior to its operation. No correction is necessary.
3-9.1.1	1983	Open Item: Documentation is not available to show that inspector's test connection orifices are equivalent to one sprinkler for the contractor's access and the AFW Pump Room.	Justification: Although a one sprinkler head equivalent is not provided on the contractor's access area and Unit 2 TDAFW pump room systems, fittings can be installed on the inspector's test pipes which will accommodate a sprinkler head. In addition, the reason behind this code requirement is to ensure an alarm will sound in a timely manner with one sprinkler flowing. Given the extremely small size of the systems in question, this is not a significant concern.

TABLE 3.4B-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1983)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3-12.1.2	1983	Open Item: Documentation is not available to verify that all threaded fittings were cut to ANSI Standard B2.1.	Justification: The intent of this code requirement is to ensure that the waterway is not blocked. Since preparational test procedures were performed to show adequate flow, the systems are considered operable.
3-12.1.3	1983	Open Item: No documentation was found to verify that joint compound or tape was applied only to the pipe threads.	Justification: The intent of this code section is to prevent the tape or joint compound from clogging the pipe during installation. Since pre-operational tests were performed to show no blockage, all systems are considered adequate.
3-15.3.1	1983	Open Item: No documentation could be found to indicate that the materials and tools used for installing power driven studs and welding studs were listed.	Justification: The intent of this code requirement is to ensure adequate stud installation. Procedures were in place to test these installations and certify them as adequate.
3-16.8	1983	Deviation: Various sprinklers under ducts at El. 587, 609 and 633 are not guarded.	AEP to provide justification.
3-17.4.5	1983	Deviation: The alarm test bypass valves and the alarm pressure switch isolation valves are globe valves which are non-indicating.	AEP to provide justification.
4-1.1.1 4-1.1.4	1983	Deviation: Sprinklers were found obstructed in the following locations: El. 587 - Zone 6N: North area near column lines WL-L and WL-4, four consecutive sprinklers are blocked by piping.	AEP to provide justification.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1983)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
		El. 609 - Zone 44N: Near column lines 16 and WL-L, sprinkler is obstructed by ductwork. Near column lines 15 and WL-L, sidewall sprinkler is blocked by fire main. El. 633 - Sidewall sprinkler heat collection plates will interfere with discharge patterns. - At column lines WL-L and WL-5, a heat collection plate is distorted such that the sprinkler discharge pattern will be blocked. - At column lines WL-L.5 and WL-8, sprinkler water discharge is obstructed by numerous conduit. - At column lines WL-L.5 and WL-8.5, a temporary curtain is installed too close to a sprinkler head and will obstruct discharge. AFW Pump Corridor - In corridor area, an upright sprinkler is obstructed by piping. - In Zone 17E, AFW Pump Room an upright sprinkler is obstructed by conduit.	
4-2.1.4	1983	Deviation: The pilot head in the SE corner of Zone 44N (Col. WL-6.5 and WL-N) is too far from the east wall.	Justification: The pilot head in question was estimated to be ten (10) to twelve (12) feet from the east wall; however, the overall area of coverage of the pilot head is far less than the 130 sq. ft. maximum. This coupled with the lack of any significant combustible loading in the area protected does not indicate that this spacing would cause a delay in system response time to actual fire conditions.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1983)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4-2.4.6	1983	Deviation: Contractor's Access Area - Sprinklers in the SW corner of the lower elevation are too close to a beam. El. 633' - Sprinklers at N end of Zone 52 (Col. WL-L) are running too close to a beam.	AEP to provide justification.
4-2.3.1 4-3.1	1983	Deviation: Sprinklers at El. 570, 587 and 633 are greater than 12" below the ceiling.	Justification: The design was mandated and accepted by the NRC in their SER and is therefore adequate for the App. R protection being provided.
4-4.8.1.1	1983	Deviation: El. 633' - There is no sprinkler in the elevator shaft.	Justification: Although outside NFPA 13 requirements, this area does not need automatic sprinkler protection based on the following features: ° The elevator shaft is enclosed by 3-hr. fire rated walls and 1 1/2 hr. fire rated doors. ° The combustible loading in the area is negligible. ° Sprinkler protection is provided adjacent to the elevator shaft.
4-4.13	1983	Deviation: El. 633' - Zone 52 (Col. WL-L.5 between WL-3.5 and WL-4.5). There are no sprinklers under a 6' wide duct.	AEP to provide justification.
4-4.19	1983	Deviation: El. 633' (Col. WL-K.5 and WL-3.8). Sprinklers underneath duct work are less than 12" apart with no baffles.	AEP to provide justification.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 13 - Installation of Sprinkler Systems (1983)

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
7-1.2	1983	Deviation: Hydraulic data placards are not installed on any of the systems.	Justification: Hydraulic design is adequately controlled under engineering responsibilities. Design placards would not enhance system protection or configuration control of design modifications.
7-2.4.4	1983	Deviation: The system design criteria is not included on the drawings.	Justification: The system design criteria is included as part of the specifications in the RFC package for these systems.
7-3.2	1983	Deviation: Area per sprinkler coverage data is not included in the hydraulic summary sheet.	Justification: Minimum design density, area, and flow parameters are included in the calculation. Addition of this information provides no significant benefit.
7-3.4	1983	Deviation: Water supply graph sheets are not provided with the hydraulic calculations.	AEP to provide justification.

3.5 NFPA 14 - Installation of Standpipe and Hose Systems

3.5.1 Scope of Evaluation

The evaluation of the standpipe and hose systems included the review of these systems under three editions - 1971, 1978 and 1986. The initial edition year selected was based on the edition that was in effect at the time the original system was specified on April 2, 1971. All subsequent edition years reviewed were applicable only to those areas where modifications occurred as identified in Calculation 0120-108-005.

The modifications made in 1980 were not evaluated against the 1980 code edition as this edition was not adopted until November 1980, after the modifications were completed. The applicable edition in effect at the time of the 1980 modification was the 1978 edition.

The evaluation of the standpipe and hose systems verified the following features:

1. Size and arrangement of standpipes and hose outlets.

2. Number and location of standpipes.

3. Adequate support of piping.

4. Adequate water supplies.

5. Arrangement of piping, valves and fittings.

3.5.2 Assumptions

The following assumption has been made for the evaluation of NFPA 14.

1. The intent of the standpipe service at the plant was to provide Class II service for those stations which have a single 1-1/2 inch hose valve and Class III service at those stations which have both 2-1/2 inch and 1-1/2 inch hose valves.

3.5.3 Deviations and Recommendations/Justifications

The hose stations provided at the plant have been labeled "for use by trained individuals only". This eliminates the requirement for pressure reducers to restrict pressures to a maximum of 80 psi for the Class II and III stations. This also eliminates all Class II and III service which, by definition, is for use by building occupants.

For the purposes of the code compliance evaluation the lack of pressure reducers and signs indicating that hose stations are for use by building occupants is treated only as a deviation to the Class II requirements. The requirements concerning hydraulic demands at those stations, which were originally intended as Class II, remain per the respective code section(s).

The standpipe and hose systems at the plant are in compliance with NFPA 14 except as identified by the open items and deviations in Table 3.5-1. The table also provides recommendations/justifications for these items.

3.5.4 References

Ref. No.	Document Number	Title	Revision No.	Date
3.5.4.1		Walkdown Verification Checklists		
1	0120-108-005A	Unit 1 - '71, Elev. 573'	0	12/22/87
2	0120-108-005B	Unit 1 - '71, Elev. 587'	0	12/22/87
3	0120-108-005C	Unit 1 - '71, Elev. 609'	0	12/22/87
4	0120-108-005D	Unit 1 - '71, Elev. 620'	0	12/22/87
5	0120-108-005E	Unit 1 - '71, Elev. 633'	0	12/22/87
6	0120-108-005F	Unit 2 - '71, Elev. 573'	0	12/22/87
7	0120-108-005G	Unit 2 - '71, Elev. 587'	0	12/22/87
8	0120-108-005H	Unit 2 - '71, Elev. 609'	0	12/22/87
9	0120-108-005J	Unit 2 - '71, Elev. 620'	0	12/22/87
10	0120-108-005K	Unit 2 - '71, Elev. 633'	0	12/22/87
11	0120-108-005L	Units 1 & 2 - '71, Elev. 573'	0	12/22/87
12	0120-108-005M	Units 1 & 2 - '71, Elev. 587'	0	12/22/87
13	0120-108-005N	Units 1 & 2 - '71, Elev. 609'	0	12/22/87
14	0120-108-005O	Units 1 & 2 - '71, Elev. 650'	0	12/22/87
15	0120-108-005P	Unit 1 - '78, Elev. 620'	0	12/22/87

3.5.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
16	0120-108-005Q	Units 1 & 2 - '78, Elev. 633'	0	12/22/87
17	0120-108-005R	Units 1 & 2 - '78, Elev. 650'	0	12/22/87
18	0120-108-005S	Unit 1 - '86, Elev. 591'	0	12/22/87
19	0120-108-005T	Unit 1 - '86, Elev. 625'	0	12/22/87
20	0120-108-005U	Unit 2 - '86, Elev. 591'	0	12/22/87
21	0120-108-005V	Unit 2 - '86, Elev. 625'	0	12/22/87
3.5.4.2		Procedures		
1	12QHP 4030 STP.007	Monthly Visual Inspection of the Plant Fire Hose Standpipe Connections	1	02/21/86
2	12QHP 4030 STP.006	Visual Inspection and Re-Rack of Fire Hoses	0	11/06/85
3	12QHP 4030 STP.003	Standpipe Operability Test	0	07/18/85
3.5.4.3		Technical Data		
1	DCCPM102QCS	Shop and Field Fabrication and Erection	4	05/24/83
2	DCCFP103QCS	Fire Detection/Suppression Equipment and Systems	0	09/10/79
3	DCCPM104QCS	Material Specification	4	11/09/72
4	DCCPV110QCS-F	Shop and Field Fabrication and Erection of Fire Protection Piping	0	10/16/85
5	SD-DCC-FP103	Fire Protection System Misc. System Description	3	08/16/87 Draft
6	RFC-DC-12-2740	Add Hose Stations Modification Packet	0	02/12/87

3.5.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
7	RFC-DC-12-2229	Add Water Hose Reels & Hose Station Modification Packet	0-3	03/27/87
8	RFC-DC-12-2621	Add Hose Stations Modification Packet	0&1	02/13/87
9	Catalog Page 25	Fire End Fog 1 1/2" Nozzles	--	--
10	Catalog Page 78	Fire End Hose Reels for 1 1/2" Hose	--	--
11	Catalog Page 23	1 1/2" Crocker Standard Fire Hose #44-APS	--	1978
12	Catalog Page 26	Crocker Standard Angle Valves 1 1/2" & 2 1/2"	--	1978
13	--	Phoenix Contractors Quality Assurance Program	0	01/10/77
14	P125-670	Jamesbury Valve Catalog	--	06/70
15	ANSI/ASME B-31.1	Power Piping Code	--	1980
16	Pages 17-53 and 17-54	Fire Protection Handbook	16th Edition	1986
17	ROC from B. Gerwe to A. L. Hall	Fire Pumps	--	01/19/88
3.5.4.4		Licensing Documents		
1	I&MED D.C. Cook Units 1 & 2	Response to Appendix A to BTP APCSB 9.5-1	0	01/31/77
2	Docket #50-315 & 316 DPR 58 & 74	Fire Hazards Analysis D.C. Cook Units 1 & 2		01/30/87

3.5.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
3.5.4.5		Drawings		
1	12-5152D	Flow Diagram Fire Protection - Water	0	10/06/86
2	1-5152B	Flow Diagram Fire Protection - Water	2	08/25/87
3	1-5152C	Flow Diagram Fire Protection - Water	0	10/06/86
4	12-5266-2	Fire Facilities Plan Below the Basement	2	08/17/87
5	12-5267-3	Fire Facilities Basement Plan	3	08/17/87
6	12-5268-2	Fire Facilities Mezzanine Floor	2	08/17/87
7	12-5268A-2	Fire Facilities Cable Vault Plans	2	08/17/87
8	12-5269-2	Fire Facilities Turbine Building	2	08/17/87
9	12-5270-2	Fire Facilities Reactor Building	2	08/17/87
10	12-5152A-1	Flow Diagram Fire Protection - Water	1	12/87
11	12-5152-1	Flow Diagram Fire Protection - Water	1	02/20/87
12	Sheet 17	Phoenix Contractor As-Built Drawings for Hose Stations	0	10/09/79
13	Sheet 18	Phoenix Contractor As-Built Drawings for Hose Stations	0	10/09/79
14	Sheet 20	Phoenix Contractor As-Built Drawings for Hose Stations	0	16/17/80

TABLE 3.5-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
151 431 4-3.1	1971 1971 1978	Deviation: a. Hose reels are not approved by nationally recognized laboratory. b. Isolation valve FP-263 is not an indicating type.	Justification: a. Reel construction is the same as a listed non-automatic reel. Also, hoses are used by trained personnel only. In consideration of these conditions the existing reels are acceptable. b. AEP to provide justification.
171	1971	Open Item: There is no record that the plans and specifications were submitted to authority having jurisdiction.	Justification: Although these documents could not be verified for approval, AEP (A/E) has plans and specifications for these systems in their files. These diagrams and specifications are controlled documents and are maintained up to date by AEP.
212 531 531 551 5-3.1 5-3.2 5-5.2	1971 1971 1971 1971 1978 1978 1978	Open Item: Documentation could not be found to verify that Class I and III standpipes are sized for minimum flow of 500 gpm plus 250 gpm for each additional standpipe to maximum 2500 gpm for a minimum 30 minutes.	AEP is to provide justification.
212a	1971	Open Item: Not all standpipe risers are minimum 4 inch in diameter. The hose stations affected are as follows:	AEP is to provide justification.

HOSE STATION NO.	ELEVATION
202E	596'
62B	609'
208	620'
201E	596'
200E	596'
204E	596'
205E	596;

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
217 541 5-4.2 2-1.3	1971 1971 1978 1986	Open Item: Class II standpipes shall be sized for minimum flow of 100 gpm for a minimum 30 minutes.	AEP is to provide justification..
321	1971	Deviation: Several areas which are served by Class III hose stations are not within 30 ft. of a nozzle attached to not more than 100 ft. of hose. These hose stations include: HOSE STATION NO. — ELEVATION 62 & 62A — 609' 41 & 41A — 609' 211 & 211A — 612' 203 & 203A — 612' 58 & 58S — 587' 45 & 45S — 587' 82 & 82A — 633' 65 & 65A — 633'	Justification: Class II hose stations are for use by trained personnel. Code requirements to limit the length of hoses to 100 ft. are primarily intended to eliminate the problems associated with kinks occurring in excessively long lengths of hose. With trained firefighters using the hoses with a minimum 5 persons in in attendance at any fire there are long lengths of hose. With trained firefighters using the hoses with a minimum 5 persons in attendance at any fire there are sufficient personnel available to assure that kinking will not occur when extra hoses must be added to reach the remote areas.
322	1971	Open Item: All areas of building protected by Class II hose stations shall be within 20 ft. of a nozzle attached to not over 75 ft. of hose.	Justification: In later edition code years an increase to 30 ft. and 100 ft. of hose, respectively, is permitted. For those zones that still do not comply (with the 30 ft. and 100 ft.), AEP will provide.

TABLE 3.5-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
216	1971	Deviation: The auxiliary building hose system at elevation 587' is not normally pressurized.	Justification: The hose system is arranged to activate two motor operated valves on either end of the auxiliary building supply main via electrical manual stations. These manual stations are located at each hose station in the auxiliary building. Upon activating the manual stations the hose system will be pressurized. The systems are pressurized upstream of the motorized valves. Therefore the intent of the code section is being met.
1-11.3	1978	Open Item: As-built calculations were not available for the Phoenix hose systems for review.	AEP to provide justification.
413 4-1.2 622	1971 1978 1971	Open Item: Approved valves are not provided at the main riser to branches of hose outlets or at each riser controlling more than two hose stations.	Justification: The intent of these code sections is to provide a means for isolating branches of hose stations or hose station risers in the event that during a fire a portion of the building collapses thus breaking either the branch or risers controlling the hose stations. The valves permit shutting off this portion of the standpipe system in order to conserve water for the effective use of the firefighters. Because the Auxiliary Building is constructed of reinforced concrete and seismically supported, the potential for collapse due to fire is virtually non-existent, thus making these code sections addressed not a concern.

TABLE 3.5-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
421	1971	Open Item: Each hose outlet on Class II stations should have a maximum of 75 ft. of hose. These hose stations include: HOSE STATION NO. — ELEVATION 209 & 209A — 650' 207 & 207A — 612' 212 & 212A — 612' 210 & 210A — 650'	Justification: In later edition years this requirement is changed to 100 ft. of hose.
432 442 4-7.1 1-6.2	1971 1971 1986 1986	Deviation: Hose for building occupants should have a sign so stating and pressure exceeding 100 psi should be reduced to maximum 80 psi.	Justification: Hose stations are marked "For Trained Personnel Only" and pressures exceed 100 psi. Trained firefighters can handle high pressure hose.
443	1971	Deviation: Hoses on wet systems should be equipped with an open or automatic drip valve to carry off slight leakages past the hose valves to prevent wetting the hose.	Justification: In 1971 the predominant hose in was linen hose. When linen hose became wet, it deteriorated rapidly. To prevent this deterioration, these valves were recommended. Linen hose is not provided at this plant.
511 524 525	1971 1971 1971	Open Item: The adequacy of the water supply for the hose system cannot be verified.	AEP to provide justification.
624	1971	Deviation: An approved indicator valve for valve no. FP 263 should be provided.	AEP to provide justification.

TABLE 3.5-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
651	1971	Deviation: Approved hangers shall be arranged to securely restrain piping. This piping includes the Auxiliary Building supply pipe valve in the main aisle at elevation 587'.	AEP to provide justification.
671	1971	Deviation: A 3-1/2 inch dial spring pressure gage is not provided at the top of each standpipe.	Justification: Standpipes located in fire zones 55 and 60 have these gages installed. AEP will provide justification for standpipes that do not have these gages.
681	1971	Deviation: Waterflow alarms are not provided on the standpipe system controlled by valves ZMO-10 and ZMO-20.	Justification: See response to NFPA 72D, 1967, section 3431.
711	1971	Open Item: No information is available on the original acceptance tests to verify that the hydrostatic tests were conducted at pressures 50 psi above normal pressures for two hours on the systems including the underground.	Justification: Although these test documents were not available for review, the NRC regulatory requirements dictate that surveillance testing of the fire main system be performed to verify their operability. Therefore, the performance of these surveillance tests will provide all equivalency for this code section.
712	1971	Open Item: No information was available on the original acceptance tests to verify that the leakage in underground piping was measured from a calibrated container.	Justification: Reference 711 above.

TABLE 3.5-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
713	1971	Open Item: No information was available on the original acceptance test to verify that the leakage at joints does not exceed 1-oz. per hour per inch of pipe diameter per joint for lead or lead substitute joints. Or, 2 quarts per hour per 100 joints irrespective of pipe diameter for gasketed joints.	Justification: Reference 711 above.
723	1971	Deviation: The valves ZMO-10 and ZMO-20, are not open at all times to provide a pressurized system.	Justification: The valves ZMO-10 and ZMO-20 are tested by procedure 12-OHP 4030.STP. 120 every six months, in the automatic mode to assure that they will open when required. This satisfies the intent of having a pressurized system at all times.
724	1971	Deviation: Hoses are not removed and reracked at least annually. Also new gaskets are not installed in the couplings both at the hose valves and at the nozzles unless the existing gaskets are degraded.	Justification: Fire hoses are inspected monthly for verification of equipment present and identification of any damage. If damage is noted, the hose is replaced. At 18 months intervals all hoses are removed; inspected for damage and degradation of gaskets; corrections made, if necessary; and reracked. This dual checking of hoses at one and 18 month frequencies satisfies the intent of the code to identify and correct damaged equipment.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 14 - Standpipe and Hose System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3-2.2 4-2.1 4-3.2 4-4.3.1	1978 1978 1978 1986	Deviation: a. Class II hose stations do not have labels indicating "For Use By Occupants". b. Several areas which are served by Class II hose stations are not within 30 feet of a nozzle attached to a maximum 100 feet of hose. Reference code section 421, 1971 edition for deficient hose stations.	Justification: a. All hose stations at this plant are restricted for use by trained persons only, thus removing them from a Class II designation which are for use by building occupants. b. Reference code section 421, 1971 edition for justification.
8-1.2	1986	Deviation: A flow test to verify that standpipe systems can achieve the requirements of Section 5-3.2 is not required to be conducted by specification DCCPM110QCS.	AEP to provide justification.

3.6 NFPA 15-1973 Water Spray Systems

3.6.1 Scope of Evaluation

The water spray systems evaluated for the D. C. Cook Nuclear Plant are limited to the systems protecting the charcoal filters and the auxiliary building hydrogen cylinder storage tanks. These systems were evaluated using the requirements of the 1973 edition of NFPA 15 which was the current edition during system installation. These systems are located as follows:

Zone 5	Unit 12-HV-SATFU
Zone 33A	Unit 1-HV-CIPX-1
Zone 34A	Unit 2-HV-CIPX-1
Zone 49	Unit 1-HV-AES-1
Zone 49	Unit 1-HV-AES-2
Zone 49	Unit 12-HV-AFX
Zone 50	Unit 2-HV-AES-1
Zone 50	Unit 2-HV-AES-2
Zone 69	Unit 1-HV-CPR-1
Zone 69	Unit 2-HV-CPR-1
Zone 70	Unit 1-HV-ACRF-1
Zone 73	Unit 2-HV-ACRF-1
Yard	Aux. Bldg. H_2 Tube Racks

3.6.2 Assumptions

The following assumptions have been made for the evaluation of NFPA 15.

1. Due to ALARA (high radiation) concerns, only one charcoal filter unit was made accessible during the walkdowns. Therefore, the water spray nozzle arrangements within the filtration units are assumed similar for all units.

2. The fire protection systems at the D. C. Cook Plant are not "subject to earthquake" as it pertains to NFPA codes.

3. The water spray systems were installed per 1971 specifications.

3.6.3 Deviations and Recommendations/Justifications

The water spray systems are in compliance with NFPA 15 with the exception of the open items and deficiencies identified in Table 3.6-1. The table also provides recommendations/ justifications for these items.

3.6.4 References

Ref. No.	Document Number	Title	Revision No./Date	
3.6.4.1		Walkdown Verification Checklists		
1	0120-108-006C	Impell Calculation, NFPA 15 Code Compliance Walkdown Verification Checklist Charcoal Filters/Zones 33A,34A)	0	11/20/87
2	0120-108-006D	Impell Calculation, NFPA 15 Code Compliance Walkdown Verification Checklist (Charcoal Filters/Zones 69, 70, 73)	0	11/20/87
3	0120-108-006E	Impell Calculation, NFPA 15 Code Compliance Walkdown Verification Checklist (Aux. H_2 Storage Tank/Yard)	0	11/20/87
4	0120-108-006F	Impell Calculation, NFPA 15 Code Compliance Walkdown Verification Checklist (Charcoal Filter/Zone 49)	0	11/20/87
5	0120-108-006G	Impell Calculation, NFPA 15 Code Compliance Walkdown Verification Checklist (Charcoal Filter/Zone 50)	0	11/20/87
6	0120-108-006H	Impell Calculation, NFPA 15 Code Compliance Walkdown Verification Checklist (Charcoal Filter/Zone 5)	0	11/20/87
3.6.4.2		Procedures		
1	PO-050-508	Fire Protection-Water Preoperational Test Procedure	0	07/03/74
2	12 MHP 4030.STP.020	Inspection of the Fire Protection System Deluge and Preaction Spray Headers in the Auxiliary Building	3	03/06/86
3	12 THP 4030.STP.223	Fire Protection Water System Test	6	09/11/87

3.6.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
4	12 OHP 4030.STP.120	Fire Protection System - Water and Carbon Dioxide	11 01/30/87
3.6.4.3		Technical Data	
1		Letter From: R.J. Daley To: R.W. Jurgensen Instruction Book, "Grinnel and Star Fire Systems Equipment"	07/15/74
2	SD-DCC-FP101	System Description, Fire Protection System-Water	2 Draft
3		Specification for Fire Protection Systems of D.C. Cook Nuclear Plant	0 04/02/71
4	DCCPM104QCS	Piping Specification	4 11/09/72
5	DCCPM102QCS	Shop and Field Fabrication and Erection	4 05/24/73
6	RFC DC-01-2680	Appendix R Sprinkler System Modification Packet	0 09/17/85
7		Instruction Manual for Appendix "R" Sprinkler Additions - RFC's 01-2680 and 02-2695 (Phoenix Contractors)	
8	DCCFP109QCS	Fabrication and Installation of Appendix R Sprinkler Systems, Specification for RFC's DC-02-2695 and DC-01-2680 PSI (Power Systems Inc.)	0 02/10/84
9	RFC #02-2695 RFCDL REF #52	Hydraulic Calculations (Phoenix Contractors)	08/--/84
10	DCCFP108QCS	Design of App. R Sprinkler Systems, Specification for RFC's DC-02-2695 and DC-01-2680 (Phoenix Contractors)	2 02/10/84

6.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
11	0120-108-007	Impell Calculation, NFPA 72D Code Compliance Verification Checklist	0	05/16/88
12	0120-108-008	Impell Calculation, NFPA 72E Code Compliance Verification Checklist	0	05/16/88
13		Telecopy from Al Hall to D. Hoover		12/14/87
14		ANI's Recommendations for Carbon Filters		09/--/77
15	ROC from D. Kipley to B. Gerwe	Ambient Conditions of Plant		12/03/87
16		Hydraulic Calculation for "The Hydrogen Bulk Storage Tanks" (Grinnell)	1	12/18/71
17	RFC #12-2231 RFCDL REF #53	Hydraulic Calculations (Phoenix Contractors)		04/26/79
18	0120-108-006	Impell Calculation, NFPA 15 Code Compliance Verification Checklist	0	04/22/88
19	DCC-FP-103	Fire Protection Systems - Miscellaneous	3	08/26/87
3.6.4.4		Licensing Documents		
1	DRP No. 74	Donald C. Cook, FHA Docket No. 50-316	1	01/30/87
3.6.4.5		Drawings		
1	Hodgman DWG 127-1	Control Room Cable Vault Sprinkler Piping Planview	2	06/18/75
2	46-032-71M-18	High Roof Area Sprinkler Piping Planview (Grinnell)	5	03/03/72

6.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
3	46-032-71M-16	Drumming Area Sprinkler Piping Planview (Grinnell)	5	02/28/72
4	12-5152N-2	Flow Diagram Fire Protection - Water System Details - Yard Piping	2	07/01/87
5	12-5152L-2	Flow Diagram Fire Protection - Water System Details - Turbine Bldg.	2	02/25/87
6	12-5152A-1	Flow Diagram Fire Protection - Water Piping at Pumps	1	01/22/87
7	HB-1181	Filter Unit Fire Hose Connection RFC-12-2463, 2465	A	08/20/81
8	46-032-71M-17	"Hydrogen Storage Tanks and Valve Header for High Roof, Drumming Area, and Outside Tanks" (Grinnell)	4	12/17/71
9	DC 1 & 2-MFP-PHX-FILE-015000	DWG DC 1 & 2-MFP-PHX-FILE-015000 Contractor's Access Sprinkler Drawing from RFC-12-1437	2	12/07/81
10	DC-2-MFP-RD22695-009-002 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. East Piping Corridor (Phoenix DWG)	7	06/19/84
11	DC-2-MFP-RD22695-010-002 (AEPSC No.)	Elev. 633'-0 Aux. Bldg. North Piping Corridor (Phoenix DWG)	8	06/19/84
12	DC-2-MFP-RD22695-008-001 (AEPSC No.	Elev. 633'-0 Aux. Bldg. South Piping Corridor (Phoenix DWG)	8	06/11/84
13	DC-2-MFP-RD22695-025-000 (AEPSC No.)	Inspectors Test Detail Elev. 633'-0 Aux. Bldg. N. Corridor (Phoenix DWG)	2	06/13/84
14	DC-2-MFP-RD22695-017-001 (AEPSC No.)	Details & Sections Elev. 633'-0 Bldg N. Corridor (Phoenix DWG)	2	06/14/84

6.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
15	DC-2-MFP-RD22695-007-001 (AEPSC No.)	Elev. 633'-0 Turbine Bldg. Supply Piping Details (Phoenix DWG)	2	06/04/84
16	DC-2-MFP-RD22695-023-001 (AEPSC No.)	Elev. 620'-6 Aux. Bldg. HVAC Room Unit #1 (Phoenix DWG)	2	06/13/84
17	DC-2-MFP-RD22695-022-002 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - Fire Protection Piping	8	07/02/86
18	DC-2-MFP-RD22695-022-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - Fire Protection Piping (Phoenix DWG)	6	06/19/84
19	DC-2-MFP-RD22695-024-001 (AEPSC No.)	RFC-02-2695 Elevation 609 Turbine Bldg. Riser Diagram (Phoenix DWG)	3	06/15/84
20	DC-2-MFP-RD22695-020-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. Section Views (Phoenix DWG)	6	06/19/84
21	DC-2-MFP-RD22695-006-002 (AEPSC No.)	Elev. 609'-0 Turbine Bldg. Supply Piping Details (Phoenix DWG)	4	06/05/84
22	DC-1 & 2-MFP-RFC-RFC-2621-001-001 (AEPSC No.)	As-Built for Aux. Bldg. 587' & 609'	2	-----
23	DC-2-MFP-RD22695-021-002 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. East/West Piping Corridors (Phoenix DWG)	3	07/02/86
24	DC-2-MFP-RD22695-019-001 (AEPSC No.)	Elev. 609'-0 Aux. Bldg. - CCW Fire Protection - Sidewall Sprinklers (Phoenix DWG)	7	06/19/84
25	DC-2-MFP-RD22695-005-004 (AEPSC No.)	Units 1 & 2 Aux. Feed Pump Corridor Sprinkler System (Phoenix DWG)	6	06/13/84
26	DC-2-MFP-RD22695-004-004 (AEPSC No.)	Unit 2 Emerg. DG Pump/Corridor Sprinkler System (Phoenix DWG)	6	06/13/84

.6.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
27	DC-2-MFP-RD22695-003-004 (AEPSC No.)	South Stair of Aux. Bldg. Elev. 587'-0 Sprinkler Water Curtain (Phoenix DWG)	4	05/14/84
28	DC-2-MFP-RD22695-016-003 (AEPSC No.)	RFC-02-2695 Elev. 587'-Inspection Test Conn. (Phoenix DWG)	4	06/13/84
29	DC-2-MFP-RD22695-002-004 (AEPSC No.)	North Stair of Aux. Bldg. Elev. 587'-0 Sprinkler Water Curtain (Phoenix DWG)	6	06/10/84
30	DC-1 & 2-MFP-RFC-2621-002-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	3	-----
31	DC-1 & 2-MFP-RFC-2621-003-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	2	-----
32	DC-1 & 2-MFP-RFC-2621-004-001 (AEPSC No.)	As-Builts for Aux. Bldg. 587' & 609' (Phoenix DWG)	2	-----
33	DC-1 & 2-MFP-RFC-2621-005-001 (AEPSC No.)	As-Builts fo Aux. Bldg. 537' & 609' (Phoenix DWG)	4	06/01/84
34	DC-2-MFP-RD22695-001-004 (AEPSC No.)	East Stair of Aux. Bldg. Elev. 573'-0 & 587'-0 Sprinkler Water Curtain (Phoenix DWG)	6	06/13/84
35	2-5152K-1	Flow Diagram, Fire Protection - Water System Details - Turbine Bldg. & Screen House	1	02/25/87
36	12-5152E-2	Flow Diagram, Fire Protection - Water Charcoal Filters	2	07/07/87
37	12-5401-7	Aux. Bldg. Fire Protection Piping to Charcoal Filters	6	01/22/86
38	12-5401A-6	Aux. Bldg. Fire Protection Piping to Charcoal Filters	5	01/10/78

6.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
39	1-5152J	Flow Diagram, Fire Protection - Water System Details - Turbine Bldg. & Screen House	0	10/06/86
40	46-032-71M-15	Grinnell Sprinkler Drawing for Unit 1 Auxiliary Feed Pump Room	0	09/24/71
41	Phoenix T-591-M	Unit 1 Emergency DG Ramp	0	03/08/84
42	Hodgman DWG 121-15	Unit 2 AFW Pump Initial Installation DWG	1	05/01/75
43	12-5152D	Flow Diagram, Fire Protection Water Aux. and Containment Buildings	0	10/6/86

TABLE 3.6-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 15 - Water Spray Fixed Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
1061	1973	Open Item: Documents verifying the certifications of all water spray systems involved are not provided.	Justification: The requirements of this code section are covered in detail in other parts of the code. Therefore, the individual requirements will be addressed within each applicable code section.
2012	1973	Open Item: There are no documents which show that all materials and devices installed for the water spray systems were new or considered satisfactory for reuse.	Justification: It is assumed that all materials and devices installed for the water spray systems are in accordance with standard installation practices under the guidance of the 1971 piping and installation specifications.
2031 4072	1973	Deviation: The support plates holding the charcoal filters obstruct the water discharge to some of the filters. See Assumption 3.6.2.1. The pilot line for the hydrogen cylinder system will interfere with the discharge pattern of one nozzle.	AEP to provide justification.
2082	1973	Deviation: The ASCO Sol. #HT8300B61F and J830081F for the thermistor wires are not approved.	Justification: Refer to the NFPA 72D Code Compliance Summary - Code Section 2212.
2111	1973	Deviation: Pipeline strainers are not provided for the H_2 storage tank pumps.	Justification: No action is required since strainers are provided at the pumps.
4011	1973	Open Item: Working plans, specifications and hydraulic calculations are not provided for the charcoal filter systems.	AEP to provide justification.

TABLE 3.6-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 15 - Water Spray Fixed Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4032(b)	1973	Open Item: There are no documents for the adequacy of the water spray nozzles within each filter unit.	AEP to provide justification.
4052	1973	Open Item: There are no documents showing that adequate provisions for drainage of the affected area upon system actuation is provided.	Justification: Due to radiation concerns, it is desirable to contain the water within each filter unit to limit the possibility of contamination upon actuation of the suppression system.
4063	1973	Deviation: There are no drains provided at the elbows entering the filter units.	Justification: Drainage at the valve, open nozzles, and pneumatic draining can be performed to satisfy this code section.
4081	1973	Deviation: 3/4" pipe is used for filter unit 12-HV-SATFU where a 1" pipe is required.	AEP to provide justification.
4081 4082(d) 4101 4102 4103	1973	Open Item: There are no documents/drawings available for the charcoal filters to verify the adequacy of the pipe supports, nozzles, gage connections, or piping arrangements.	AEP to provide justification.
4082(d)	1973	Deviation: There are no test gage connections provided for the charcoal filter systems.	AEP to provide justification.
4101 4102 4103	1973	Open Item: A pipe, supplying water to filter unit 1-HV-CIPX-1, is supported by a rod welded to the pipe itself. No approval or evaluation could be found for this assembly.	AEP to provide justification.

<u>TABLE 3.6-1</u>
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 15 - Water Spray Fixed Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4121	1973	Deviation: There are no pressure gages installed for the water spray systems.	AEP to provide justification.
5021 5031	1973	Open Item: There is no documentation to to verify that the hose hook-up system was tested.	AEP to provide justification.
5023	1973	Open Item: There are no test results for the discharge pressure at the most remote nozzle of each system.	AEP to provide justification.
5011 5031 6001 6002 6003 6013 6014 6015 6016 6017 6018	1973	Open Item: Charcoal filter unit 12-HV-SATFU is not included in any of the procedures reviewed.	AEP to provide justification.
7000	1973	Deviation: There are no plant drawings which show the hose hookup system or the configuration of the nozzles within each filter unit. Not all required information appears on the drawing for the hydrogen cylinder system.	AEP to provide justification.
7010	1973	Open Item: There are no hydraulic calcu-lations for the charcoal filter water spray systems.	AEP to provide justification.

TABLE 3.6-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 15 - Water Spray Fixed Systems

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
7010	1973	Deviation: A graph sheet is not included in the hydraulic calculation for the H_2 tank system.	AEP to provide justification.
8051	1973	Deviation: The response time of the thermistor wire detectors is not acceptable.	Justification: The response time has been previously evaluated and accepted by AEP.

3.7 NFPA 72D - PROPRIETARY SIGNALING SYSTEMS

3.7.1 Scope of Evaluation

The evaluation of the proprietary signaling system included the review of this system under two editions. The initial edition year selected was based on the edition that was in effect at the time the system was specified on April 2, 1971. The edition that was applicable was 1967. Modifications were performed later during 1983 and 1985 time period and the edition in effect at that time was 1979. The portions of the systems addressed under the applicable edition, are as follows:

<u>1967 Edition</u>

- Pyralarm System
  - a. Unit 1 & 2 "EFR" Panels
  - b. Unit 1 "GRC" Panel
- Alison Control, Inc.
  - a. Model A924, Charcoal Filter Unit Panels
  - b. Model A909 Diesel Generator Room Detection Panels
  - c. Model 7035, Cable Vault Halon Release Panels
  - d. Model 6007, Containment Alarm Panels
- Chemetron Corp. (Cardox)
  - a. CO_2 Control Panels
- Rochester Annunciator System
  - a. Unit 1 & 2 "EF" Panels
    1. Unit 1 & 2 "Plant Fire System" Annunciator
    2. Unit 1 & 2 "Misc. Area Fire System" Annunciator
  - b. This annunciator monitors all sprinkler, fire pump and hose station waterflow and supervisory signaling devices. In addition, they also monitor all CO_2 and halon 1301 suppression system actuation and supervisory signals.

1979 Edition

- Pyrotronics "System 3" panels

  a. ESW Pump Cubicle Panel

  b. Unit 1 Transformer Room/Diesel Corridor/Auxiliary Feed Water Vestibule Panel.

  c. Unit 2 Transformer Room/Diesel Corridor Panel.

  d. Unit 1 & 2 Main Steam Line, Main Steam Valve Enclosure & NESW Value Area Panels.

  e. Unit 1 & 2 Computer Room Detection Halon Panel.

- Alison Control, Inc.

  a. Model A700-9, Unit 1 & 2 RCP Pump Detection Panels.

The areas of the plant where these systems monitor alarm devices, has been addressed under Section 2.1 of this report. In addition sprinkler system riser and fire pump alarm initiating devices were verified during the walkdown phase were located outside the areas referenced. These devices were located as follows:

System Type	Fire Zone	Elevation
(3) Electric Fire Pumps	2	573'
(1) Electric Jockey Pumps	2	573'
(2) Diesel Driven Fire Pumps	28 & 30	587'
(4) Sprinkler System Headers	79, 80, 84 & 85	587'
(2) Sprinkler System Headers	31 & 96	609'

The evaluation of the functional capabilities of the proprietary signaling system included the verification of the monitoring of sprinkler system waterflow and supervisory system signaling, fire pump system signaling, halon and CO_2 system signaling, supplemental manual station signaling and fire detection system signaling. The interface between the proprietary system and the control room operators was evaluated to confirm compliance for the actions taken upon receipt of signals. The Surveillance Program was also evaluated to determine compliance.

Certain scope limitations are identified in the report which are not verified due to their non-applicability. The limitations are as follows:

a. The proprietary signaling system has not been designed to perform Manual Fire Signaling Services as outlined in NFPA 72D, Article 310. This is based on code section 3010 which states that the signaling services may be applied individually or in any combination of different types of systems. Therefore, the requirements of code section 3113 are not applicable. However, code sections 3321 and 3421 requires manual fire stations to be located where designated by the authority having jurisdiction. These devices have been provided as required.

b. The intent in the design of proprietary signaling system at D.C. Cook was to be a "Class B" (two wire) system in accordance with the requirements of code section 4011. Therefore, the requirements of code sections 4012, and 4080 which address "Class A" systems are not applicable.

c. The review of the line-type heat detector configurations for the RCP pump (ACI A700-9) and containment alarm systems (ACI 6007) are not included in this review.

3.7.2 Assumptions

The following assumption has been made for the evaluation of NFPA 72D.

1. For the purpose of this report, it is assumed that under most conditions the authority having jurisdiction was the architect/engineer (A/E) for the plant who is American Electric Power Service Corporation (AEPSC) unless otherwise indicated.

3.7.3 Deviations and Recommendations/Justifications

The plant proprietary signaling system is in compliance with NFPA 72D except as identified by the open items and deviations in Table 3.7-1. The table also provides recommendations/justifications for these items.

3.7.4 References

Ref. No.	Document Number	Title	Revision No./Date	
3.7.4.1	72D Walkdown Verification Checklists			
1	0120-108-007A	Fire Zone 1-1H, 29G 29A-F, 7 thru 11, 1,3,4,5, 6N,6M,6S, 13,15,16, 18,19,21 and a portion of 79 & 85.	0	12/10/87
2	0120-108-007B	Fire Zone 32, 33-33B, 34-34B, 37 thru 39, 40A&B, 41 42A-D, 43, 44N&44S, 45, 46A thru D, 47A&B	0	12/10/87
3	0120-108-007C	Fire Zone 56, 57, 58, and a portion of 44N	0	12/10/87
4	0120-108-007D	Fire Zone 49 thru 54	0	12/10/87
5	0120-108-007E	Fire Zone 69 thru 73	0	12/10/87
3.7.4.2	72E Walkdown Verification Checklists			
1	0120-108-008A	Fire Zone 1-1H	0	12/10/87
2	0120-108-008B	Fire Zone 29G	0	12/10/87
3	0120-108-008C	Fire Zone 14 & 79	0	12/10/87
4	0120-108-008D	Fire Zone 3, 4, 5, 6N, 6M, 6S, 64A&B, 65A&B, 61, 62A thru C, 63A thru C	0	12/10/87
5	0120-108-008E	Fire Zone 13,15,16	0	12/10/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
6	0120-108-008F	Fire Zone 17C	0	12/10/87
7	0120-108-008G	Fire Zone 7 thru 11	0	12/10/87
8	0120-108-008H	Fire Zone 29A thru F	0	12/10/87
9	0120-108-008J	Fire Zone 23 thru 27	0	12/10/87
10	0120-108-008K	Fire Zone 18, 19 & 21	0	12/10/87
11	0120-108-008L	Fire Zone 20 & 85	0	12/10/87
12	0120-108-008M	Fire Zone 37, 43, 44N & 44S	0	12/10/87
13	0120-108-008N	Fire Zone 33 thru 33B	0	12/10/87
14	0120-108-008O	Fire Zone 38	0	12/10/87
15	0120-108-008P	Fire Zone 40A&B, 41 42A thru D	0	12/10/87
16	0120-108-008Q	Fire Zone 34 thru 34B	0	12/10/87
17	0120-108-008R	Fire Zone 45, 46A thru D 47A&B	0	12/10/87
18	0120-108-008S	Fire Zone 39	0	12/10/87
19	0120-108-008T	Fire Zone 56 & 57	0	12/10/87
20	0120-108-008U	Fire Zone 58 & 59	0	12/10/87
21	0120-108-008V	Fire Zone 55	0	12/10/87
22	0120-108-008W	Fire Zone 60	0	12/10/87
23	0120-108-008X	Fire Zone 53 & 145	0	12/10/87
24	0120-108-008Y	Fire Zone 54 & 144	0	12/10/87
25	0120-108-008Z	Fire Zone 52 & 106	0	12/10/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
26	0120-108-008AA	Fire Zone 48 thru 51 & 107	0	12/10/87
27	0120-108-008BB	Fire Zone 32, 69, 70 & 73	0	12/10/87
28	0120-108-008CC	Fire Zone 71 & 72	0	12/10/87
3.7.4.3	Procedures			
1	12-OHP4030.STP.120	Fire Protection System - Water & CO_2	11	01/30/87
2	1-OHP4030.STP.121LD	Low Demand Fire Pump Oper. Test	1	12/13/85
3	1-OHP4030.STP.121HD	High Demand Fire Pump Oper. Test	1	12/13/85
4	2-OHP4030.STP.121HD	High Demand Fire Pump Oper. Test	1	12/13/85
5	2-OHP4030.STP.121DD	Diesel Fire Pump Oper. Test	0	02/17/85
6	1-OHP4030.STP.121DD	Diesel Fire Pump Oper. Test	0	02/17/85
7	12-THP4030.STP.223	Fire Protection Water System Test	6	09/04/86
8	12-QHP4030.STP.003	Standpipe Oper. Test	0	07/18/85
9	12-THP6030.IMP.144	Man. Oper. Fire Alarm Boxes	2	06/09/81
10	12-THP6030.IMP.142	Fire Det. Inst. & CO_2 Surv.	10	05/09/87
11	12-THP6030.IMP.153	Sys. 3 Fire Det. Surv. Testing	4	04/23/87
12	12-THP6030.IMP.051	Fire Det. High Volt. Prev. Maint.	2	05/18/87

.7 4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
13	12-THP4030.STP.224	Control Room Cable Vault Halon System Surv.	4 01/15/87
14	-	- -	-
15	12-THP6040.PER.105HR	Hose Reel Sta. CO_2 Test	0 04/25/86
16	12-THP4030.STP.225.010	Control Room Cable Vault CO_2 System Test	1 05/14/87
17	12-THP4030.STP.225.020	Auxiliary Cable Vault CO_2 System Test	1 05/14/87
18	12-THP4030.STP.225.030	Reactor C.T.Q #1 CO_2 Test	1 06/04/87
19	12-THP4030.STP.225.031	Reactor C.T.Q #2 CO_2 Test	1 06/04/87
20	12-THP4030.STP.225.032	Reactor C.T.Q #3S CO_2 Test	1 06/11/87
21	12-THP4030.STP.225.033	Reactor C.T.Q #3M CO_2 Test	1 06/18/87
22	12-THP4030.STP.225.034	Reactor C.T.Q #3N CO_2 Test	1 06/18/87
23	12-THP4030.STP.225.035	Reactor C.T.Q #4 CO_2 Test	1 06/11/87
24	12-THP4030.STP.225.042	Diesel Generator Oil & Pump & Valve Room CO_2 Test	1 05/29/87
25	12-THP4030.STP.225.050	4KV Swtgr CO_2 Test	1 06/23/87
26	12-THP4030.STP.225.051	Emergency Swtgr. CO_2 Test	1 06/25/87
27	12-THP4030.STP.225.052	CRD Trans. Swtgr Room CO_2 Test	1 06/24/87
28	12-THP4030.STP.225.053	Swtgr. Cable Vault CO_2	1 08/20/87

?.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
29	1-THP4030.STP.225.040	Unit 1 AB Diesel Gen. CO_2 Test	1 06/04/87
30	1-THP4030.STP.225.041	Unit 1 CD Diesel Gen. CO_2 Test	1 05/29/87
31	1-OHP4024.102.001-050	Annunciator #2 Resp. Misc. Area Fire System	3 11/06/86
32	2-OHP4024.202.001-050	Annunciator #2 Resp. Misc. Area Fire System	1 11/06/86
33	1-OHP4024.101.001-100	Annunciator #1 Resp. Plant Fire System	2 04/27/82
34	2-OHP4024.201.001-100	Annunciator #1 Resp. Plant Fire System	2 12/03/86
35	PMI-2270	Fire Protection	16 07/09/87
36	12-PMP2070.TRN.108	Maint. Skills Testing Prog.	1 04/23/87
37	OHI-2272	Use & Maint. of D.C.C. Fire Prg - Rans	0 06/13/85
38	OHI-4011	Conduct of Oper. (Shift Staffing)	3 06/25/87
39	OHI-4013	Operators: Auth. & Resp.	2 04/23/87
40	12-AHP2060.SEC.052	Fitness for Duty	0 11/06/85
41	OHI-4012	Conduct of Operator (Shift Turnover)	5 01/06/87
42	12-AHP2060.SEC.016	Employee ID	12 08/27/87
43	12-QHP2270.FIRE.011	Fire Watch Activities	2 07/31/86
44	12-PMP2070.TRN.115	Fire Brigade Training	2 05/09/87
45	OHI-2070	Training	5 04/07/86
46	PMI-2070	Training	8 07/26/85

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
47	12-THP6030.IMP.307	System 3 Fire Det. Surv. Testing	0 04/16/85
48	PMI-2040	Information Management	6 06/26/86
49	PMI-4030	Technical Specifications	13 12/24/87
50	12-THP4030.STP.239	RCP Pump Fire Prot. Test	5 07/09/87
51	12-OHP4022.066.001	Alternate Filter Unit Valve Operator	1 11/06/86
52	1-THP6030IMP.151	Containment Cable Tray Fire Detection	4 04/11/86
53	2-THP6030IMP.251	Containment Cable Tray Fire Detection	5 12/20/85
3.7.4.4	Technical Data		
1	-	Alison Controls Operation Maintenance Manual	- 01/15/75
2	00900020001	FCI Ltr. Ref. Cook Plant & Job #1882	- 12/06/77
3	PLC Report	D.C. Cook Unit 1 Control Room Fire Det. Test Results	- 10/13/83
4	Ref. 2-6.4, F.I. 78-2	NFPA 72E - '84 Edition Formal Interpretation	- 1984
5	-	NFPA 220 - '85 Edition Page 4 & 5 only	- 1985
6	SD-DCC-FP101	Fire Protection System Water System Description	2 Draft
7	SD-DCC-FP103	Fire Protection System-Misc. System Description	3 08/16/87 Draft
8	-	Specification for Fire Protection System @ D.C. Cook Unit 1 & Unit 2	0 04/02/71

ˀ.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
9	DCCFP106QCF	Specification for Low Volt Ion Fire Detection System	0 03/15/87
10	Letter from P. Regenscheid to P. Wycoff	Fire Protection for Char Filter Unit @ Spray Add. Tank Room	- 01/15/87
11	Sht. 1-54	D.C. Cook "Pyralarm" Detection System Ckt. Layout Unit 1 & 2	1 04/09/85
12	-	ANI Recom. for Charcoal Filter	- 09/77
13	Technical Data "Viking"	Emergency Release Part #01553C	- -
14	Mercoid Pg. 1-5 Data Sheet	Mercoid Pressure & Temperature Controls	- -
15	Page 1 of 1 Potter Electric	Gate Valve Switch Model #OSYS-U	- -
16	Potter Electric Bulletin 518 Page 1 & 2 of 2	Gate Valve Switch Model #OSYS-B	Pg 1 12/83 Pg 2 07/84
17	3129402021 Page 1-3	Telex with Cable Descriptions	- 12/17/87
18	January 1985	Underwriters Laboratories Fire Protection Equipment Directory	- 12/31/84
19	January 1977	Underwriters Laboratories Fire Protection Equipment Directory	- 12/31/76
20	UL864	UL Standard for Safety Control Units for Signaling System	6th 06/06/80

3.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
21	P7825	Factory Mutual Approval Guide 1986	Rev 01/86 86
22	RFC#12-2521	Fire Detection Design Packet	- 08/14/85
23	RFC#12-2741	Fire Detection Design Packet	0 02/13/87
24	RFC#12-1843	Fire Detection Design Packet	3 10/23/87
25	RFC#01-2679	Fire Detection Design Packet	0&1 01/31/86
26	RFC#02-2694	Fire Detection Design Packet	0&1 05/02/86
27	RFC#12-2678	Fire Detection Design Packet	0&1 12/18/87
28	-	- -	-
29	NFPA 13	Installation of Sprinklers	- 1971 1983
30	NFPA 72D	Proprietary Protection Signaling System	- 1967 1979
31	NFPA 72E	Automatic Fire Detection	- 1974 1978 1982 1984
32	Data Sheet 3050	Pyrotronics "System 3" CP-30	- 04/82
33	Data Sheet 3165	Pyrotronics "System 3" BM-30	- 12/76
34	Data Sheet 3173	Pyrotronics "System 3" BM-32	- 08/78
35	ROC dated 12/3/87 B. Gerwe from D. Kipley	Ambient Conditions of Plant	- 12/03/87

3.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
36	Data Sheet 3325	Pyrotronics "System 3" "EA" Enclosure	- 08/82
37	Data Sheet 6113	Pyrotronics Ion Det. DI-4A	- 04/79
38	Data Sheet S121	AFA-Minerva I.R. Det. S121	- -
39	ROC From D. Kipley (Impell) to D. Bronmier (U.L.)	U.L. Listed Pyrotronics Det. Equipment	- -
40	RFC 12-2231	RCP Pump Fire Detection Supp. Protection Modification Packet	0 03/27/87
41	ROC dated 1/8/88 L. Taylor from D. Kipley	Pressure Switch Numbering Data	- 01/08/88
42	RFC 12-2149	P-250 Comp. Room Halon System Modification Packet	- -
43	Data Sheet 3168	Pyrotronics "System 3" HC-30	- 12/79
44	-	FCI Detection System System Data Sheet & Man.	App 01/22/75
45	Data Sheet 403-4	Pyrotronics I.R. DFS-10	- 05/73
46	ROC from Joe Black to Delpoletto/Veldhuizen	Pyrotronics FIU & CP-30	- 01/05/88
47	ROC from Joe Black to Depona/Guilfoos	Rochester AN-159	- 01/06/88
48	ROC from J. Black to to E. Taylor	Cable Information	- 01/12/88
49	ROC from J. Black to F. Keymak (M. Kimak; ACI)	ACI Power Supply	- 01/13/88

3.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
50	NFPA 70, Section 310	NEC Table 310-16	- 1987
51	Data Sheet 3351	Pyrotronics BM-30	- 03/80
52	0120-108-009	Impell Air Movement Calculation	0 02/24/88
53	Impell Letter 0120-108-019	Meeting Minutes of Jan. 28 & 29, 1988 (Item: Table 3-7.1, Section 4116)	- -
54	UL 346	UL Standard for Safety Waterflow Indicators for Protective Signaling System	2nd 08/19/82
55	UL 38	UL Standard for Safety Manually actuated signal-ing Boxes	4th 07/23/82
56	Catalog #29	Automatic Switch - Co. Pages 3, 9, 50 & 98	- 1973
57	NFPA 90A, Section 4-3	Air Conditioning and Ventilating System	- 1978
58	"Snaplock" Data Sheet	National Acme Company	
59	HVAC Data Input From B. Gerwe to D. Kipley	HVAC Data	- 02/19/88
60	Pyr-A-Larm B-335-8-74	Application Engineering Fundamentals	- 1974
61	Radiation Data From B. Gerwe to D. Kipley	Radiation Level Data	- 03/04/88
62	Fire Protection Report Output #1	D.C. Cook Power Plant, Units 1 and 2	- 12/03/86

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
63		HVAC Systems Duct Design Page 5.10, Section E.1	- 1981
3.7.4.5	Licensing Documents		
1	Letter from S.A. Varga (NRC) to J. Dolan (I & MEC)	Appendix A to BTP APCSB/ 9.5-1 Deviations Pg. 1-10	- 08/27/85
2	Letter from S.A. Varga (NRG) to J. Dolan (I & MEC), Page 1-19	Appendix R to 10CFR 50 Section III G & III O Exemption	- 12/23/83
3	Letter from S.A. Varga (NRG) to J. Dolan (I & MEC), Page 1-19	Appendix R to 10CFR 40 Section III G & III L Exemption	- 11/22/83
4	AEP:NRC:00258 Pg 1-32	Amendments # 31 & 12 Facility Operator License	- 07/31/79
5	-	NRC 53 Questions on Appendix A & FHA 1st & 2nd Sub.	#1 09/30/77 #2 11/22/77
6	I & MEC D.C. Cook Units 1 & 2	Response to Appendix A to BTP/APCSB 9.5-1	0 01/31/77
7	Docket #50-315 & 316 DPR 58 & 74	Fire Hazard Analysis D.C. Cook Units 1 & 2	1 01/30/87
8	Appendix R to 10CFR 50 Part 50	Fire Protection Program for Nuclear Power Facility	- 09/01/82
3.7.4.6	Drawings		
1	1-98602	Descriptive List of Annunciators Station #2	51 04/16/86
2	12-5266	Fire Facilities Plan Below Basement El. 573'	2 08/17/87
3	12-5267	Fire Facilities Plan Basement El. 591'-0" & 587'-0"	3 08/17/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
4	12-5268	Fire Facilities Plan Mezzanine Floor El. 609'	2	08/17/87
5	12-5268A	Fire Facilities Plan Cable Vaults El. 620'-6" & 625'-10"	2	08/17/87
6	12-5269	Fire Facilities Plan Main Floor El. 633'-0"	2	08/17/87
7	12-5270	Fire Facilities Reactor Building El. 650'-0"	2	08/17/87
8	1-5152B	Flow Diagram F.D. Water Unit 1: Turbine Building & Screenhouse	2	08/25/87
9	2-5152C	Flow Diagram F.D. Water Unit 2: Turbine Building & Screenhouse	0	10/06/86
10	12-5152D	Flow Diagram F.P. Water Auxiliary & Cont Buildings Units 1 & 2	0	10/06/86
11	1-98602	Descriptive List of Annunciators, Sheet 2	51	04/16/86
12	1-98601	Description List of Annunciators, Sheet 1	51	06/19/86
13	12-98992	Pyr-A-Larm Systems Service Building Ele. Diagram	2	05/29/79
14	1-92003	Emergency Fire Panel "EF" Wiring Diagram	35	02/10/87
15	1-92006	Emergency Fire Rear Panel "EFR", Sheet 1	10	06/26/81
16	1-92007	Emergency Fire Rear Panel "EFR", Sheet 2	29	04/01/87
17	1-92161	F.P. System Logic Cabinet Wiring Diagram	13	07/16/81

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
18	1-92160	Emergency Fire Rear Panel "EFR", Sheet 4	2	07/18/74
19	1-98611	Annunciator Internal Diagrams Unit 1	4	05/14/87
20	1-98612	Plant Fire System Annunciator Elevation Diagram Unit 1	12	07/01/86
21	1-98951	Scheme of F.P. Turbine & Auxiliary Sheet 1	3	03/09/79
22	1-98952	Scheme of F.P. Turbine & Auxiliary Sheet 2	3	12/18/86
23	1-98966	F.P. Logic Diagram Unit 1	14	03/16/87
24	2-92003	Emergency Fire Panel "EF" Wiring Diagram Unit 2	24	09/18/86
25	2-92006	Emergency Fire Panel "EFR" Sheet 1, Unit 2	6	12/30/77
26	2-92007	Emergency Fire Rear Panel "EFR" Sheet 2	24	08/04/87
27	2-92008	Emergency Fire Rear Panel "EFR" Sheet 3	11	09/17/87
28	2-92160	Emergency Fire Rear Panel "EFR" Sheet 4	4	11/07/78
29	2-92161	F.P. System Logic Cabinet Unit 2	15	08/04/87
30	2-98612	Plant Fire System Annunciator Unit 2	16	08/14/87
31	2-98952	Scheme of F.P. Turbine & Auxiliary Sheet 2	2	12/18/86
32	1-92335	Cont. & Auxiliary sub panel "CAS" Sheet 8	14	04/01/87
33	1-92373	RCP Fire System Control Cab	1	04/01/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
34	1-95901	F.P. Emergency Fire Pump Wiring Diagram	4	11/16/72
35	1-95902	Diesel Engine Fire Pump Sheet 1	13	11/26/79
36	2-95926	F.D. Charcoal Filter Unit 2	7	08/18/86
37	2-98977	F.D. Cont. Detection, Sheet 4	4	08/21/78
38	2-98979	F.D. Reactor Cool Pumps Sprinkler System	2	01/09/87
39	12-95914	Auxiliary Building Sprinkler System	1	05/01/84
40	A924	Alison Control Inc. Sprinkler Control System	0	05/18/72
41	A924	Alison Control Inc. Sprinkler Control System	0	05/17/72
42	541012	Sensor Detection	1	07/27/77
43	324022	Interconnection Diagram	A	08/14/72
44	324028	Elementary Diagram		
45	324029	Elemental Diagram	A	09/30/82
46	771026	Schematic Diagram - (4) Sheets	E	11/23/83
47	771478	Schematic & Interconn Diagram - (2) Sheets	D	06/27/79
48	324173	Int. Diagram A700-9 System - (2) Sheets	D	06/27/79
49	191006	F.P. System Solenoid Valve	C	12/27/79
50	883072	F.P. System 19" Rack - (2) Sheets	E	06/26/79
51	771477	Sch. & Interconn Diagram - (4) Sheets	D	06/27/79

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
52	1-95906	F.P. Transformer H_2O	10	02/13/76
53	1-95909	F.P. Charcoal Filter H_2O Spray Systems	6	04/29/87
54	1-95910	F.P. Charcoal Filter H_2O Spray Systems Turbine & Auxiliary	6	01/29/87
55	1-95911	F.P. Charcoal Filter H_2O Spray Systems Turbine & Auxiliary	6	01/29/87
56	1-95926	F.P. Charcoal Filter H_2O Spray Systems Unit 1 Containment	9	09/18/86
57	1-98969	F.P. H_2O Systems Sheet 3 Elevation Diagram	7	06/08/87
58	1-98971	F.P. H_2O System Sheet 1	8	07/29/83
59	1-98972	F.P. H_2O Systems Sheet 2 Elevation Diagram	9	11/05/86
60	1-98977	F.P. Containment Detection Sheet 4	5	01/07/85
61	1-98978	F.P. H_2O Systems Sheet 4	8	07/01/86
62	1-98979	F.P. Reactor Coolant Pumps	3	04/02/87
63	2-95901	F.P. Emergency Fire Pump Wiring Diagram	1	06/13/77
64	2-95902	Diesel Engine Fire Pump	8	11/26/79
65	2-95906	F.P. Transformer H_2O Spray	10	10/21/86
66	2-95909	F.P. Charcoal Filter H_2O Spray Auxiliary & Turbine System	3	04/29/87
67	2-95910	F.P. Charcoal Filter H_2O Spray Auxiliary & Turbine System	4	04/29/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
68	2-95911	F.P. Charcoal Filter H_2O Spray Auxiliary & Turbine System	4	04/29/87
69	2-95946	F.P. System Control Room Cable Vault Halon	6	02/06/86
70	DK-NY-1433	Pipe Layout Computer Room Units 1 & 2	1	03/28/79
71	DL-NY-1433	Logic Diagram Comp. Room Units 1 & 2	-	-
72	1-95946	F.P. Control Room Cable Vault Halon	6	02/06/86
73	12-98996	Miscellaneous Halon System	4	09/03/86
74	12-98997	Comp. Rooms Halon System	2	09/04/86
75	12-95913	Comp. Rooms F.P. Wiring Diagram	4	09/04/86
76	12-95915	Comp. Rooms F.P. Wiring Diagram Sheet 2	1	06/08/86
77	1-95936	F.P. Turbine & Auxiliary Building CO_2, Sheet 1	15	04/29/86
78	1-95937	F.P. Turbine & Auxiliary Building CO_2, Sheet 2	18	04/29/86
79	1-95938	F.P. Turbine & Auxiliary Building CO_2, Sheet 3	14	04/29/86
80	1-95939	F.P. Turbine & Auxiliary Building CO_2, Sheet 4	14	12/05/87
81	1-95941	F.P. Turbine & Auxiliary Building CO_2, Sheet 6	15	04/29/86
82	1-95942	F.P. Turbine & Auxiliary Building CO_2, Sheet 7	15	04/29/86
83	1-95943	F.P. Turbine & Auxiliary Building CO_2, Sheet 8	15	04/29/86

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date
84	1-95944	F.P. Turbine & Auxiliary Building CO_2, Sheet 9	16 12/01/83
85	1-95945	F.P. Turbine & Auxiliary Building CO_2, Sheet 10	14 04/29/86
86	1-98981	F.P. CO_2 System, Sheet 1	20 06/15/87
87	1-98983	F.P. CO_2 System, Sheet 3	1 07/16/87
88	2-95936	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 1	10 04/29/86
89	2-95937	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 2	13 04/29/86
90	2-95938	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 3	11 04/29/86
91	2-95941	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 6	14 06/13/85
92	2-95942	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 7	6 04/29/86
93	2-95943	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 8	6 04/29/86
94	2-95944	F.P. Turbine & Auxiliary CO_2 Fire System, Sheet 9	10 04/29/86
95	12-95993	F.P. Turbine & Auxiliary CO_2 Hose Reels	2 04/29/86
96	FL-15771	Cardox Fire Extinguisher System Elm. Line, Sheet 17	B 04/21/72
97	FL-15771	Cardox Fire Extinguisher System Elm. Line, Sheet 18	B 04/31/72
98	FL-15771	Cardox Fire Extinguisher System Elect. Control Cab., Sheet 19	A 05/07/71

3.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
99	FL-15771	Cardox Fire Extinguisher System Elect. Control Cab., Sheet 20	A	05/07/71
100	FL-15771	Cardox Fire Extinguisher System Alarm System Elm. Line, Sheet 21	A	05/07/71
101	FL-15771	Cardox Low Pressure Fire Extinguisher System	D	02/15/72
102	12-95929	Fire Detection System Screen-house & ESW	5	10/15/86
103	1-95927	F.P. System Main Steam Line Etc.	1	10/16/86
104	1-95928	F.P. System Trans. Room Etc.	4	10/15/86
105	1-95981	Auxiliary Building Pyr-A-Larm Fire System, Sheet 1	18	03/18/87
106	1-95984	Auxiliary Building Pyr-A-Larm Fire System, Sheet 3	1	10/16/86
107	1-95995	F.P. System Auxiliary Building Fire Siren	3	09/03/74
108	1-98970	F.P. Miscellaneous Elementary Diagram	5	01/23/80
109	1-98990	F.P. Pyr-A-Larm System, Sheet 3	3	10/16/86
110	1-98991	F.P. Detection System Elementary Diagram	12	08/06/86
111	2-95927	F.P. System Main Line Etc.	1	08/11/86
112	2-95928	F.P. System Trans. Room Etc.	2	10/16/86
113	2-95981	Auxiliary Building Pyr-A-Larm Fire System	12	10/05/87
114	2-95982	Auxiliary Building Pyr-A-Larm Fire System, Sheet 2	1	10/16/86

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
115	2-98990	F.P. Pyr-A-Larm System	4	11/18/86
116	2-95995	F.P. System Auxiliary Building Fire Siren	3	09/19/75
117	PM-4302	Detection System Screenhouse - Sheet 1	3	03/04/85
118	PM-4302	Detection System Screenhouse - Sheet 2	1	04/30/85
119	PM-4303	Detection System Main Steam Encl. Etc. - Sheet 1	5	07/27/85
120	PM-4303	Detection System Main Steam Encl. Etc. - Sheet 2	2	07/25/85
121	PM-4303	Detection System Main Steam Encl. Etc. - Sheet 3	0	05/01/85
122	PM-4303	Detection System Main Steam Encl. Etc. - Sheet 4	2	07/25/85
123	PM-4303	Detection System Main Steam Encl. Etc. - Sheet 5	2	07/25/85
124	PM-4304	Detection System Main Steam Line Area - Sheet 1	5	07/25/85
125	PM-4304	Detection System Main Steam Line Area - Sheet 2	2	07/25/85
126	PM-4304	Detection System Main Steam Line Area - Sheet 3	2	07/25/85
127	PM-4304	Detection System Main Steam Line Area - Sheet 4	2	07/25/85
128	PM-4305	Detection System Auxiliary Feed Pump	5	07/25/85
129	PM-4308	Detection System Tranf. Room	5	07/25/85
130	2-95907	Fire Protection XFMR Sprinkler Wiring Diagram	13	10/86

.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
131	1-95907	Fire Protection XFMR Sprinkler Wiring Diagram	16	04/01/87
132	1-95906	Fire Protection XFMR Sprinkler Wiring Diagram	10	02/86
133	1-95903	Diesel Engine Fire Pump Wiring Diagram	7	03/79
134	2-95903	Diesel Engine Fire Pump Wiring Diagram	5	03/20/79
135	12-95908	Auxiliary Building Sprinkler Wiring Diagram	15	-
136	2-98972	Fire Protection Elementary Diagram, Unit 2, Sheet 2	9	10/24/86
137	2-98978	Fire Protection Elementary Diagram, Unit 2, Sheet 4	7	01/26/85
138	2-98971	Fire Protection Elementary Diagram, Unit 2, Sheet 1	10	07/08/87
139	1-95940	Fire Protection Turbine & Auxiliary CO_2 Wiring Diagram Unit 1, Sheet 5	18	04/24/86
140	1-95939	Fire Protection Turbine & Auxiliary CO_2 Wiring Diagram Unit 2, Sheet 4	14	10/14/87
141	2-95940	Fire Protection Turbine & Auxiliary CO_2 Wiring Diagram Unit 2, Sheet 5	13	04/24/86
142	2-98981	Fire Protection CO_2 Elementary Diagram Unit 2, Sheet 1	20	10/30/87
143	2-98983	Fire Protection CO_2 Elementary Diagram Unit 2, Sheet 3	1	06/19/81
144	1-98613	Miscellaneous Fire Area System & Vent. Elementary Diagram	19	10/26/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
145	12-5972	FHA Plan Below Basement, Units 1 & 2	2	04/03/86
146	12-5973	FHA Base T Plan - 587' & 591' Units 1 & 2	3	01/06/87
147	12-5974	FHA Mezzanine Floor - 609'	2	09/03/86
148	12-5975	FHA Plan 601', 609', & 620'-6" to 625'	2	09/03/86
149	12-5976	FHA Turbine Building Main Floor 633'	3	11/25/86
150	12-5977	FHA Reactor Building - 650'	2	09/31/86
151	12-5152P	Flow Diagram Water Fire Protection	2	02/25/87
152	12-5152N	Flow Diagram Water Fire Protection	2	07/01/87
153	12-5152M	Flow Diagram Water Fire Protection	1	07/02/87
154	12-5152L	Flow Diagram Water Fire Protection	2	02/25/87
155	12-5152K	Flow Diagram Water Fire Protection	1	02/25/87
156	12-5152J	Flow Diagram Water Fire Protection	0	10/06/86
157	12-5152H	Flow Diagram Water Fire Protection	0	10/06/86
158	12-5152G	Flow Diagram Water Fire Protection	1	08/06/87
159	12-5152F	Flow Diagram Water Fire Protection	1	01/22/87
160	12-5152E	Flow Diagram Water Fire Protection	2	07/07/87

.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
161	12-5152A	Flow Diagram Water Fire Protection	1	01/22/87
162	12-5152	Flow Diagram Water Fire Protection	1	02/20/87
163	1-2010	Conduit & Cable Schedule, Unit 1	58	05/23/86
164	1-94211	600VA Auxiliary Bus Wiring Diagram	19	04/08/87
165	1-2011	Conduit & Cable Schedule	49	05/18/87
166	1-2012	Conduit & Cable Schedule	38	05/21/87
167	1-2098	Conduit & Cable Schedule	51	12/16/86
168	1-2111	Conduit & Cable Schedule	27	03/31/87
169	1-12000	Auxiliary One-Line Index	3	04/10/87
170	1-12001	Main Auxiliary One-Line Diagram Bus A & B	4	-
171	1-12002	Main Auxiliary One-Line Diagram Bus C & D	3	04/10/87
172	1-12003	250V DC Main One-Line	2	02/26/87
173	1-12050	120/208V AC Control Room Inst.	2	09/14/87
174	1-12051	120V AC Critical Control Room	3	05/26/87
175	1-12052	120/208V AC Control Room Power	6	05/13/87
176	1-12060	DC Auxiliary One-Line 250V DC Bus	2	02/26/87
177	1-12061	DC Auxiliary One-Line 250V DC Bus	1	02/26/87
178	1-12062	DC Auxiliary One-Line 250V DC Bus	1	02/26/87

3.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
179	1-12063	DC Auxiliary One-Line 250V DC Bus	3	04/10/87
180	1-12065	DC Auxiliary One-Line 250V DC Bus	2	06/19/87
181	1-12070	DC Auxiliary One-Line 250V DC Bus	2	02/26/87
182	1-12071	DC Auxiliary One-Line 250V DC Bus	2	07/15/87
183	1-12072	DC Auxiliary One-Line 250V DC Bus	3	04/10/87
184	1-12073	DC Auxiliary One-Line 250V DC Bus	2	02/26/87
185	1-93211	600V Auxiliary Bus 11C	17	06/20/85
186	1-94230	600V Auxiliary Bus 11D	9	07/15/87
187	2-2009	Conduit & Cable Schedule	43	01/29/87
188	2-2010	Conduit & Cable Schedule	35	08/11/87
189	2-2011	Conduit & Cable Schedule	32	09/05/79
190	2-2098	Conduit & Cable Schedule	34	
191	2-2111	Conduit & Cable Schedule	27	10/08/87
192	2-12000	Auxiliary One-Line Index	3	03/26/87
193	2-12001	Main Auxiliary One-Line Diagram	2	09/09/87
194	2-12002	Main Auxiliary One-Line Diagram	1	09/09/87
195	2-12003	250V DC Main One-Line Diagram	0	10/06/86
196	2-12050	120V AC Control Room Inst.	2	-
197	2-12052	120/208V AC Control Room Power	4	10/15/87

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No.	Date
198	2-12060	DC Auxiliary One-Line 250V DC Bus	0	10/06/86
199	2-12061	DC Auxiliary One-Line 250V DC Bus	0	10/06/86
200	2-12062	DC Auxiliary One-Line 250V DC Bus	1	-
201	2-12063	DC Auxiliary One-Line 250V DC Bus	1	04/10/87
202	2-12065	DC Auxiliary One-Line 250V DC Bus	1	06/19/87
203	2-12070	DC Auxiliary One-Line 250V DC Bus	0	10/06/86
204	2-12071	DC Auxiliary One-Line 250V DC Bus	0	10/06/86
205	2-12072	DC Auxiliary One-Line 250V DC Bus	1	09/09/87
206	2-12073	DC Auxiliary One-Line 250V DC Bus	1	-
207	2-93211	600V Auxiliary Bus 21C	11	07/02/85
208	2-94211	600V Auxiliary Bux 21A	7	07/07/87
209	2-98991	Fire Detection Elementary Diagram	7	-
210	2-98613	Misc. Fire Area System & Vent. Elementary Diagram	17	10/30/87
211	1-95982	Auxiliary Building Pyralarm Wiring Diagram	11	10/15/87
212	2-98611	Annunciator Internal Diagram	1	10/87
213	2-98951	Schedule of Fire Protection Turbine & Building, Sheet 1	2	07/09/87
214	2-98970	F.P. Misc. Elementary Diagram	3	03/08/78

.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
215	12-5152B	Flow Diagram Fire Protection Water	2	08/25/87
216	12-5152D	Flow Diagram Fire Protection Water	0	10/06/86
217	12-5152C	Flow Diagram Fire Protection Water	0	10/06/86
218	1-98963	CO_2 Fire Protection Elementary	1	07/16/87
219	2-98963	CO_2 Fire Protection Elementary	1	06/19/81
220	1-98977	CAS ELementary Diagram	5	01/07/85
221	2-98977	CAS Elementary Diagram	4	08/21/78
222	1-92335	CAS Wiring Diagram	14	04/01/87
223	2-92335	CAS Wiring Diagram	14	-
224	12-5713	Heat & Vent. Aux. Bldg. Elev. 573'	4	05/17/84
225	12-5714	Heat & Vent. Aux. Bldg. Elev. 587'	13	None
226	12-5715	Heat & Vent. Aux. Bldg. Elev. 587'	12	05/08/87
227	12-5719A	Heat & Vent. Aux. Bldg. Elev. 587'	3	08/29/85
228	12-5718A	Heat & Vent. Aux. Bldg. Elev. 587'	0	09/16/81
229	1-5688	Heat & Vent. Reactor Cont. Elev. 598' & 612	10	02/01/88
230	2-5688	Heat & Vent. Reactor	8	02/01/88
231	1-5724	Heat & Vent Aux. Center, North, South & East 587' & 609' Elec. Swgr & Dsl. Gen.	8	09/27/85

.7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
232	1-5724	Heat & Vent Aux. Bldg. 609'	11	06/07/84
233	2-5724	Heat & Vent Aux. Bldg. 609'	9	11/10/82
234	1-5724B	Heat & Vent Aux. Bldg. 609'	2	05/11/84
235	2-5724B	Heat & Vent Aux. Bldg. 609'	2	05/24/84
236	12-5736	Heat & Vent Aux. Bldg. 609'	9	05/01/87
237	12-5736B	Heat & Vent Aux. Bldg. 609'	2	02/05/87
238	1-5750	Heat & Vent Aux. Bldg. 633'	9	05/01/87
239	2-5750	Heat & Vent Aux. Bldg. 633'	5	06/10/87
240	12-5737	Heat & Vent Aux. Bldg. 620' & 609'	8	05/13/87
241	12-5718	Heat & Vent Aux. Bldg. 609'	5	10/28/83
242	12-5720	Heat & Vent Aux. Bldg. 633' & 650'	7	10/07/80
243	1-51486	Flow Diagram Aux. Bldg. Elec. Equip. Area. Heat & Vent	0	None
244	1-5148C	Flow Diagram Aux. Bldg. Elec. Equip. Area. Heat & Vent	0	None
245	2-5148C	Flow Diagram Aux. Bldg. Elec. Equip. Area. Heat & Vent	0	None
246	12-5719	Heat & Vent. Aux. Bldg. Elev. 633'	8	08/20/85

7.4 References (Continued)

Ref. No.	Document Number	Title	Revision No./Date	
247	12-5733	Heat & Vent. Aux. Bldg. Elev. 633'	5	02/05/79
248	12-5722	Heat & Vent. Aux. Bldg. Exhaust Sys. Plan & Sections	5	08/25/75
249	1-5149	HVAC Flow Diagram	22	01/25/88
250	2-5149	HVAC Flow Diagram	25	01/25/88
251	12-5265	Fire Facilities Plot Plan	2	08/17/87

TABLE 3.7-1

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2032, 2212 & 3111	1967	Deviation: The Alison Control, Inc. panels (models A909, A924, A700-9 and 7035), the sprinkler waterflow and supervisory devices (Mercoid pressure switches and Snap Lock tamper switches), the Rochester annunciator panel ("EF" panel) and the Pyralarm detection panels (FIU/ZIU panels), the manual alarm stations (ACI start/stop stations, hose system break glass stations) are not approved or listed for the application in which they are used.	Justification: a. An engineering analysis was performed to determine if the devices that were not approved for the application, functionally operate as an approved or listed device would. The devices were evaluated against Underwriters Laboratory (UL) Standards of Safety to confirm that the performance characteristics of the devices would be acceptable to U.L. and therefore comply with the code section. The devices evaluated and found to be equivalent, are listed below: • Alison Control Inc. Panels: A909 A924 A700-9 6007 • Sprinkler Alarm Devices: "Mercoid" pressure type Waterflow switches. "Automatic Switch Co." filter unit deluge system solenoids. "National Acme Co." Control Valve Tamper Switches. • Pyralarm Control Panels FIU/ZIU Control Panels.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
			b. AEPSC to provide justification for the following devices: • Rochester Instruments "EF" Annunciator Panels. • Hose System Manual Stations • ACI Model 446002 Manual Start/Stop Stations.
2033 and 2-2.3	1967 1979	Deviation: Acceptance tests for the signaling system were not performed in the presence of the authority having jurisdiction.	Justification: The NRC regulatory requirements dictate that surveillance tests be performed to confirm the operability of the signaling system. The performance of these surveillances incorporate the test requirements of NFPA 72D the manufacturer's recommendations. Pre-operational test documentation is available to verify that the systems were tested for their operability prior to the turnover to AEPSC. Therefore, this conditon is acceptable.
2033 and 2-2.3		Open Item: Data was not available to confirm compliance for the Alison Control, Inc. panels, the Chemetron panels, "EF" annunciators and the Pyrotronics systems halon panels.	Justification: Although data is not available the justification referenced above, still applies.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2034 & 4052	1967	Deviation: The procedures do not perform surveillance tests or verify the receipt of alarm or supervisory signals at the control room from sprinkler system, fire pump supervisory signals and hose system manual stations alarm initiating devices to confirm their operability.	Justification: Procedure 12 OHP 4030. STP. 120 verifies monthly the position of the sprinkler system riser control valves which satisfies the intent of the valve tamper switches. AEP to provide justifications for fire pump and hose system.
2046	1967	Open Item: Data was not available to confirm that the "EF" panels, ACI panels or CO_2 panels would operate under 85 percent to 110 percent of rated input voltage.	Justification: These panels are connected to the 250VDC plant emergency power system. This system is regulated such that fluctuations of the input voltage to these panels is unlikely, therefore this condition is acceptable.
2047	1967	Deviation: The procedures do not verify the reset of signals received by the control room for sprinkler system and fire pump signals.	AEP to provide justification.
2122 & 4061	1967	Deviation: The alarm initiating circuit cables are exposed to potential hazards at elevations 587', 609', 624' and 650'. DEVICE a. Sprinkler alarm flex conduit is not water tight type for all riser alarm devices at the rises in zone 79, 80,84 & 85 El. 587'; 96 & 31,El. 609'; 49, El. 633';Unit 1 charcoal filter risers, El. 650'.	Justification: a. The alarm circuits may be inadvertantly operated, however, their only purpose is to initiate an alarm to the "EF" panel in the control and will not actuate suppression systems. Therefore, this condition is acceptable and no further action is required.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
		b. Open junction boxes were noted for smoke detectors the conduit system at El. 624',zone 57 at detector no. 18-18 & 18-25. Open junction boxes with exposed cable protruding from them were also noted, at the halon panel for zones 71 & 72 at El. 650'.	Justification: b. These items are considered isolated maintenance issues which are being resolved by the plant. The alarm system was properly installed in conduit throughout the area reviewed to prevent exposure to hazards.
		c. The solenoid circuit flex conduit for unit 2 computer room (zone 72) halon tank is damaged exposing the circuit conductors.	Justification: c. This item is considered an isolated maintenance issue which is being resolved by the plant.
2154	1967	Open Item: Data was not available to confirm compliance for cables to meet maximum fault current, noninterchangeable overcurrent protection, energy limitation criteria and approved for use as a limited energy cable.	AEP to provide justification.
2221	1967	Deviation: The ACI panels (models A909, A924, A700-9 & 7035) and the Chemetron CO_2 control panels are not provided with the proper connection to an independent trouble power source.	Justification: NFPA 72D, 1967 Edition code section 4121.d, indicates that the secondary power source may be used for the trouble signaling source. The secondary source of power for the ACI A700-9 panels is provided by standby batteries and will operate the trouble circuitry.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
			The secondary source of power for the other panels are independant of other sources (diesel generators, plant batteries or offsite emergency source) but are transmitted over the same conductors for the primary power. Failure of this circuit will prevent operation of the system. These panels, however, will transmit a system "abnormal" condition to the "EF" panel upon loss of power which will cause compensatory action to be taken by the control room operators. In addition, manual mechanical means for actuating the cable vault halon system via the Ansul Automan IIC cabinet, at the pilot cabinets for the CO_2 systems and at the pneumatic deluge valve of the charcoal filter spray systems as discussed in procedure 12-OHP 4022.066.001 are provided should the need arise. Therefore, this condition is acceptable.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2223	1967	Deviation: The power cables connected to the ACI A924 panels from power panel 1-DAB, circuit 5 & 2-DAB circuit 5, are under sized for the 35 AMP breakers provided.	AEP to provide justification.
2331 & 2251	1967	Deviation: The overcurrent device on the supply side of the Pyralarm (FIU) power supply is greater than 150 percent of the rating of the control unit.	Justification: The load demand for the FIU unit is 475ma versus a 5 amp. fuse. This panel, however, has been tested under the requirements of UL Standard #864 and has been found to be acceptable for over-current & voltage variations and is approved for NFPA 72A thru 72C signaling system services. Therefore, this condition is acceptable.
		Open Item: Power supply data for the ACI panels was not released to Impell by Alison Control, Inc. Therefore confirmation of compliance of this equipment was not possible.	AEP to provide justification.
2341	1967	Open Item: Continuous duty rating data for the power supply transformers was not available from all the manufacturers of the alarm system.	AEP to provide justification.
2411 & 2422	1967	Deviation: a. The alarm initiating circuits for the "EF" panels are not electrically supervised to indicate a trouble condition at the "EF"annunciator upon a circuit fault.	Justification: a. AEP to provide justification.. b. The NRC reviewed the system elementary drawing in the 53 question response (Question 45) which clearly indicated the CO_2 manual stations were unsupervised.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
		b. The CO_2 and hose system manual stations are not connected to electrically supervised circuits.	The NRC approved the CO_2 system in the Appendix A SER. AEPSC to provide justification for the hose system manual stations.
2431 & 2631	1967	Deviation: The audible devices for the "EF" annunciator are common to all alarm types. Also local panel fire alarm and trouble conditions are transmitted over the same circuit and are not distinctive as to the type received.	Justification: The common audible is acceptable since distinctive visual indications are provided for supervisory, fire alarm and trouble conditions at the "EF" annunciator with the exception of the combined fire/trouble signals from the ACI A924 and A700-9 panels. The Pyralarm "EFR" panels provide redundant initiating circuit alarm and trouble lamps at the "EFR" and "EF" vertical board annunciation. The "EFR" panel also transmits a common fire/trouble signal to the "EF" annunciator panel in addition to the annunciaton discussed above. The annunciator response procedures (1 & 2 OHP 4024.100 and .200 series) require the operators actions to verify these alarms as fire conditions.
2432	1967	Deviation: A trouble silence switch visual indicator is not provided for the ACI A700-9 panels.	Justification: Since the control room "EF" panels indicate a trouble condition, the appropriate action will be taken to investigate the condition. trouble audible will not reset or clear the condition. The trouble condition must be corrected prior to reset. Therefore, this condition is acceptable.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM		RECOMMENDATION/JUSTIFICATION
3112 and 3-3.1.2	1967 1979	Deviation: Several manual stations have not been properly mounted within the mounting height requirements specified. These manual stations are as follows:		Justification:
		SYSTEM	ELEVATION	
		a. Sprinkler system manual station are mounte 4' above the finished floor in zone 44N, 44S & 32.	609'	a. 3112 - The mounting location of the manual stations does not deviate drastically from the minimum 4.5' mounting height required or mounted such that the device cannot be properly operated. In addition, NFPA 72D, 1979 Edition lowered the minimum criteria to 3.5 AFF. Therefore, this condition is acceptable.
		b. CO_2 Manual stations are mounted 4' abovefinished floor in zones 40A & B thru 42D, 45 thru 47B, 38 & 39.	620'	b. See Justification for 3112 above.
		c. CO_2 manual station at zone 44N is mounted 4' above finished floor.	620'	c. See Justification for 3112 above.
		d. ACI charcoal filter manual stations are mounted 4' above finished floor.	650'	d. See Justification for 3112 above.
		e. (2) halon manual stations are mounted 5.5' above finished floor in zones 71 & 72.	650'	Justification: 3-3.1.2 e. The halon manual stations for zones 71 & 72 do not deviate drastically from the 5' maximum criteria and will not impact the operation of the device. Under the 1967 Edition of NFPA 72D, this installation would have been acceptable.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3423	1967	Deviation: The sprinkler system low air pressure and valve tamper supervisory devices are connected to the same initiating circuit and will not indicate the element of the sprinkler system which is inoperative. The sprinkler systems included are as follows: SYSTEM — ELEVATION Preaction sprinkler risers for Auxiliary Bldg. located in zone 96. — 609' Preaction sprinkler risers located in zone 31 Auxiliary Bldg. High Roof U1, H_2 storage Tanks & Drumming Area. — 609'	Justification: The "EF" annunciators indicate cate a sprinkler system "abnormal" condition. The annunciator response procedures (1&2 OHP 4024.100 & .200 series) indicate the potential problems and directs the operators to take the appropriate corrective actions.
3424	1967	Deviation: The alarm initiating circuits for the devices connected to the "EF" annunciator can be readily tampered with and a trouble signal will not be produced.	Justification: Reference the results of Code Section 2411 and 2422.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3431	1967	Deviation: Waterflow alarm devices are not provided for the charcoal filter unit risers and the Auxiliary Building ZMO-10 & 20 hose system supply piping.	Justification: The charcoal filter unit risers are provided with individual alarm annunciation to the "EF" panels via the ACI A924 panels. In addition, the suppression systems are actuated by manually opening the riser isolation valve. Therefore, waterflow signaling does not provide significant increase in the level of fire protection features. The justification for the waterflow signaling the Auxiliary building hose system supply will be provided by AEPSC.
3441, 3442 & 3443	1967	Deviation: a. The valve tamper devices for the ZMO-10 & 20 and the charcoal filter unit isolation valves, are installed on the valves but are not connected to the alarm systems. b. Also, low air pressure supervisory devices are not provided for the pre-action sprinkler system piping in zone 31, elevation 609'.	Justification: a. The isolation valves are chained and sealed in the appropriate position which is a satisfactory method of supervising sprinkler valves in accordance with NFPA 13, 1983 Edition, code section 3-14.2.3.d. Although weekly surveillances are not performed as required, the intent of the code is being met by the performance of monthly surveillances under procedure 12-OHP 4030.STP.120. Therefore, this condition is acceptable. Justification: b. The intent of the low air pressure supervisory devices is to indicate a failure in the sprinkler piping due to mechanical damage. The piping for Zone 3 and 32 have extremely high ceiling and the probability for damage is low. Therefore, this condition for Zones 3 and 32 is acceptable.

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
			The sprinkler piping for the H_2 storage tanks also is not provided with pressure supervision, however, since only open head sprinklers are provided, this supervision is not required.
3541	1967	Deviation: Several smoke detectors on elevations 587' & 609' are not readily accessible due to conduit congestion.	Justification: Although these devices are not readily accessible, surveillances are performed on all these devices to conform their operability under procedure 12THP 6030 IMP.142 and .051 which meets the intent of the code. This condition is acceptable.
3542	1967	Deviation: Detector #3-29 in zone 44S is not accessible for testing due to sprinkler piping obstruction.	AEP to provide justification.
3543	1967	Deviation: The fire detections, halon and CO_2 system control are not inspected monthly.	Justification: The systems controls are verified for operability typically semi-annually with CO_2 system valve positions verified monthly. Since the D.C. Cook plant specifically indicated that the testing frequencies required by NFPA 72D will not be met in their response to Appendix A to BTP/APSCB 9.5-1. Therefore, thismonthly surveillance is not required.
4011	1967	Deviation: The intent of the alarm system is to be a "Class B" system. The "EF" panels, however do not provide electrical supervision of the alarm initiating circuits connected to them.	Justification: Reference the results of code section 2411 and 2422 NFPA 72D, 1967 Edition.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4031	1967	Deviation: A reliable means of transmitting alarm signals to the off-site fire department is not provided.	Justification: A (5) member fire brigade is maintained on site at all times and are trained in the use and placement of the fire fighting equipment and the strategy for fighting a fire in the plant. Off site fire departments are called via telephone from the Secondary Alarm Station as directed by the Shift Supervisor when required. Therefore, the direct transmission of via alarms is not required.
4041 & 4042	1967	Deviation: a. Automatic recording devices for documenting alarms received by the "EF" panels are not provided. b. Transmission of signals to the fire department are also not provided.	Justification: a. Based on the review of the AEPSC response to Appendix A to BTP/APCSB 9.5-1 Section II.B.1 and clarification statements in NRC 53 question (Questions 16 and 48) clearly do not commit to providing a printer and is therefore not required. b. Reference the results of code section 4031 NFPA 72D, 1967 Edition for fire department communication.
4051	1967	Deviation: Daily tests of the alarm system circuits, are not performed.	Justification: The response to Appendix A to 9-5.1 has indicated that testing frequencies will not be performed in accordance with NFPA 72D. The circuits are verified during testing performed in accordance with the fire protection program.
4053, 4101 & 4111	1967	Deviation: The procedures do not require the documenting of supervisory or trouble conditions.	Justification: Reference the results of code Section 4041 & 4042a. for justification.

TABLE 3.7-1
(Continued)

DEVIATION AND RECOMMENDATIONS/JUSTIFICATION
NFPA 72D - Proprietary Protective Signaling System

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4091	1967	Deviation: The "EF" panels do not indicate trouble conditions upon circuit faults. Also remote signaling from the ACI/Pyrotronics panels to the "EF"/"EFR" panels do not provide distinguishable alarms between fire and trouble conditions.	Justification: Reference code sections 2411 and 2422 NFPA 72D, 1967 for "EF" panel actions. Reference code section 2431 and 2631 NFPA 72D, 1967, for procedure actions required upon receipt of these signals.
4121	1967	Open Item: Data was not available to confirm automatic transfer of power from primary to secondary within 30 seconds.	Justification: The power supplies for the detection and suppression systems are the discussed and accepted by the NRC as documented in the Appendix A SER.
2-2.2.1	1979	Open Item: Data was not available to confirm compliance of the ACI A700-9 panels for environmental operability.	Justification: These panels are located in fire zone 52, elevation 633' of the Auxiliary Building. The maximum temperature to be achieved in this zone is 104°F. The minimum is 60°F. Based on this data, the ambient conditions for the ACI A700-9 panels, is well within the limiting criteria of 120°F - 32°F.
3-6.4.2	1979	Deviation: The RCP pump suppression system supervisory devices are wired in series in the initiating circuits. Supervisory alarms are not distinguishable from circuit fault conditions.	Justification: The arranagement of the circuit will always indicate a sprinkler system impairment which will require the operators to verify the closure of the isolation valve. Upon determining a circuit fault condition, compensatory actions would be required until the fault condition is corrected. This condition is acceptable.

3.8 NFPA 72E - Automatic Fire Detectors

3.8.1 Scope of Evaluation

The evaluation of the installation and maintenance of the automatic fire detectors included the review of the devices under four editions. The initial edition year selected was based on the edition that was in effect at the time alarm system was specified on April 2, 1971. Since NFPA 72E was not adopted until 1974, this edition was used as the basis for the initial installation of the devices. All subsequent edition years were reviewed for compliance with the applicable areas modified as identified in Impell Calculation No. 0120-108-008.

The areas of the plant where these devices are installed, has been addressed under Code Section 2.1 of this report.

The evaluation of the functional testing of detection devices was also reviewed for compliance with the standard.

Scope limitations have been identified as follows:

a. The space above Unit 1 & 2 Control Rooms could not be verified for compliance during the walkdown phase due to the units operating.

b. The detection arrangement for the charcoal filter units was verified for compliance by the review of two charcoal units only (1 & 2-HV-ACRF). This was due to the other units within our scope, operating and/or contaminated.

c. Some detectors on elevations 587', 609' and 650' could not be verified for placement due to conduit congestion. These detectors are listed as follows:

Device	Zone	Elevation
2-13, 2-14, 2-33, 2-34, 2-35 & 2-47	5	587'
3-6, 3-7, 3-22, 3-37, 3-38 & 3-39	44N	609'
7-1	38	609'
2-2	39	609'
4-19 & 4-27	52	650'

d. Although NFPA 72D reviewed the ACI A700 - 9 and 6007 panels (RCP pump detection and containment alarm system) for compliance, the verification of the arrangement of the detectors was outside the scope of this evaluation. The verification of the detector arrangement within filter Units 1 & 2-HV-CFT-1 & 2 is also outside the scope of this evaluation.

3.8.2 Assumptions

The following assumptions have been made for the evaluation of NFPA 72E.

1. It is assumed that the detection arrangements for the space above the control room ceilings are as depicted in the walkdown data sheet sketch so as to confirm compliance.

2. It is assumed that the detection arrangement for the charcoal filter units are typical with exception of change in the number of charcoal filter beds.

3. It is assumed that the detectors identified in item 3.8.1.c are installed and are verified for operability as indicated in the Surveillance Procedures.

3.8.3 Deviations and Recommendations/Justifications

The plant fire alarm system is in compliance with NFPA 72E with the exception of the open items and deviations identified in Table 3.8-1. The table also provides recommendations/justifications for these items.

3.8.4 References

See Section 3.7.4 of this report.

TABLE 3.8-1

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2-5.2.1; 2-5.2	1974 and 1982	Deviation: a. Acceptance tests for the signaling system were not performed in the presence of the authority having jurisdiction.	Justification: a. The NRC regulatory requirements dictated that surveillance surveillance tests be performed to confirm the operability of the signaling system. The performance of these surveillances incorporate the test requirements of NFPA 72D and the manufacturer's recommendations.
		b. Open Item: Data was not available to confirm compliance for the ACI panels and the "EF" annunciator panels.	Justification: b. Although this data was not available for review, the justification statement noted above still applies.
2-6.1	1974	Deviation: Several detectors are exposed to mechanical damage on elevations 587', 609', 625' and 633'.	Justification: Detectors 4-9A (zone 106) and 4-33A (zone 107) are located in a normally locked room, located over batteries which is not a normal path of travel through the room. Justification: AEP to provide justification for remaining devices listed.

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2-6.1 (Cont'd)		The devices are as follows:	

Device	Zone	Elev.
Line Type Heat Det. @ 1-HV-SAT-FU Unit is exposed outside unit approximately 8".	5	587'
3-17 thru 3-18, 3-21, 3-25 thru 3-28	33	609'
7-5, 7-7 16-3 & 16-4	38	609'
13-7 thru 13-9	41	609'
3-16 thru 3-21, 3-26 & 3-27	34	609'
8-7 thru 8-9	45	609'
20-3 & 20-4, 2-5 & 2-7	39	609'
27-2	60	625'

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2-6.5, 2-6.7, 4-1.2	1974 and 1978	Deviation: Detectors are not properly provided in all portions of a fire zone where detection has been installed.	Justification: a. The ceiling space above zone 43 is not provided with detection. Detection, however is not required since the ceiling system is of non-combustible materials as discussed in NFPA 72E Formal Interpretation for this code section. b. AEP to provide justification for the fire zones listed.

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
2-6.5, 2-6.7, 4-1.2 (Cont'd)		These zones are the following:	

Zone No.	Elevation	Deficiency
1	573'	Air Movement & Det. 1-1 For Beam Construction
3	587'	Throughout Zone
4	587'	Deep Bay @ West End
5	587'	Det. 2-25 & 2-3, For Beam Construction
6N	587'	Air movement,
6M	587'	inadequate
6S	587'	Det. spacing.
7	587'	I.R. Det. obstructions. Beam const. @ center of zone.
8	587'	I.R. Det. obstr. & air movement.
10	587'	I.R. Det. obstr. & air movement.
11	587'	I.R. Det. obstr.
23	587'	I.R. Det. obstr. & air movement.
24	587'	I.R. Det. obstr. & air movement.
25	587'	I.R. Det. obstr. & air movement.
26	587'	Typical of zone 8.
27	587'	Typical of zone 11.
33	612'	Det. not installed @ ceiling.
34	612'	Det. not installed @ ceiling.
37	609'	Air movement.
38	609'	Typical of zone 11.
39	609'	Typical of zone 11.
44N	609'	Det. 3-4, beam constr.
44S	609'	Det. 3-27 & 3-28 @ bot. of beam.
40A	609'	Air movement & beam construction.
40B	609'	Air movement & beam construction.

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM			RECOMMENDATION/JUSTIFICATION
2-6.5, 2-6.7, 4-1.2 (Cont'd)		Zone No.	Elevation	Deficiency	
		32	609'	High ceilings & beam construction.	
		42A-C	609'	Air movement.	
		43	609'	Air movement.	
		47A&B	609'	Air movement & beam construction.	
		46A-C	609'	Air movement.	
		41 & 45	609'	Det. 13-9(41) & 8-9 & 8-7 (45) do not cover entire area. I.R. obstructions.	
BJH 11-15-91		57 ~~56~~	620'	Det. 18-10 & 18-12 within 4" of deep beam.	
		48	625'	Deep bay const. @ east end of room.	
		49 & 50	633'	Deep beam const. @ east end and for 8" beam const. throughout each zone.	
		51	633'	Deep beam const. @ northeast & south-east end of zone.	
		52	633'	Det. not spaced for deep & 8" beam const. @ north & south end of zone.	
		55	620'	Typical of zone 10.	
		60	620'	Typical of zone 10.	
		69	650'	Typical of zone 32.	

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
3-5.3	1974 and 1978	Deviation: The fixed temperature portion of the heat detectors in zones 106 and 107 does not provide adequate coverage.	Justification: The heat detectors are combination rate-of-rise/fixed temperature units. The rate-of-rise portion of the detector is more than adequate for the coverage of the room and will respond promptly upon a fire condition.
4-3.1; 4-3.2	1974; 1978 and 1982	Deviation: Smoke detectors in zones 29A thru D, 32 thru 34, 44N, 49, 52 thru 54, 57 and 69 are installed at the bottom of deep beams or installed greater than 12" from the ceiling. The devices are as follows: Device / Zone / Elev. 5-29 @ bottom of beam. / 32 / 650' 4-13 @ bottom of beam. / 49 / 633' 4-26 installed within 4" of 18" beam. / 52 / 633' 5-1 thru 5-3 & 5-10 thru 5-12 approx. 4' down from the ceiling. / 69 / 650' 18-10 & 18-12 are installed within 4" of a deep beam. / 57 / 625'	Justification: a. AEP to provide justification for remaining zones. b. The discussion in RFC #-1-2679 & 02-2694 adequately evaluates the lack of ceiling mounted detectors in zones 33A & 34A. c. The detectors located in zones 53 and 54 are installed below the ceiling system due to the results of fire testing performed by Professional Loss Controls in their report dated 10/13/83. d. Detector 18-30 has been in Zone 57 located at the bottom of a 6" deep beam. The placement of this device is acceptable in accordance with 4-3.2 72E, 1984 Edition. e. Detectors No. 2-6 & 3-6 in zones 29A thru D are installed at the top of open grated doorways leading out of these zones. The placement of these devices are adqeuately evaluated in RFC#01-2679 and 02-2694.

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4-3.1; 4-3.2 (Cont'd)			f. Detector No. 23-10 located in zone 44N (Equip. Decontamination Room) has been installed approximately 2.5' down from the ceiling due to conduit congestion. This room has partion barriers which stop below the congestion. Ceiling mounted smoke detectors from zone 44N will adequately provide detection over the congestion of this room.
4-3.5.1.1	1984	Deviation: Detectors provide in zones 40A & B, 41, 45, 47A & B, 52, 55 and 60 do not adequately cover all portions of the zone within 0.7 times the listed spacing. These detectors include the following:	AEP to provide justification.

Device	Fire Zone
12-3 & 12-4	40A
12-1 & 12-2	40B
13-9	41
8-7 & 8-9	45
7-3 & 7-4	47A
7-1 & 7-2	47B
4-20 thru 4-23, 4-36 thru 4-38	52
15-8, 15-9 & 15-10	55
10-8, 10-9 & 10-10	60

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4-4.1, 4-4.5.2, 4-5.1 & 4-5.1.5; 9-3.3	1974; 1982	Deviation: a. Smoke detection is not properly provided in zones 7, 27, 32, 33, 34 and 69 due to high ceilings. b. Device placement in zone 43 are too close to supply air diffusers. Device: 23-4, 23-14 thru 23-19, 23-21 & 23-22 — Zone: 43 c. Conduit congestion in zones 5, 6N, 6M and 6S may prevent detector actuation of devices installed above the congestion to a fire condition at the floor.	Justification: a. AEP to provide justification. b. AEP to provide justification. c. Dry pilot heat actuated sprinklers actuate the pre-action sprinkler systems installed in these zones. Upon actuation of the dry pilot sprinkler, a low pressure supervisory signal will be transmitted to the control room with a waterflow alarm signal following immediately. Since these devices are provided throughout the zone under the congestion and transmit signals to the control room, these devices will meet the intent of the code to provide rapid detection in congested areas. This condition is acceptable.
4-4.2	1974	Deviation: The operator's area (zone 53 & 54), the vestibule area (zone 53) and the toilet (zone 54) are not provided with detection at the suspended ceiling.	Justification: a. The operator's area of the control rooms are continuously manned and all parts of the area are visible from the control boards. Therefore, a fire would be detected in the early stages in this area.

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
4-4.2 (Cont'd)		Detectors are not properly spaced for the air movement in the zone. The zones are listed as follows: Fire Zone — Elevation 1 — 573' 6N, 6M & 6S — 587' 8 & 10 — 596' 26 — 587' 37 — 625' 40A - 40B — 609' 42A - 42C — 609' 43 — 609' 47A & 47B — 609' 46A - 46C — 609' 55 & 60 — 625'	b. AEP to provide justification for the vestibule & toilet areas. c. AEP to provide justification for these zones.
4-4.6; 4-3.7.2 & 4-3.7.3	1974 and 1978	Deviation: Detectors are not properly provided in beam construction required as follows: Device — Zone a. Deep equipment hatch in the ceiling may delay detector response and is not considered in detector placement. — 1 & 5 b. Detectors not provided in each bay as required for deep beam construction greater than 18". — 3, 7 & 27, 32 & 69, 48, 49 & 50 c. Reduced spacing is not provided in greater than 8" but less than 18". — 5, 6N, 6S, 49, 50 & 52	AEP to provide justification.

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
5-3.2, 5-4.1, 5-4.2, 5-5.1	1974	Deviation: The field of vision for several infrared detectors were obstructed by conduit/cable tray systems, structure and equipment. In several cases the arrangement of the detector was not appropriate. The deficient detectors are listed as follows:	AEP to provide justification.

Zone No.	Device No.	Deficiency
7	17-1	Obstruction by cable trays.
7	17-2	Misalignment for the combustibles present.
7	17-3	Obstructed by conduit.
8	18-5	Misalignment and obstructed.
8	18-1	Obstructed.
10	14-2	Obstructed.
10	14-1	Obstructed.
11	13-3	Obstructed.
25	19-3	Obstructed.
26	22-4	Misaligned and obstructed.
26	22-5	Misaligned and obstructed.

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM			RECOMMENDATION/JUSTIFICATION
5-3.2, 5-4.1, 5-4.2, 5-5.1 (Cont'd)		Zone No.	Device No.	Deficiency	
		27	21-3	Misaligned and obstructed.	
		27	21-2	Misaligned for combustibles present.	
		27	21-3	Obstructed by cable tray.	
		33	3-23 & 3-24	The alignment of the detectors for the platform @ elev. 646'-9" Detector is obstructed by platform.	
		34	3-23 & 3-24	Typical of zone 33.	
		38	16-3 & 16-4	Obstructed by cable tray. Misalignment due to low ceiling for 16-3.	
		39	20-3 & 20-4	Obstructed by cable tray. Misalignment due to low ceiling for 20-3.	
		41	21-3, 21-4 & 21-5	Det. 21-3 obstructed by MCC equipment. Detector 21-4 & 21-5 misaligned and obstructed.	
		42A	22-1	Misaligned.	
		42C	22-3 & 22-4	Misaligned and obstructed.	

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
5-3.2, 5-4.1, 5-4.2, 5-5.1 (Cont'd)		Zone No. / Device No. / Deficiency 45 / 25-3, 25-4 & 25-5 / Det. 25-3 obstructed by MCC equipment. Detector 25-4 & 25-5 misaligned and obstructed. 55 / 23-3 & 23-4 / Obstructed by structure do not provide proper area coverage. 60 / 27-1, 27-2, 27-3 & 27-4 / Det. 27-3 obstructed by structure. Detector 27-1, 27-2 and 27-4 misaligned & obstructed.	
5-5.2	1974	Deviation: The procedures do not confirm the changes in the alignment, physical configurations or combustible loading during surveillances.	AEP to provide justification.
7-3.1.2 & 8-3.2.2	1974 and 1982	Deviation: The line type heat detectors for the RCP pumps are not tested semi-annually as required.	Justification: Surveillance testing frequencies are dictated by the AEP response to Appendix A to BTP/APSCB 9-5.1 Section II.E.1.
7-3.1.4 & 8-2.1.2	1974 and 1982	Deviation: The line type heat detectors for the RCP pumps are not verified for their operability by loop resistance testing as required.	AEP to provide justification.

TABLE 3.8-1
(Continued)

DEVIATIONS AND RECOMMENDATIONS/JUSTIFICATIONS
NFPA 72E - Automatic Fire Detectors

CODE SECTION	CODE EDITION	DEVIATION/OPEN ITEM	RECOMMENDATION/JUSTIFICATION
8-1.1.1 & 8-1.2.1	1974	Deviation: a. The air duct detectors for the control room HVAC units do not shut down the fans as required. Also, air duct detectors are not provided for HVAC units located in zones 52 & 44N.	Justification: a. The Control Room HVAC units are provided as local units units for the Control Room ventilation only and spot type smoke detection is provided in zones 53, 54, 70 & 73 which annunciate in the Control Room. Upon a receipt of an alarm from the air duct detectors the procedures require the operators to manually shutdown the fan units.
		b. Air duct detectors are not provided for HVAC units located in zones 51 & 44N. These units include the following: Fan — Fire Zone 1&2-HV-AX 1&2 — 52 1&2-HV-AS 1&2 — 52 12-HV-AFS-1 thru 4 — 32 12-HV-SATFU — 5 1&2-HV-AES-1&2 — 49 12-HV-AFX — 49 12-HV-ACA 1&4 — 43	b. Based on the discussion from the exemption request for (22) undampered duct penetrations (NRC Letter dated 8/28/85), the lack of provision of air duct detection and automatic shutdown of HVAC units is an acceptable deviation from code section 8-1.2.1. The HVAC units include the following: 1&2-HV-AX 1&2 1&2-HV-AS 1&2 12-HV-AFS-1thru 4 12-HV-ACA-1 & 4
		c. Automatic shutdown of HVAC units by means of automatic fire detection has not been properly provided for the HVAC units referenced in item b. as required by NFPA 90A, Section 4-3, 1978 Edition.	c. Reference item b. above for HVAC units without shutdown or detection features. Charcoal filter units are provided with heat detection and automatic shutdown of the the fans in accordance with the ANI criteria and do meet the intent of the code. This condition is therefore acceptable. These units include the following: 12-HV-SATFU 12-HV-AFX 1 & 2-HV-AES-1&2

Section 4.0

Supplemental Justifications

Section 4.0 of the NFPA Code Compliance Evaluation Report 09-0120-0123 has been added by AEPSC. The report was originally prepared by ABB Impell. This section was added by AEPSC in order to keep the entire report and its final justifications and recommendations together as a complete package. These supplemental justifications have been prepared to remove prior recommendations from the "Deviation and Recommendations/Justifications" Tables found in Sections 3.1-1 to 3.8-1 of the report.

Prepared Justifications for NFPA Code Compliance Deviations

The following technical justifications have been prepared in response to NFPA code compliance deviations identified in ABB Impell Report 09-0120-0123.

A number of the justifications were prepared by ABB Impell for AEPSC. These justifications are contained in a package dated June 17, 1988 from D.E. Kipley to J.A. Kobyra.

The remaining justifications were prepared by AEPSC and appear in chronological order. The attached Table 4.1 identifies the NFPA code sections for which justifications have been provided and the justification letter date. In instances where a justification could not be provided, reference is provided to a design change package (RFC) or identified as a maintenance item which will bring the system into compliance with the applicable NFPA Code section.

Table 4.1 provides a cross reference for all deviations, justifications and corrective actions which have been taken for those code sections identified in Tables 3.1-1 through 3.8-1 of Report 09-0120-0123.

Table 4.1

Cross Reference To
NFPA Code Deviations Identified by
Impell Technical Report No. 09-0120-0123
Tables 3.1-1 Through 3.8-1

NFPA Code	Code Edition	Code Section	Number of Justifications	Justification Letter Date	Remarks
10	1984	1-6.2	NA	5-17-88	Revised Fire Facility Drawings
10	1984	3-1.2 3-1.2.2	NA NA	1-23-89 1-29-90	Revised Fire Facility Drawings.
			40 NA N/A	1-24-89 11-30-89 11-18-91	Several Extinguishers Replaced as Maintenance Items.
10	1984	3-2.1 3-3.1 3-3.3	8	1-23-89	
10	1984	4-3.2	NA	5-17-88	Revised Fire Facility Drawings.
			NA	3-31-91	Procedure Changed-12SHP2270 FIRE.001, Rev. 2.
12	1968	122	1	6-17-88	
12	1968	134 165 254 255	1	6-17-88	
12	1968	1436 1632 1634	1	6-17-88	
12	1968	1716	NA	9-6-90	Procedure Changed
12A	1977	1-5.4 1-7.4	1	6-17-88	
12A	1977	1-8.3.6	1	1-25-89	
12A	1977	1-8.5.1	1	6-17-88	
12A	1977	1-9.5.6	1	11-14-91	Maintenance Item
13	1971	1141	1	6-17-88	
13	1971	3241 3783	1	6-17-88	
13	1971	3681 3682 3683	NA	9-6-90	Procedure Changed
13	1983	1-9.2	1	6-17-88	

Table 4.1

Cross Reference To
NFPA Code Deviations Identified by
Impell Technical Report No. 09-0120-0123
Tables 3.1-1 Through 3.8-1

NFPA Code	Code Edition	Code Section	Number of Justifications	Justification Letter Date	Remarks
13	1983	2-2.1.2.4 2-2.1.2.5	1	11-13-91	RFC 12-3065
13	1983	3-16.8	NA	11-18-91	Maintenance Item
13	1983	3-17.4.5	1	6-17-88	
13	1983	4-1.1.1 4-1.1.4	4	6-17-88	
13	1983	4-1.1.1 4-1.1.4 4-2.4.6	6 1	2-8-89 8-20-90	RFC 12-3003
13	1983	4-2.4.6	1	6-17-88	
13	1983	4-4.13	1	6-17-88	
13	1983	4-4.19	1	6-17-88	
13	1983	7-3.4	1	11-13-91	RFC 12-3065
14	1971	151	1	11-19-91	
14	1971	212 212A 217 531 541 551	3	9-20-88	
	1978	1-11.3 5-3.1 5-3.2 5-4.2 5-5.2			
	1986	2-1.3			
14	1971	322 421	1	6-17-88	
	1978	1-11.3 3-2.2 4-2.1 4-3.2			
	1986	4-4.3.1			
14	1971	511 524	1	6-17-88	
14	1971	525	1	11-13-91	RFC 12-3065
14	1971	624	1	11-19-91	

Table 4.1

Cross Reference To
NFPA Code Deviations Identified by
Impell Technical Report No. 09-0120-0123
Tables 3.1-1 Through 3.8-1

NFPA Code	Code Edition	Code Section	Number of Justifications	Justification Letter Date	Remarks
14	1971	651	1 1	1-30-89 9-4-90	
14	1971	671	1	9-20-88	
14	1986	8-1.2	1	11-15-91	
15	1973	2031 4072	1	6-17-88	
15	1973	4011	1	6-17-88	
15	1973	4032(b)	1	6-17-88	
15	1973	4081 4082(d) 4101 4102 4103	1	6-17-88	
15	1973	4081	1	6-17-88	
15	1972	4082(d)	1	6-17-88	
15	1973	4101 4102 4103	1	6-17-88	
15	1973	4121	1	6-17-88	
15	1973	5011 5031 6001- 6003 6013- 6018	NA	11-18-91	Procedure needs to be changed
15	1973	5023	1	6-17-88	
15	1973	5021 5031	NA	11-18-91	Procedure needs to be changed
15	1973	7000	1	6-17-88	
15	1973	7010	1 1	6-17-88 11-13-91	RFC 12-3065
72D	1967	2032 2212 3111	1 1	6-17-88 11-30-88	
72D	1967	2034 4052	NA	9-6-90 11-18-91	Partial Procedural Change. Additional Procedure Changes Required.

Table 4.1

Cross Reference To
NFPA Code Deviations Identified by
Impell Technical Report No. 09-0120-0123
Tables 3.1-1 Through 3.8-1

NFPA Code	Code Edition	Code Section	Number of Justifications	Justification Letter Date	Remarks
72D	1967	2047	NA	11-18-91	Procedure Needs to be Changed
72D	1967	2122 4061	NA	11-18-91	Maintenance Item
72D	1967	2154	1	6-17-88	
72D	1967	2223	1	6-17-88	
72D	1967	2251 2331	1	6-17-88	
72D	1967	2341	1	6-17-88	
72D	1967	2411 2422	1 1 1 NA 1	11-29-88 10-31-89 4-26-90 9-6-90 8-19-91	 NRC SER Item 2.3.1. Procedures Changed.
72D	1967	3431	NA	9-6-90	Procedures Changed
72D	1967	3542	1	9-5-90	
72E	1974	2-6.1	1 1	6-17-88 11-14-91	
72E	1978 1974	2-6.5 4-4.2	1	6-17-88	
72E	1974	2-6.5 2-6.7 4-1.2	1 45 1	6-17-88 4-26-89 11-15-91	 RFC 12-3004
72E	1974; 1978 & 1982	4-3.1; 4-3.2	2 6	6-17-88 4-26-89	
72E	1984	4-3.5.1.1	1 9	6-17-88 4-26-89	 RFC 12-3004
72E	1974 1982	4-4.1 4-4.5.2 4-5.1 4-5.1.5 9-3.3	1 9	6-17-88 4-26-89	
72E	1974 1978	4-4.2	21	4-26-89	RFC 12-3004
72E	1974; 1978	4-4.6; 4-3.7.2 4-3.7.3	4; 5	6-17-88 6-17-88	
72E	1974; 1978	4-4.6; 4-3.7.2 4-3.7.3	14	4-26-89	

AMERICAN ELECTRIC POWER

Date November 19, 1991

Subject Cook Nuclear Plant
NFPA 14 Code Compliance Review
Impell Report 09-0120-0123

From B.J. Gerwe

To NFPA Code Compliance Report 09-0120-0123, Section 4.0

ABB Impell code compliance review for NFPA 14 identified the following code deviation.

NFPA 14, 1971 Edition, Sections 151 and 624

Deviation: Existing valve 12-FP-263 is not an approved indicator valve.

An engineering review of this deviation has been performed and the resulting justification for acceptance of the NFPA code deviation is given below.

Justification: The existing valve is Manufactured by Centerline. A job order (No. A17791) has been written to replace this valve with a UL Listed/FM Approved Grinnell butterfly valve.

This valve is being replaced as part of an ongoing program to replace the unapproved fire protection valves with UL Listed/ FM Approved fire protection valves. The unapproved valves are replaced as they require maintenance or repair.

The unapproved valves generally do not provide visual indication as to whether the valve is open or closed. The isolation valves are normally open (as is the case with valve 12-FP-263) and only closed when repairs are needed to the fire protection system. All repairs are done in accordance with plant procedures. Personnel performing repairs are highly trained and must adhere to all procedures. We have no reason to believe that an isolation valve would remain in the closed position once work is completed. Additional assurance that these valves have not changed position is provided through the monthly fire protection valve lineups performed at the plant per procedure 12 SHP 4030 STP.011, "Fire Protection Valve Lineup Verification." Plant personnel are required to check these valves monthly to assure that they are in their normal position and that the valve seal remains intact.

Based on the replacement of valve 12-FP-263, the requirements of NFPA 14 will be met. The above general discussion provides justification for the continued use of other unapproved valves until they are replaced with an approved valve.

References: Design Change 12-PM-740, Job Order A17791.
Procedure 12 SHP 4030 STP.011, Revision 0, dated 4-6-91.

Concurrence: J.D. Grier

J.D. Grier, Section Manager, Piping, Valves,
HVAC & Fire Protection Section

BJ Gerwe

B.J. Gerwe

cc: J.D. Grier/B.J. Gerwe
P.H. Jacques - Bridgman
MF: Yes

AMERICAN ELECTRIC POWER

Date November 18, 1991

Subject Cook Nuclear Plant
NFPA Code Compliance
Procedure Revisions

From B.J. Gerwe

To P. Carteaux - Bridgman
J. Sampson - Bridgman
T. Beilman - Bridgman

The NFPA Code Compliance reviews performed by ABB Impell, Report No. 09-0120-0123 and 09-0120-0381, identified procedures which required revision to incorporate surveillance and testing issues. A review of these plant procedures shows that several of the previously identified changes under Report No. 09-0120-0123 have not been incorporated as previously requested. The required changes are given below. Please direct this listing to the appropriate personnel for incorporation of these surveillance requirements.

These procedural changes are being committed to the NRC and require completion by the end of 1992. In reviewing the changes with the various departments, the end of 1992 date has been agreed to due to the two unit refueling outages occurring in 1992, and the additional procedural burden associated with the outages. Each department also indicated that they should be able to better this date. Please advise the writer in writing when the procedures have been revised.

NFPA Code	Edition	Code Section	Procedure	Deviation/Requirement
15	1973	5011 5021 5031 6001-6003 6013-6018	12MHP4030.STP.020 Series	Deviation: Charcoal filter unit 12-HV-SATFU is not included in any of the procedures. Requirement: The charcoal filter unit 12-HV-SATFU fire protection system is to be tested. Nozzle operability should be confirmed. NOTE: The 12-HV-SATFU water spray system is supplied water through Hose Station No. 4. Hose Station No. 4 angle valve operability, ZMO-10 and ZMO-20 operability and connecting fire hose operability are already being performed under separate procedures which can be used to satisfy the first part of this requirement.

NFPA Code	Edition	Code Section	Procedure	Deviation/Requirement
72D	1967	2034 4052 2047	12SHP2270.FIRE.004 1&2OHP4030.STP.121 Series	<u>Deviation:</u> The procedures do not perform surveillance tests or verify the receipt of alarm or supervisory signals at the control room from fire pump supervisory signals and hose system manual stations alarm initiating devices to confirm their operability. <u>Requirement:</u> The procedures should be enhanced to verify the receipt of all required signals at the control room. Each hose station device should also be activated to verify operability of the device and its circuit. <u>Deviation:</u> The procedures do not verify the reset of signals received by the control room from the fire pumps. <u>Requirement:</u> The surveillance test should be revised to verify the reset of each signal prior to continuing the test.
			12THP4030.STP.223	<u>Deviation:</u> Air flow testing is not performed for the Unit 1 and 2 containment CFT charcoal filter units. <u>Requirement:</u> Incorporate the air flow testing of the Unit 1 and 2 CFT charcoal filter units into the plant procedures.
72D 72E	1967 1974	3542 7-3.1.4	12THP4030.STP.239	<u>Deviation:</u> Loop resistance testing for the Unit 1 and 2 reactor coolant pumps (RCP) thermistor line type detectors is not performed. <u>Requirement:</u> Incorporate loop resistance testing of the Unit 1 and 2 RCP detection systems into the plant procedures.

NFPA Code	Edition	Code Section	Procedure	Deviation/Requirement
72E	1974	5-5.2	12THP6030.IMP.153	<u>Deviation:</u> The procedures do not confirm the changes in the alignment of the infrared flame detectors. <u>Requirement:</u> The procedures should be revised to verify the alignment of the flame detectors. <u>Deviation:</u> The line type heat detectors for the RCP pumps are not verified for their operability by loop resistance testing. <u>Requirement:</u> The procedures should be revised to verify the operability of the line type heat detectors as required.

Please call if you have any questions.

B.J. Gerwe

BJG/gh

cc: E.E. Fitzpatrick
A.A. Blind - Bridgman
P.H. Jacques - Bridgman
A. Arent - Bridgman
T. Walsh - Bridgman
C. Miles - Bridgman
R.L. Shoberg
J.D. Grier/B.J. Gerwe
File: NFPA Code Compliance Report 09-0120-0123
NFPA Code Compliance Report 09-0120-0381
MF: N

INDIANA MICHIGAN POWER

Date November 18, 1991

Subject Fire Protection Code Compliance Review

From P.H. Jacques

To B.J. Gerwe

Per your request I have reviewed the status of Plant implementation of maintenance items and procedure revisions as outlined in the Code Compliance Review, Expanded Code Compliance Review, NFPA 30 Compliance Review and ESW Pump Room Area Extinguishers. With the exception of the items listed below all maintenance items and procedure revisions have been completed.

NFPA 30 Code Compliance

P.J. Russell memo dated June 29, 1990

Status

Complete

P.J. Russell memo dated July 2, 1990

Status

To be completed by Operations Department per your discussion with A. Puplis.

P.J. Russell memo dated July 10, 1990

Status

In some fire zones there are more than three flammable liquid cabinets. In these areas flammable liquid cabinets are used to store Class A combustibles such as cleaning materials, aerosols, grease, etc. We consider this to be an acceptable practice and monitor the additional cabinets on a regular basis.

Code Compliance Review - Impell Report No. 09-0120-0123

NFPA ~~13~~ 12A, Paragraph 1-9.5.6
BJG 11-20-91

Status

Signs will be made for the Unit 1 and Unit 2 Halon systems by December 31, 1991.

NFPA 72D, Paragraph 2034, 4052

Status

Plant procedures will be revised or new procedures developed to verify that alarms are received in the Control Room from those Auxiliary Building standpipes that are fed from piping equipped with a flow alarm or are controlled by ZMO-10 and ZMO-20 by June 1, 1992.

NFPA 12, Paragraph 1625

Status

The vent lines referred to in this item were not part of the original installation and will not be reinstalled for safety reasons. In the event of a blockage in any part of the vent line pressure can back up through the back side of the pilot valves opening the valves and allowing an uncontrolled discharge of CO2 into all of the areas connected to the vent line.

NFPA 13, Paragraphs 3-16.2.2, 3-16.3.5, 3-16.9.2

Status

This item will be completed with the Expanded Code Compliance review items.

NFPA 72D, Paragraph 2042 Item b.

Status

Relocation of fire detectors or installation of protective guards will require a design change.

FOR JUSTIFICATION OF THIS ITEM SEE 11-14-91 MEMO BY B.J. GERWE. BJG 11-20-91

Expanded Code Compliance Review
Impell Report No. 09-0120-0381

NFPA 10, Paragraph 4-3.2

Status

Procedure 12 SHP 2270 FIRE.001 has been revised to verify that fire extinguishers are clear. On fire extinguishers the operating instructions are applied by the manufacturer as is the hanging bracket. Since the extinguisher can only be hung one way we will not change the procedure. The monthly inspection is the document that verifies that the extinguisher has been inspected. The inspection procedures meet NFPA criteria.

NFPA 13, Paragraph 1041

Status

A walk down of the sprinklers will be completed and the sprinklers realigned as needed by December 31, 1992.

Valve 1-FP-196 was installed without a hand wheel. A determination will have to be made on whether one can be added without a design change.

Paragraph 3612

Status

A field walk down will be conducted and sprinkler heads changed as required by December 31, 1992.

Paragraphs 3681, 3682, 3683

Status

This item will be completed in 1992 or 1993 depending on budget allocation.

Paragraph 4143

Status

A walk down will be completed and sprinklers installed per applicable drawings by December 31, 1992.

NFPA 72D, Paragraphs 2034, 4052

Status

Procedures for the testing of the CFT Charcoal Filter Units will be completed by the start of the 1992 refueling outages for each unit.

ESW Extinguishers

Status

Per your request we have verified that the fire extinguishers in the ESW Pump Room area are all ABC Dry Chemical extinguishers.

P.H. Jacques /jp

P.H. Jacques

c: P.F. Carteaux
File

Table 4.1

Cross Reference To
NFPA Code Deviations Identified by
Impell Technical Report No. 09-0120-0123
Tables 3.1-1 Through 3.8-1

NFPA Code	Code Edition	Code Section	Number of Justifications	Justification Letter Date	Remarks
72E	1974	5-3.2 5-4.1 5-4.2 5-5.1	8 14	6-17-88 4-26-89	 RFC 12-3004
72E	1974	5-5.2	1 NA	6-17-88 11-18-91	 Procedure needs to be changed.
72E	1974; 1982	7-3.1.4 8-3.2.2	NA	11-18-91	Procedural Change Required.

AMERICAN ELECTRIC POWER

Date November 15, 1991

Subject Donald C. Cook Nuclear Plant
NFPA Code Compliance
Impell Report No. 09-0120-0123

From B.J. Gerwe

To NFPA Code Compliance Report 09-0120-0123, Section 4.0

ABB Impell code compliance review for NFPA 14 identified the following code deviation.

NFPA 14, 1986 Edition, Section 8-1.2

Deviation: The specification used for installation of hose station and standpipe systems does not specify a required flow test.

An engineering review of this deviation and the resulting justification for acceptance of the NFPA code deviation is given below.

Justification: Specification DCC-FV110-QCF is a generic specification for the design, installation and testing of fire protection systems. The specification has always contained the requirement that, "All testing of the fire protection systems shall be in accordance with the applicable NFPA Standards." While this specification does not specifically state the individual testing requirements of each of the NFPA Standards it covers, the statement was intended to encompass all the testing requirements of each standard. Therefore, the flow test requirements of NFPA 14, Section 8-1.2 are part of and have always been part of the specification.

In certain situations, it may not be prudent to perform a full flow test due to ALARA concerns. Water discharged within the Auxiliary Building requires treatment to remove radioactive contaminants which is a concern in both the management of this large volume of water and the costs involved with its treatment. In addition, due to the location of some of the standpipes and hose stations there may be no easy way to discharge such a large volume of water without raising other safety concerns. Therefore, in these situations a limited flow tested is a more reasonable alternative and the adequacy of the water supply at the hose station will be demonstrated by hydraulic calculation.

Based on the above evaluation, the code requirement for flow testing has always been part of the specification and does not require revision of the specification to make specific reference to this requirement.

References: Specification DCC-PV110-QCS-FP, Revision 0, dated 8-21-85.

Specification DCC-PV110-QCF, Revision 3, dated 9-11-91.

Concurrence: P.J. Russell, Fire Protection Engineer

B.J. Gerwe

BJG/jmf

cc: J.D. Grier/B.J. Gerwe
MF: Y

AMERICAN ELECTRIC POWER

Date November 15, 1991

Subject Donald C. Cook Nuclear Plant
NFPA Code Compliance Review
Impell Report No. 09-0120-0123

From B.J. Gerwe

To NFPA Code Compliance Report 09-0120-0123, Section 4.0

ABB Impell Code Compliance review for NFPA 72E had identified various code deviations. A number of these deviations were further reviewed and justified in the June 17, 1988 memo from D.E. Kipley of Impell to J.A. Kobyra of AEPSC. Many of the remaining deviations were also reviewed and justified in the April 26, 1989 memo by P.J. Russell to the NFPA Code Compliance Report. In reviewing the documents, three errors were found.

First, Table 3.8-1 of the NFPA Code Compliance Report 09-0120-0123 (pg. 3-130, NFPA 72E Code Sections 2-6.5, 2-6.7 and 4-1.2) contained two typographical errors. The wrong Fire Zone number was referenced, Fire Zone 56 instead of Fire Zone 57, and the wrong detector and circuit number was given, 10-12 instead of 18-12. In support of the fact that an error exists the next page of the Report, pg. 3-131, correctly states the same deviation in Fire Zone 57 and detector circuit-detector number 18-12 for Code Sections 4-3.1 and 4-3.2. In addition, a check of the detector circuit numbers, detector numbers and the Fire Zone numbers was performed to confirm the correct identification. These typographical errors have been corrected in the report.

The second error was noted in the April 26, 1989 memo, where the justification incorrectly lists detectors 18-10 and 18-12 in Fire Zone 58 instead of 57. Fire 58 is the Unit 2 Control Room Cable Vault, while Fire Zone 57 is the Unit 1 Control Room Cable Vault. The April 26, 1989 memo has been corrected to reference the correct fire zone.

The third error was found in a June 17, 1988 justification which was also performed for these detectors under a code deviation for Code

Sections 4-3.1 (1974 Edition) and 4-3.2 (1978 and 1982 Edition). This justification however, did not make reference to the same deviation noted under Code Sections 2-6.5, 2-6.7 and 4-1.2. This justification states that after a second field review, the detectors were found to be installed 6 inches away from the sides of the beams and not 4 inches away as stated in the Report. Therefore, it was concluded that the detectors were correctly installed to meet NFPA 72E and there was no code deviation. This memo serves to provide the additional reference to the June 17, 1988 justification for Code Sections 2-6.5, 2-6.7 and 4-1.2 of NFPA 72E (1974 and 1978 Editions).

Concurrence: Patrick Russell 11-15-91
P.J. Russell, Fire Protection Engineer

B.J. Gerwe

BJG/jmf

cc: J.D. Grier/B.J. Gerwe
FILE: RFC 12-3004
MF: Y

AMERICAN ELECTRIC POWER

Date November 14, 1991

Subject Cook Nuclear Plant
NFPA Code Compliance Review
Impell Report No. 09-0120-0123

From B.J. Gerwe

To NFPA Code Compliance Report No. 09-0120-0123, Section 4.0

ABB Impell code compliance review for NFPA 72D and 72E identified the following code deviations.

NFPA 72D, 1967 Edition, Section 2042
NFPA 72E, 1974 Edition, Section 2-6.1

Deviation: Several detectors are exposed to mechanical damage and require protective guards as follows:

Fire Zone 33 - Detectors 3-26 and 3-27
Fire Zone 34 - Detector 3-27
Fire Zone 39 - Detector 2-7

Fire Zone	Fire Zone Evaluation	Device
33	609'	Smoke detector 3-26 and 3-27 are located under a platform at elevation 646'-9" at 6.5' above the platform elevation 639'-4" floor. These devices are located in the normal access path to this platform and are exposed to damage.
34	609'	Smoke detector 3-27 is arranged as discussed for Fire Zone 33.
39	609'	Smoke detector 2-7 located at the reactor cable tunnel penetration mezzanine is installed at 5.75' above the mezzanine floor and located in the normal path of travel in this mezzanine.

An engineering review of this deviation has been performed and the resulting justification for acceptance of the NFPA code deviation is given below.

Justification: Even though the above smoke detectors are located in "normal access paths", the areas where they are located are not frequently occupied. In addition, these detectors are not in the normal travel routes through the area. They are instead located off the main travel routes where only a person with a specific purpose would enter.

In Fire Zones 33 and 34, the detectors are located beneath platforms where valves, instrumentation and piping are located. The detectors are located in small beam pockets formed by the structural steel members supporting the platforms. These steel beams provide protection from activity outside the small beam pockets.

In Fire Zone 39, detector 2-7 is located in the mezzanine area of the zone. Access to the mezzanine is by a ladder. While a door is provided at the end of the mezzanine, the door is only used in an emergency. This door separates a radiologically controlled area from a non-controlled area. The detector is also located towards the end of the mezzanine away from the ladder. The mezzanine contains cable trays and conduits which pass through the area.

Historically, these detectors have not been a source of problems and have never been known to suffer damage due to their location.

Based on the above evaluation, the protection of these detectors will not be required and are considered to be acceptable as installed.

References:
- o ABB Impell NFPA 72E (1974 Edition) Section 2-6.1 Code Compliance Evaluation dated June 17, 1988 from D.E. Kipley (Impell) to J.A. Kobyra.
- o Engineering judgement based on field review.
- o Conversation with Plant Fire Protection Coordinator.

Concurrence: Patrick Russell 11-15-91
P.J. Russell, Fire Protection Engineer

B.J. Gerwe
B.J. Gerwe

BJG/gh

cc: J.D. Grier/B.J. Gerwe
P.H. Jacques - Bridgman
MF: Y

AMERICAN ELECTRIC POWER

Date November 14, 1991

Subject Cook Nuclear Plant
NFPA 12A Code Compliance Review
Impell Report No. 09-0120-0123

From B.J. Gerwe

To NFPA Code Compliance Report No. 09-0120-0123, Section 4.0

ABB Impell code compliance review for NFPA 12A identified the following code deviation.

NFPA 12A, Edition 1977, Section 1-9.5.6

Deviation: A system nameplate is not provided for any of the areas/systems which were evaluated.

An engineering review of this deviation has been performed and its resulting resolution and justification for acceptance of the NFPA code deviation is given below.

Resolution: Nameplates are being provided for the Unit 1 and 2 Control Room Cable Vault halon systems. These halon systems are the only Technical Specification halon systems installed at the plant. Nameplates will not be provided for the non-Technical Specification halon systems.

Justification: A halon essential use study has been conducted for the halon systems installed at the plant to determine their need in light of the environmental concerns surrounding the continued use of this fire suppression agent. This study evaluated each halon system and made determinations as to whether the system should remain, be replaced with an alternate suppression system (e.g., water or carbon dioxide) or be removed with no alternative suppression system provided. The replacement and removal of these systems is scheduled to occur over the next several years. At this time, only the Control Room Cable Vault halon systems are to remain.

Prior to system removal, all work performed on the halon systems is done in accordance with plant procedures and the appropriate drawings. In addition, the halon cylinders are located outside the area being protected and, therefore, can be readily identified and would not lead to confusion between systems. Members of the fire brigade are also trained and knowledgeable in the operation of halon systems and in their locations throughout the plant.

Based on the above evaluation, the lack of system nameplates for the non-Technical Specification halon systems is considered acceptable.

References: Halon Essential Use Study
Lesson Plan FF-C-AS19 Miscellaneous Fire Protection
Fire Facility Drawings
RFC-12-3082 Design Change

Concurrence: Patrick J Russell 11-15-91
P.J. Russell, Fire Protection Engineer

B.J. Gerwe

B.J. Gerwe

BJG/gh

cc: J.D. Grier/B.J. Gerwe
P.H. Jacques - Bridgman
R.L. Shoberg
File: Halon Essential Use Study
MF: Y N

AEP AMERICAN ELECTRIC POWER

Date November 13, 1991

Subject Cook Nuclear Plant
Impell NFPA Code Compliance Report No. 09-0120-0123

From B.J. Gerwe

To NFPA Code Compliance Report No. 09-0120-0123, Section 4.0

NFPA Code Compliance Report No. 09-0120-0123 identified several deviations to NFPA 13, 14 and 15 concerning confirmation of hydraulic supply and demands. The Impell-identified deviations and AEPSC resolution are noted below.

(1) NFPA 13, 1983 Edition, Sections 2-2.1.2.4 and 2-2.1.2.5

Deviation: Exterior fire hose demands were not added to the hydraulic sprinkler system calculations.

(2) NFPA 14, 1971 Edition, Sections 525

Deviation: Water supply requirements for both sprinklers and interior hose stations are to be considered.

(3) NFPA 13, 1983 Edition, Section 7-3.4
NFPA 15, 1983 Edition, Section 7010

Deviation: Water supply graph sheets are not provided for the water suppression system calculations.

Resolution: As a result of the new fire protection water supply system currently being installed (RFC-12-3065), new hydraulic calculations are being prepared to demonstrate the adequacy of the new water supply in meeting the demands of the existing water suppression systems and standpipe systems.

The calculations will be complete from the fire pumps up to the demand points and include the requirements of the applicable referenced code sections. This will ensure that an adequate water supply and pressure will be available to meet all system demands. Since the calculations will be complete back to the water source, i.e., fire pumps, there will be no need for the development of water supply graphs.

References: RFC-12-3065 Design Change

Concurrence: Patrick J. Russell 11-15-91
P.J. Russell, Fire Protection Engineer

B.J. Gerwe
B.J. Gerwe

BJG/gh

cc: J.D. Grier/B.J. Gerwe
File: RFC-12-3065
MF: Y N

AEP
AMERICAN ELECTRIC POWER

Date August 19, 1991

Subject Cook Nuclear Plant
Fire Alarm Circuit Supervision
Closeout of App. R Action Item 1.26

NFPA 72D
1967 EDITION
SECTIONS 2411, 2422

From B.J. Gerwe

To 1) J.D. Grier JDH
2) S.J. Brewer

The following discussion provides PH&F's response to the identified discrepancies made by the NRC in their April 26, 1990 SER concerning fire alarm system circuit supervision. The issue was stated in Section 2.3.1 of the SER and the response was given in Section 2.3.2. This discussion is based on the results of the Impell review and write-up of this problem in their July 6, 1990 letter by Mr. D. Kipley. A spot check of some of the procedures referenced in the Impell letter was performed to verify that the activity was still being performed.

Sections 2.3.1 and 2.3.2 of the SER addressed compliance of the plant alarm signaling system with the requirements of the NFPA 72D. A review of the statements made in Section 2.3.2 indicates that the NRC is of the understanding that all plant fire alarm system initiating circuits are electronically supervised in accordance with the requirements of NFPA 72D with the exception of two circuits. These two circuits are within the control room between the plant fire input panels and the Emergency Fire (EF) annunciator panel on the main control board. This supervision statement could be interpreted as including all waterflow and sprinkler supervisory alarm initiating circuits as well as fire detection and suppression actuation and initiating circuits. Under this interpretation, the statement is only partially correct in that not all of the plant alarm signalling system circuits are supervised in accordance with NFPA 72D. Secondly, this statement is incorrect with respect to the number of unsupervised circuits within the control room.

It should be noted that the following response is based on the 1986 Edition of NFPA 72D. This Edition was in force at the time of the November 1 and 2 meeting in 1989 between AEPSC and the NRC at the Cook Nuclear Plant. The following response is also based on only those systems reviewed under the NFPA Code Compliance Reports, which includes the Technical Specification systems and those systems in areas of the plant which contain safety related and safe shutdown components and/or cables.

In addressing the portions of the system outside the control rooms which are not supervised in accordance with NFPA 72D, these circuits include waterflow and sprinkler supervisory alarm initiating circuits and alarm signals between the local control panels and the control room. As documented in the NFPA 72D Code Compliance Report, the following alarm signals are not supervised to the requirements of NFPA 72D.

- CO_2 System Cardox and Alison control panel alarm and trouble signals,
- Reactor Coolant Pump (RCP) panel alarm and trouble signals,
- Containment cable tray detection panel alarm and trouble signals,
- Halon System Alison and Pyrotronics control panel alarm and trouble signals
- alarm initiating circuits for waterflow,
- sprinkler supervisory (valve tamper and low air pressure switches) signals, and
- fire pump signals

The detection system alarm and trouble signals of the CO_2, RCP and Containment cable tray systems interface with the control room via Alison control panels. The suppression system alarm and trouble signals of the CO_2 systems interface with the control rooms via Cardox control panels. The control room cable vault Halon systems signals interface with the control rooms via Alison control panels. The plant computer room Halon system signals interface with the control rooms via Pyrotronics low voltage System 3 control panels.

The NFPA Code Compliance Report also documents that the fire detection system alarm initiating circuits and the CO_2 and Halon suppression system actuation (i.e., solenoids) circuits are properly supervised as required by their respective local control panel.

A properly supervised circuit as defined by NFPA 72D, Sections 3-9 and 3-10, is a circuit that verifies operability of the circuit by indicating a trouble condition at the associated control panel for both open circuit and ground fault conditions. The NFPA Code Compliance review identified that the annunciator circuits associated with the EF panels are not electrically supervised to detect open circuits or wire breaks. These annunciator circuits are properly supervised for detecting ground fault conditions. A review of our licensing documents indicates that we have committed to comply with the requirement to supervise for open circuits for only the fire detection systems. The NRC accepted this position in their SER for Appendix A to BTP APCSB 9.5-1, dated July 31, 1979.

Two of the fifty-three Appendix A follow-up questions posed by the NRC addressed circuit supervision. These questions were Numbers 16 and 53. Information was presented which identified which portions of the overall fire alarm system were supervised. The Appendix A requirement for circuit supervision is limited to fire detection systems only. This was the commitment position taken by AEPSC as given in the response to Question 16b. The Appendix A SER also refers to only circuit supervision in the context of fire detection systems. The Appendix A SER states that the NRC "reviewed the fire detection system's design criteria and the basis to ensure that it conforms to the applicable sections of NFPA 72D, for Class B supervised circuits". Therefore, it is interpreted that the only NFPA 72D requirements for circuit supervision to which Cook Nuclear Plant is committed are for fire detection systems.

Again, the initiating device circuits on the high and low voltage Pyrotronics (smoke and flame detection) and Alison (thermistor heat detection) local control panels are Class B supervised circuits. The high voltage Pyrotronics panels, referred to as the Emergency Fire Rear (EFR) panels, are located in each control room behind the main control board containing the EF panel. The high voltage panel monitors detection circuits as well as input signals from some of the other Pyrotronics low voltage panels. The Technical Specification required low voltage Pyrotronics detection panels transmit alarms back to the control room on supervised high voltage Pyrotronics initiating device circuits. These EFR panels transmit duplicate alarm signals to the front of the EF panels. These alarm signals are unsupervised. However, they are considered to be in accordance with Section 2-7.1 of NFPA 72D since these circuits are contained within the enclosure of the control room horseshoe control panel. Section 2-7.1 does not require supervision of wiring within a common enclosure. Since the control room horseshoe panel is considered to be a common enclosure, this wiring need not be supervised.

For the Alison local detection control panels, they transmit signals to annunciator logic cabinets located behind the main control board containing the EF panel. The Cardox suppression system control panels and the Pyrotronics System 3 control panels for the computer rooms, also transmit signals to the annunciator logic cabinets located behind the main control board. These annunciator logic cabinets transmit unsupervised alarm signals to the front of the EF panels. Since the signals between the logic cabinets and the EF panels run through the common enclosure of the control room horseshoe panel, they are not required to be supervised per Section 2-7.1.

The routine surveillance testing performed for the detection and suppression actuation and initiating circuits described above, also comply with the requirements of NFPA 72D Section 2-4.3.d with the exception of the RCP systems. Section 2-4.3.d requires testing to be performed every six months. Alarms sent to the control rooms which are not electrically supervised are checked every six months. The RCP systems are functionally tested every 18 months due to the fact that the

detection and suppression actuation devices are located within Containment and are normally not accessible during plant operation. The function tests include checking for alarms at the local control panels and those sent to the control rooms. Operations also performs a once-per-shift visual examination of all fire panels. This examination includes checking for alarms and actuations which may have occurred. During a meeting held on November 1 and 2, 1989, at the Cook Nuclear Plant, Messrs. D. Kubicki of the NRC and B.J. Gerwe of AEPSC discussed the surveillance testing program. Mr. Kubicki indicated that the current surveillance practices being implemented for the fire detection and suppression systems met the intent of the code and were considered acceptable.

Although the fire detection and suppression systems are being properly surveilled, all waterflow and sprinkler supervisory devices (valve tamper and low air pressure switches) are not being verified as required by NFPA 72D. Justification for acceptance of these conditions are discussed below.

1) All of the waterflow alarm devices and circuits, with the exception of the Training Buildings and Technical Support Center (TSC), are verified for operability by simulated or actual flow test methods in accordance with plant procedures. The Training Buildings and TSC are non-safety related areas of the plant and have no impact on the operation of the plant.

2) The valve tamper alarm signals are not verified for receipt of a trouble signal in the control room during the performance of the valve cycling testing. However, the valves are inspected for correct position monthly by procedure. This inspection fulfills the intent of the valve tamper switch trouble signal.

3) The low air pressure supervisory alarm devices and their circuits are not verified for operability with the exception of the RCP low air alarm devices. However, this is not viewed as a negative factor based on the reliability of the plant air supply system and the inspection of dry pilot preaction sprinkler system piping by plant procedure. In addition, the plant procedures prohibit the indiscriminate changing of valve positions. Valve positions may only be changed under the umbrella of a plant procedure or job order. The plant air supply is considered reliable due to the redundant plant air compressors which serve both units. Should a low air pressure condition occur within one of the dry pilot piping systems located in the Auxiliary Building, the preaction valve would operate resulting in a waterflow alarm signal being sent to the control room. Since the dry pipe systems use closed head sprinklers, no water would be discharged. The ensuing investigation of the spurious water flow alarm would point to the loss of pilot air pressure condition.

4) The fire pump supervisory devices are connected to the EF panels and are verified for operability under plant procedures.

Section 2.3.2 of the SER also states that there are only two unsupervised circuits within the control room to the annunciator panels on the main control board. This is not correctly stated. The statement should have said that there are two cases of unsupervised circuits within the control room. These two cases were discussed previously and include the transmittal of signals from the EFR panels and annunciator logic panels to the main control board EF panels in each unit. However, these circuits are judged to be in accordance with NFPA 72D, Section 2-7.1, which states that circuit wiring contained within a common enclosure need not be supervised. The wiring between the EFR and logic panels to the EF panels are considered to be within the common enclosure of the control room horseshoe panel.

B.J. Gerwe

cc: R.L. Shoberg/E.A. Taylor (App. R Action Item 1.26)
J.D. Grier/B.J. Gerwe
file: NFPA 72D Code Compliance
App. R Continuing Compliance

MF: Yes

ABB
ASEA BROWN BOVERI

Inter-Office Correspondence

File: 0120-158
M-018
Copy: GAW
MJS
SJC
DEK

MEMO TO: Bruce Gerwe

FROM: David E. Kipley DEK

DATE: September 6, 1990

SUBJECT: NFPA Code Compliance Evaluation Review

REFERENCE: Memo from S. J. Brewer to A. A. Blind Et.Al., Re: "Action Item Assignments", Rev. 2, Dated 4/26/90

This memo is being issued to document ABB Impell's review of Station's procedures which close out deficiencies identified in ABB Impell Report No. 09-0120-0123. These procedures include:

Deficient Section/Standard-Edition	Procedure Reviewed	Status
1716/12-1968	PMSO-103	Closed
3681/13-1971	12 OHP 4030 STP.125NS 12 OHP 4030 STP.125TS 12 OHP 4030 STP.120SF 12 MHP 4030 STP.020	Closed
2034/72D-1967	12 OHP 4030 STP.125NS 12 OHP 4030 STP.125TS 12 OHP 4030 STP.120SF 12 THP 4030 STP.239	Closed for Sprinkler Flow Testing Reset Signal Verification. Open Item for Fire Pump Signal Verification.

Deficient Code Section/Standard	Procedure Reviewed	Status
2411/72D-1967	12 OHP 4030 STP.125CP	Closed
	1 & 2 OHP 4030 STP.125CV	
	12 THP 4030 STP.239	
	1 & 2 OHP 4030 STP.123	
	12 OHP 4030 STP.125NS	
	12 OHP 4030 STP.125TS	
	12 IHP 6030 IMP.190	
	12 IHP 6030 IMP.334	
	2 THP 6030 IMP.251	
	1 THP 6030 IMP.151	
	2 THP 6030 IMP.290	
	12 OHP 4030 STP.120SF	
	12 THP 6030 IMP.142	
	12 THP 4030 STP.225 SERIES	
	12 THP 6030 IMP.053	
	12 THP 6030 IMP.153	

All other procedure deficiencies still remaining open from those identified in the report, have been detailed in memo no. M-013, dated 8/31/90.

AEP

AMERICAN ELECTRIC POWER

Date September 5, 1990

Subject Donald C. Cook Nuclear Plant
Impell Code Compliance Review

From P.J. Russell

To [redacted]

The Cook Nuclear Plant was identified as not being in compliance with the following section of NFPA 72D (1967 edition).

- Section 3542 "Suitable and practical facilities shall be provided to permit periodic testing for sensitivity". Specifically, detector number 29 located in Fire Zone 44S was the detector identified as being deficient in this compliance.

Plant Procedure 12-THP6030.IMP.051 currently tests all detectors located within Fire Zone 44S. This procedure has not identified any detector located within this fire zone as being inaccessible. While we agree that some obstructions exist to easily test this detector, we feel that past performance testing proves that this detector can be tested and maintained. Therefore, we feel that this detector meets the intent of section 3542 of the 1967 edition of NFPA 72D. No modification will be made to this fire detector.

PJR/jmf

cc: R.L. Shoberg
J.D. Grier/B.J. Gerwe/P.J. Russell
File: Appendix R Audit

Intra-System

[redacted]

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ITEM 2 FOR
CLOSE OUT OF
NFPA 14
1971 EDITION
SECTION 651

Date September 4, 1990

Subject Cook Nuclear Plant
RFC-DC-12-3003
S&ADNS's Review of Open Items

From A. K. Dey

To P. J. Russell

RFC-DC-12-3003 required Structural & Analytical Design Nuclear Section (S&ADNS) to review:

1. Impact of piping changes on Auxiliary Building (AB) support system.

2. Fire protection main on EL. 587' for lateral restraints and compliance with NFPA #14, section 651.

S&ADNS has reviewed above items and has concluded as noted below:

<u>Item 1</u>

Piping changes generally comprise of adding and/or revising sprinkler heads in an existing Fire Protection (FP) system, which have been effected by addition of small pipe sections (1" dia. x 4" to 6" long). These changes are insignificant and would have no significant effect on the FP system.

<u>Item 2</u>

We understand that the review of item 2 is required to close out Impell's finding which stated that the 6" FP main at 587'-0" elevation lacked lateral supports and might not remain in place under flow condition.

As per discussion with you, NED had confirmed that this FP system has been in operation for a number of years and has been tested under flow conditions numerous times in accordance with existing plant procedures such as 12-OHP-4030.STP.124. During this time, S&ADNS has not been informed of any vibration related and/or pipe displacement related problem for this system under flow condition. Site Design's inspection of this specific pipe section did not reveal any visible wear (see Attachment 1) indicating significant displacements. In addition, sufficient number of pipe supports are in place for this Seismic Class III system and the installation of lateral restraints is not a specific requirement of NFPA #14, section 651.

We therefore believe NFPA requirements have been met and no additional changes are required to close out this open item.

If you have any questions, please contact the writer at extension 3862.

A. K. Dey

AKD/dm
REF: 12-3003/RFC90

Attachment

xc: J. A. Kobyra/D. J. Petro - w/attachment
N. Ruccia - "
File: RFC-DC-12-3003

INDIANA MICHIGAN POWER

Date March 7, 1989 THC.003

Subject FWR #766-SM
587' E-W Hallway 6" Fire Protection Main

From T. H. Cummings

To A. K. Dey

As per your request, the 587' E-W hallway 6" fire protection main was reviewed to determine if the system had adequate lateral support to restrain the pipe from movement during the operation of the system.

The results of this review are as follows:

1. There is no existing lateral supports on the 220 feet of straight pipe running through the 587' E-W Auxiliary Building hallway.

2. Even though there is no lateral support on this 6" piping system, there was no visible wear seen on the pipe or supports reviewed which would indicate system movement during operation.

If you have any questions or comments, please contact the undersigned.

T. H. Cummings
Thomas H. Cummings
Site Mechanical Engineer

/jc

ATTACHMENT - 1

(REF. - MEMO FROM A.K.DEY TO P.J. RUSSELL)
DATED 9.4.1990, RFC-DC-12-3003

NFPA 14, 1971 EDITION, SECTION 651

Intra-System

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Date September 4, 1990

Subject Cook Nuclear Plant
NFPA Code Compliance Verification
Response to Impell Comments

From P.J. Russell 9-4-90

[redacted]

Several generic deficiencies were identified by ABB Impell's review of AEPSC's NFPA Code Compliance Verification reports and closeouts. A number of these deficiencies impacted documents prepared by the PH&F Section. Our response to the ABB Impell comments are as follows.

NFPA 20 - FIRE PUMP CODE COMPLIANCE REPORT

Item C.1

Sections 41a and 41b. The compliance statement indicated that the fire pumps are isolated in separate fire zones. Although this may be true for the two diesel driven fire pumps, the three electric driven fire pumps are all located within the same fire zone (Fire Zone 2). Further clarification should be provided to address the concern of the installation of these pumps within the same fire zone.

Response

Our response to Sections 41a and 41b have been revised for clarification.

Item C.2

Section 143b. The compliance statement has indicated that the unlined steel suction pipes installed for the fire pumps has not experienced excessive friction loss. The basis for this statement should be indicated (i.e., flow testing). Also, the statement that the internal painting of the suction piping is an "unnecessary expense" should not be provided as a part of any justification. This statement should be deleted.

Response

Our response to Section 143b has been revised to delete the "unnecessary expense" comment. We also added the Performance testing procedures as technical reference for the basis of our statement that excessive friction loss through the suction pipe is not a problem.

Item C.3

Section 222a. This section has been listed as not applying; however, this section is an extension of Sections 222b and 222c and should be addressed accordingly.

Response

Our response to Section 222a has been revised so that there will be no misunderstanding in our complete compliance with Section 222 of NFPA 20.

The following is the PH&F Section's response to ABB Impell's comments concerning AEPSC's memos dated February 8, 1989 and April 26, 1989.

Item A

A hydraulic analysis should be performed to verify the adequacy of the existing water supply system to support the demands of the existing and any new suppression systems installed.

Response

A computerized program has been purchased for the purpose of evaluating existing as well as new fire suppression systems. This program is being installed onto the AEPSC computer system by calculation number DCC-FP-12-MC05-S.

Item B.1

These memos further discuss justifications made for deficiencies identified in Impell's Report No. 09-0120-0123. The evaluations provided in these memos should identify the technical data used in supporting the conclusions made (i.e., AEPSC memo dated June 17, 1988).

Response

These memos are based on the engineering judgement of a qualified fire protection engineer. The justifications were written upon the completion of a field walkdown conducted by the author. This information is contained within these documents.

Item B.2

The memo dated April 26, 1989 made numerous references to the cost of retrofitting certain features of a system as part of the justification. The reference to the cost for not installing equipment for compliance should not since it is believed that the NRC would not consider this a reasonable answer. Therefore, it is recommended that all references to cost be deleted from these justifications. The sections in question include Fire Zones 1, 32, 43, 48, 51, 42, 58 and 69.

Response

All references to the cost of retrofitting certain features of the fire detection systems have been deleted from this memo.

Patrick J. Russell

P.J. Russell

PJR/gh

cc: R.L. Shoberg
J.D. Grier/B.J. Gerwe/P.J. Russell
File: 1990 Fire Protection Correspondence

AMERICAN ELECTRIC POWER

Date August 23, 1990

Subject Response to Impell's Review of Our NFPA 20 Code Compliance Report

From J.D. Markham

To P.J. Russell

As you requested, the following are our comments to the Impell's review comments of our NFPA 20 Code Compliance Report related to electrical sections:

Comment a and b:

Attached is updated NFPA Code Compliance review Sections 4, 5, and 7 with Technical Data references which were used as a basis for specific conclusion or justification. Also, attached is a listing of REFERENCES (Electrical/Instrumentation & Controls). In addition, the following should be added to the introduction: "A field walkdown was made by cognizant Electrical/I&C Engineering personnel to review the arrangement of equipment, installation details, and to obtain other equipment details such as ratings, model numbers, etc. that was not available in reference technical data. This information was used as a basis for those conclusions or justifications marked as WALKDOWN (W)."

Comment d4:

Our reply was based on our interpretation of the NFPA 20 requirements and applicability which is noted "Comply".

Comment d5:

The statement "Comply" is correct. The fire pump motors have NEC Code Letter G. The reason for the statement of "comply with intent of requirement" is that the table listing NEC Code Letter requirements does not list motors above 200HP. The high demand fire pump motors are 300HP.

Comment d6:

Section 455b applies to the 300HP (high demand) motors since they are drip-proof motors, but this section does not apply to the 75HP (low demand) motor since it is totally enclosed. However, the requirements of Section 455b (and 455a) is not applicable (as noted) since the hose valves are located outside the pump room.

Section 455d applies to the 75HP (low demand) motor since it is totally enclosed, but this section does not apply to the 300HP (high demand)

motors since they are drip-proof. As noted, the 75HP motor complies with the requirements.

Comment ~~d~~c7:

The compliance statement "Comply" is correct. However, the additional explanation is a typographical error. The technical data reference has been indicated in the revised checklist as - "Technical Data - Vendor Information".

Comment ~~d~~c8:

The incomplete sentence resulted in improper copying. New page has been made available.

J. D. Markham
J.D. Markham

JDM/cld/2442

Approved S K Farlow
R.C. Carruth

Attachment

cc: R.F. Kroeger W/O ATTACHMENT
S.K. Farlow/J.V. Ruparel "
S.Z. Parsons "

ATTACHMENT
Page. 1 of 5

ABB
ASEA BROWN BOVERI

Inter-Office Correspondence

File: 0120-158
M-013
Copy: GAW
SJC
MJS
DEK

MEMO TO: Brian McLean/Bruce Gerwe

FROM: David E. Kipley DEK

DATE: August 31, 1990

SUBJECT: NFPA Code Compliance Evaluation Review

REFERENCE: Memo from S. J. Brewer to A. A. Blind Et.Al.,
Re: "Action Item Assignments", Rev. 2, Dated 4/26/90

This memo is being issued to document ABB Impell's review of the NFPA code compliance evaluations performed by AEPSC. The evaluations and associated documents reviewed have been listed below. The completion of this review process closes out Action Item No. 21 of the referenced memo.

Safety & Assessment Weekly Activity Report Dated 6/15/88.

PH&FP Memo From B. Gerwe to P. Jacques, "Documentation Revisions Required for NFPA Code Compliance", Dated 7/7/88.

PH&FP Memo From B. Gerwe to J. Kobyra/A. Auvil, "NFPA 14 Code Compliance Justification for Reduced Hose Station Flow", Dated 9/20/88.

PH&FP Memo from P. Russell to RFC-3003, "NFPA 12A Code Compliance Walkdown Impell Report No. 09-0120-0123", dated 1/25/89.

PH&FP Memo from P. Russell to A. Auvil, "Impell Code Compliance Walkdown NFPA 10 Portable Fire Extinguishers", dated 1/25/89.

PH&FP Memo from P. Russell to M. Noronha, "Impell Code Compliance Walkdowns NFPA 14 Standard and Hose Stations", dated 1/30/89.

Attachment
Page 2 of 5

PH&FP Memo from B. Gerwe to J. Kobyra/A. Auvil for NFPA 720 Code Compliance Sections 2032, 2212, & 3111, dated 11/30/88.

PH&FP Memo from P. Russell to Impell Code Compliance Walkdown, "Automatic Sprinkler Systems", dated 2/8/89.

PH&FP Memo from P. Russell to Impell Code Compliance Walkdown, "Automatic Fire Detection System", dated 4/26/89.

Code Compliance Verification Checklist for NFPA 20-1969 "Standard for the Installation of Centrifical Fire Pumps".

ABB Impell's review of the Code Compliance Verification Checklist for NFPA 20 identified several generic deficiencies which are detailed below.

A. Numerous code sections and justification statements have not provided a technical reference to provide a basis for the conclusion made in the compliance statement. The code sections noted, but not limited to, include Sections 243 through 531 and 666c through 934. The technical references are essential for supporting the respective compliance statement or justification.

B. Numerous "Comply" or "Does not Apply" statements made to document compliance to code section requirements, did not indicate the basis for why the system is in compliance. These code sections include Sections 443, 454a, 456c, 456d, 511e, 512c, 513d1, 513d2, 514b2 thru 514b9, 514c1, 514c2, 515d4, 515e, 525 thru 528, 712a thru 712c, 713e2 thru 713g, 714a2, 714a3, 714b1, 714b3, 715b1 thru 715c2, 715d4, 714e3 thru 715f3. The applicable supporting statements should be provided to document why compliance or non-applicability is true.

C. Inconsistencies were noted in a number of statements raised questions which requires additional clarifications. These sections include the following:

   1. Sections 41a and 41b. The compliance statement indicated that the fire pumps are isolated in separate fire zones. Although this may be true for the two diesel driven fire pumps, the three electric driven fire pumps are all located within the same fire zone (Fire Zone 2). Further clarification should be provided to address the concern of the installation of these pumps within the same fire zone.

Attachment
Page 3 of 5

2. Section 143B. The compliance statement has indicated that the unlined steel suction pipes installed for the fire pumps has not experienced excessive friction loss. The basis for this statement should be indicated (i.e., flow testing). Also, the statement that the internal painting of the suction piping is an "unnecessary expense" should not be provided as a part of any justification. This statement should be deleted.

3. Section 222a. This section has been listed as not applying, however, this ection is an extension of the Sections 222b and 222c and should be addressed accordingly.

4. Section 440. This section may not apply since this facility is a power plant and does not have a transformer specifically provided for the fire pumps.

5. Section 451c. The compliance statement made for this section implies that there is a non-compliance with the system however, a detailed justification has not been provided. This justification should be provided.

6. Sections 455b and 455d. The compliance statements for these sections seem to be incomplete since the statements only make reference to either the high or low demand fire pumps. Further clarification should be provided to indicate that all electric driven pumps have been reviewed against the requirements of these sections.

7. Section 513d3. The compliance statement does not adequately address the code section requirements. The compliance statement should address whether the pump controller components (i.e., power supplies, fuses) have been rated for continuous duty. This system should be evaluated against this code section's requirements.

8. Section 514a. The last sentence in the justification statement provided has not been completed. This statement should be completed.

Attachment
Page 4 of 5

ABB Impell's review of several station surveillance procedures to verify if that the procedural deficiencies noted in Impell's Report 09-0120-0123, have identified several unresolved issues. These issues include the following:

NFPA Code	Procedure Required for Revision	Requirement
15	12 MHP 4030 STP. 020 SERIES	The filter unit 12-HV-SATFU nozzle system is not verified for operability.
72D	12 SHP 2270 FIRE.004 1&2 OHP 4030 STP.121 SERIES	The fire pump and hose system manual station alarm signals are not verified for their operability.
72E	12 THP 6030 IMP.153	The verification of the alignment of Ultraviolet detectors to confirm proper protection.

ABB Impell's review of numerous evaluations performed by AEPSC to show compliance with deficiencies identified in Impell's Report 09-0120-0123, indicated the following open items.

A. A hydraulic analysis should be performed to verify the adequacy of the existing water supply system to support the demands of the existing and any new suppression system installed.

B. The review of AEPSC's memos dated 2/8/89 (NFPA 13) and 4/26/89 (NFPA 72E) indicated the following open items.

   1. These memos further discuss justifications made for deficiencies identified in ABB Impell's Report 09-0120-0123. The evaluations provided in these memos should identify the technical data used in supporting the conclusions made (i.e., AEPSC memos dated 6/17/88).

2. The memo dated 4/26/89 made numerous references to the cost of retrofitting certain features of a system as part of the justification. The reference to the cost for not installing equipment for compliance, should not since it is believed that the NRC would not consider this a reasonable answer. Therefore, it is recommended that all references to cost be deleted from these justifications. The sections in questions include: Fire Zone 1, 32, 43, 48, 51, 52, 58 and 69.

AEP
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Date August 20, 1990

Subject Cook Nuclear Plant
Automatic Sprinkler System

From P.J. Russell PJR 8-20-90

To Impell Code Compliance Walkdown

This memorandum is to be used as a supplement to our February 8, 1989 memo (P.J. Russell to Impell Code Compliance Walkdown) regarding automatic sprinkler system code compliance. This previous memo was written by a qualified fire protection engineer based on the field conditions encountered during a walkdown of the Impell identified deviations. All evaluations were based on the engineering judgements of the author. In this previous memo, a justification was written for the fact that the sprinklers protecting Fire Zone 105 were not installed in accordance with Sections 4-1.1.1, 4-1.1.4 and 4-2.4.6 of the 1983 edition of NFPA 13, "Automatic Sprinkler Systems." Since the occupancy of Fire Zone 105 has been changed, the previous evaluation is no longer valid. Following is a new evaluation for this area.

It was stated in the Impell Report that sprinklers in the Southwest corner of the lower level of the Contractors Access Area are installed too close to a beam. It is agreed that looking at these sprinklers individually a problem with compliance to NFPA 13 exists. However, since this area (approximately 16 ft. by 14 ft.) contains four sprinklers, it is felt that the area should be reviewed as a whole. It appears that the sprinkler contractor took into consideration the obstruction problem caused by the beam and compensated by placing sprinklers on each side of the beam. Currently, the Southwest corner of this room contains no permanent combustibles. In fact, this entire fire zone contains very few permanent combustibles. This room is now used as a wrapping and temporary storage area for radiologically controlled scaffolding. Material is not typically stored here. Any storage that does exist remains under stringent control by Plant Procedure PMI-2270. The four sprinklers installed in this area more than adequately cover the floor space below. It is this author's belief that the intent of Sections 4-1.1.1, 4-1.1.4 and 4-2.4.6 of NFPA 13 are met by the existing sprinkler configuration. It is felt that the existing sprinklers are adequate and no changes need to be made.

PJR/gh

B.J. Gerwe 8-20-90
Fire Protection Concurrence

cc: R.L. Shoberg BJG
J.D. Grier/B.J. Gerwe/P.J. Russell
File: 1990 FP Correspondence

Intra-System

ABB
ASEA BROWN BOVERI

Inter-Office Correspondence

File: 0120-158
M-007
Copy: GAW
SJC
MJS

MEMO TO: Brian McLean/Bruce Gerwe

FROM: David Kipley

DATE: July 6, 1990

SUBJECT: Recommended Justification of the Alarm Circuit Supervision for the Donald C. Cook Nuclear Plant in Response to the NRC's Safety Evaluation Reported Dated April 26, 1990

REFERENCE: Memo from S. J. Brewer to A. A. Blind Et. Al., Re: "Action Item Assignments", Rev. 2, Dated 4/26/90

The purpose of this memo is to report on ABB Impell's assessment of the subject report Sections 2.3.1 and 2.3.2 to provide input for addressing discrepancies identified in the NRC statements of this report. This item is listed as Action Item No. 21 in the referenced memo.

On April 26, 1990, the NRC issued a Safety Evaluation Report (SER) which discussed the fire protection features installed at the D.C. Cook Plant. Section 2.3.1 and 2.3.2 of the SER addressed compliance of the Plant Alarm Signaling System with the requirements of National Fire Protection Association (NFPA) Standard 72D. A review of Section 2.3.1 indicates that it is the NRC's understanding that all plant fire alarm system alarm initiating circuits are electrically supervised in accordance with NFPA 72D requirements with the exception of two circuits within the main control boards. This statement is not entirely accurate in that all plant fire system circuits could be interpreted to include all waterflow and sprinkler supervisory alarm initiating circuits as well as fire detection/suppression actuation and initiating circuits.

ABB Impell's NFPA 72D Code Compliance review, documented in Report No. 09-0120-0123 indicates that the fire detection system alarm initiating circuits and CO_2/Halon suppression system actuation (i.e., solenoid) circuits installed throughout the plant were properly supervised as required by the respective local alarm panel. However, the alarm initiating circuits for waterflow, sprinkler supervisory signals, CO_2 panel alarm/trouble signals, RCP Pump alarm/trouble panel signals, Alison cable tray detection panel alarm/trouble panel signals, Halon panel alarm/trouble signals and fire pump signals connected to the control room main control board (EF) panels via alarm signaling line circuits are not properly supervised.

A properly electrically supervised circuit as defined by NFPA 72D Sections 3-9 and 3-10 would be a circuit which verifies the operability of a circuit by indicating a trouble condition at the associated control panel for an open circuit and ground fault conditions. These properly supervised circuits installed at the D.C. Cook Plant include those circuits between the local control panels and alarm initiating devices.

Improperly supervised circuits are defined as those circuits which are supervised for ground fault conditions, however do not indicate an open circuit trouble condition as required by NFPA 72D, Section 3-10. These improperly supervised circuits installed at the D.C. Cook Plant includes the circuits between the local control panels and the EF panels.

Review of the responses made by AEPSC for APCSB BTP 9.5-1, Appendix A Section E.1(a) and the NRC's 53 follow-up Questions indicate that Cook Nuclear Plant committed to complying to the applicable sections of NFPA 72D for the fire detection/suppression system control circuits only [Question 16b of the NRC 53 Questions]. The plant fire detection (EFR) panels located within the control room control board, properly supervise their associated detection system circuits located throughout the plant. The local control panels for the RCP pump, Charcoal filter unit, CO_2 and Halon systems, located near their respective hazard, properly supervise their respective actuation circuits. The EFR panels however, transmit signals to the EF panels via signaling line circuits which are considered equivalent to properly supervised circuits as defined by NFPA 72D Section 2-7.1, since these circuits are contained within the enclosure of the control room control board. Although the local control panels of the suppression systems are not monitored via properly supervised signaling line circuits, the actuation devices for these local systems are connected to properly supervised actuation circuits. Therefore, these local actuation devices are in compliance with the commitment made in the Appendix A document.

The routine surveillance testing performed for the detection/suppression actuation and initiating circuits described above, also comply with the requirements of NFPA 72D Section 2-4.4.d (every six months) with the exception of the frequency for performing the surveillance on the RCP pump systems (every eighteen months). This is primarily due to the fact that all RCP pump detection/suppression actuation devices are located within the containment structures and these areas are normally not accessible during plant operation. During a meeting held in November of 1989 at the plant, Messrs. Dennis Kubicki of the NRC and Bruce Gerwe of AEPSC discussed the surveillance testing program. Mr. Kubicki indicated that the current surveillance practices being implemented for the fire detection/suppression actuation systems met the intent of the code and was considered acceptable [Ref. AEP memo from L. A. Bilionis to T. H. Bestrom dated 10/31/89]. The plant procedures utilized for performing these

surveillances include:

12 THP 4030 STP.239
12 OHP 4030 STP.125CF
12 OHP 4030 STP.125NS
12 IHP 6030 IMP.334
2 THP 6030 IMP.251
1 OHP 4030.001.001
1&2 OHP 4030 STP.123
1&2 OHP 4030 STP.125CV
12 IHP 6030 IMP.190
1 THP 6030 IMP.151
2 THP 6030 IMP.290

Although the fire detection/suppression actuation systems are being properly surveilled, all waterflow and sprinkler supervisory devices (valve tamper and low air pressure switches) are not being verified as required by NFPA 72D. Additional justifications for why these conditions are considered acceptable are discussed below:

a. All of the waterflow alarm devices and circuits, with the exception of the Training and TSC Buildings are verified for the operability by simulated or actual flow test methods under the following procedures: 12 OHP 4030 STP.125CV, 12 OHP 4030 STP.125NS, 12 OHP 4030 STP.125TS, 12 OHP 4030 STP.120SF, and 1&2 OHP 4030 STP.123.

b. The valve tamper alarm signals are not verified for their receipt in the control room during the performance of valve cycling testing under procedure 12 OHP 4030 STP.120VC. However, the intent of the valve switches for verifying the respective valve's position is inspected under procedures 12 OHP 4030 STP.120VV and Safety & Assessment Office Guide No. 21.

c. The low air pressure supervisory alarm devices and their circuits are generally not verified for their operability with the exception of the RCP pump low air alarm devices.

   Based on the reliability of the plant air supply system due to the provision of redundant air compressors and the adequate supporting of the air system piping [Flow Diagram No. 12-5120-17], and the verification of the Dry Pilot piping system performed under procedure 12 OHP 4030 STP.125TS, it is believed that adequate measures have been taken to insure the operability of suppression systems. However, should a low air pressure condition occur within the Dry Pilot piping system(s) located in the Auxiliary Building the preaction valve would operate which would result in transmitting a waterflow alarm signal to the control room. Since the Dry Pilot system employ's closed head type sprinklers water discharge would not result. Thus an investigation of the spurious water flow alarm would point to the loss of pilot air pressure condition.

d. The fire pump supervisory devices and circuits are connected to the EF panels and are verified for their operability under procedure 12 THP 4030 STP.223.

In Section 2.3.2 of the SER, it was noted that only TWO improperly supervised circuits exist within the main control boards. This is not a true statement since all the circuits between the fire detection (EFR) panels and the main control board annunciator (EF) panels are not properly supervised as required by NFPA 72D. However, an exception noted in NFPA 72D (Section 2-7.1) indicates that the circuit wiring be contained within a common enclosure (i.e., EF/EFR panel), are considered equivalent to an electrically supervised circuit. As discussed in the SER, since these circuits are verified for their operability during the performance of the respective surveillances, this condition is considered acceptable.

Recommendations for Alarm System Supervision Response

AEPSC should provide clarification of the following statements documented in the SER:

a. Section 2.3.2 should indicate that all fire detection/suppression actuation and initiating circuits are properly supervised by their respective local alarm system panels and that the circuits between the local alarm panels and the main control board annunciators (EF) do not provide supervision in accordance with NFPA 72D. However, this is considered acceptable based on the supervision of the local alarm system circuits and the verification of the associated EF panel circuits during surveillance testing.

b. In the case of the loss of supervisory air pressure to Dry Pilot systems, a diverse alarm source is provided in the form of a waterflow alarm signal to the control room. The transmission of this signal and the subsequent investigation of the cause of the alarm will lead the operating personnel to identify the failure of the air pressure and take the appropriate corrective action (i.e., fire watch). Based on the availability of an alternate alarm source and the verification process performed under the existing surveillance testing, this condition is considered acceptable.

APR 30 1990

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 26, 1990

Docket Nos. 50-315
and 50-316

NFPA 72D
1967 EDITION
SECTIONS 2411, 2422

Mr. Milton Alexich
Indiana Michigan Power Company
c/o American Electric Power
Service Corporation
1 Riverside Plaza
Columbus, Ohio 43216

Dear Mr. Alexich:

The enclosed safety evaluation documents the staff's evaluation of IMPC's February 21, 1990 response to unresolved issues related to post-fire safe shutdown methodology. Sixteen of the twenty-five issues are considered closed. Four of the remaining open items (8, 11, 20, and 23) will be addressed by the NRC inspection team during the upcoming fire protection audit. Two of the open items involve incorporation of TS for Appendix A fire barriers (1) and hatch surveillance (21). The staff requests that IMPC respond to open items 1 and 21 by August 1, 1990. Items 2 and 17 will remain open pending submission of the results of IMPC's NFPA code review. IMPC has previously stated that the results of their NFPA code review would be available by mid-summer, 1990. The last open item (10) should be resolved on a schedule negotiated with the Project Manager.

Sincerely,

Joseph G. Giitter

Joseph G. Giitter, Project Manager
Project Directorate III-1
Division of Reactor Projects - III,
IV, V & Special Projects
Office of Nuclear Reactor Regulation

cc: See next page

2.1.3 Status:

This issue is open pending submittal and approval of TS for Appendix A fire barriers.

2.2.1 Issue:

NFPA Code Conformance. The staff was concerned that fire protection features in the plant (sprinkler systems, detection systems, etc.) were not designed and installed in accordance with the applicable NFPA codes.

2.2.2 Response:

This issue was raised with IMPC in a meeting at the plant on November 1 & 2, 1989. IMPC responded that a code conformance appraisal had been performed but only for areas containing safe shutdown systems. The staff responded that it would be necessary for IMPC to extend this review to all safety related areas of the plant. The staff suggested that IMPC take the results from the initial review and focus the followup review on those areas where significant deficiencies were identified. The staff also indicated that the results of this review would have to be evaluated and reflected in a safety evaluation.

2.2.3 Status:

This issue is open pending submission of the results of IMPC's NFPA code review to the staff for evaluation.

2.3.1 Issue:

Fire alarm system circuit supervision. The staff was concerned that all circuits (including fire suppression system trip actuating circuits) were not electrically supervised in accordance with NFPA standard 72D.

2.3.2 Response:

IMPC responded in the November 1989 meeting that all circuits were supervised in accordance with the referenced code with the exception of two circuits within the control room to the annunciator panels on the main control board. The viability of these unsupervised circuits is confirmed in conjunction with tests of the local alarm panels. Written confirmation of this should be contained in the NFPA code conformance review. During the discussions of this issue the staff inquired if the alarm system had a "reflash" capability. IMPC responded that although this capability did not at that time exist, a reflash capability would be installed by December, 1991. On the basis that all but two circuits are electrically supervised in accordance with NFPA 72D and those two circuits are regularly tested to confirm operability the staff considers this issue resolved.

2.3.3 Status:

Closed

AEP INDIANA MICHIGAN POWER

SAFETY & ASSESSMENT DEPT.
Form 5328
MAR 27 1991
VOLUME ___

DONALD C. COOK NUCLEAR PLANT

PROCEDURE COVER SHEET

Procedure No.	12 SHP 2270 FIRE.001
Revision No.	2

TITLE PORTABLE FIRE EXTINGUISHER INSPECTIONS

SCOPE OF REVISION

Revision 2: Minor revision. Marginal markings used. Updated references. Added references to Halon extinguishers, requirements for verifying clear access to extinguishers and updated Attachments 3, 4, 5 and 6 to reflect current extinguisher locations. Reworded body paragraph 8.1.3 to require verification that access to fire extinguishers is clear during monthly inspection and verification that extinguishers have not passed there hydrostatic test date on semiannual inspections. Updated hydrostatic test frequencies for pressurized dry chemical extinguishers in Attachment No. 2.
QA/NSDRC Audit No. QA-90-27/NSDRC 176.

SIGNATURES	REVISION NUMBER			
••••••	REVISION 2			
PREPARED BY	Pal [signature]			
DEPARTMENT HEAD APPROVAL	[signature]			
INTERFACING DEPARTMENT HEAD CONCURRENCE	NA			
QUALITY ASSURANCE SUPERVISOR APPROVAL	[signature]			
PLANT NUCLEAR SAFETY COMMITTEE	Meeting #2490			
PLANT MANAGER APPROVAL	[signature]			
APPROVAL DATE	3/14/91			
EFFECTIVE DATE	03/31/91			

INDIANA MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT

1.0 TITLE: Portable Fire Extinguisher Inspections

2.0 OBJECTIVE

2.1 To establish the criteria by which the Safety and Assessment Department will perform inspections of the portable fire extinguishers (excluding the new Training Facility).

2.2 To assure that all the portable fire extinguishers are in operable condition and are in their proper locations.

3.0 REFERENCES

3.1 PMI-2270, Fire Protection.

3.2 12 PMP 6010 RAD.001 and .002 Radiation Protection Manual.

3.3 Fire Facilities Plan - Drawing Numbers 12-5265, 12-5266, 12-5267, 12-5268, 12-5268A, 12-5269, 12-5270 and 12-5271. Service Building extension 12-4510, 12-4511, 12-4512 and 12-4513. Security Control Center - 12-4507.

3.4 NFPA-10.

3.5 QA Audit 86-21-4A - Requires inspection of all Fire Extinguishers that are assigned to the Fire Watches.

3.6 QA Audit/NSDRC Audit No. QA-90-27/NSDRC 176.

4.0 PREREQUISITES/PRECAUTIONS/INITIAL CONDITIONS

4.1 The following equipment and supplies are necessary:

4.1.1 Paper Punch

4.1.2 Fire Extinguisher Cards

4.1.3 Plastic Seals

4.1.4 50# Spring Scale

AEP
AMERICAN
ELECTRIC
POWER

Date November 30, 1989

Subject Cook Nuclear Plant
Fire Hazards Analysis
Revision 4

NFPA 10
SECTIONS 3-1.2, 3-1.2.2
CODE COMPLIANCE REPORT
IMPELL 09-0120-0123
FOR CLOSEOUT SEE 11-18-91
MEMO FROM P.H. JACQUES TO
B.J. GERWE

From P.J. Russell PJR 11-30-89

To P.H. Jacques - Bridgman

All of the portable fire extinguisher changes that were required per the Impell Code Compliance Walkdown have been verified complete with one exception. Please verify that the three (3) portable P-K dry chemical extinguishers that are mounted outside of Fire Zones 29A through 29F have been changed to ABC dry chemical type extinguishers.

Please respond in writing by December 15, 1989, as to the status of this open item. If you should have any questions, please contact me at extension 2532.

PJR/gf

cc: A.A. Blind - Bridgman
R.L. Shoberg
J.D. Grier/B.J. Gerwe/P.J. Russell BJG
File: FHA Revision 4

Intra-System

PIPING, HVAC

NOV 1 1989

FIRE PROTECTION

INDIANA MICHIGAN POWER

Date October 31, 1989$\not{0}$

Subject Alison Panel Alarm Annunciator Circuits

NFPA 72D
1967 EDITION
SECTIONS 2411, 2422

From L. A. Bilionis

To T. H. Bestrom

Upon reviewing the prints concerning the Alison panel alarm annunciator circuits, it is my opinion that the recommendation to perform the monthly surveillance program for the Technical Specification-required panel is not necessary.

Operations performs a once-per-shift visual examination on all fire panels. This examination, using procedure 1 OHP 4030.001.001 consists of checking for alarms and actuations that may have occurred.

The alarms to the Control Rooms which are not electrically supervised are checked every six months by the I&C Department using procedures 12 IHP 6030 IMP.334, .151, and .251.

A functional test to the Reactor Coolant Pumps fire system is conducted by Performance every 18 months using STP.239. This procedure checks alarms to the panels and to the Control Rooms.

L. A. Bilionis

L. A. Bilionis

/mmp

cc: T. P. Beilman
B. Gerwe - AEPSC
File

Intra-System

AMERICAN ELECTRIC POWER

Date April 26, 1989

Subject Donald C. Cook Nuclear Plant
Automatic Fire Detection System

From P.J. Russell

To Impell Code Compliance Walkdown

Impell Corporation has identified several areas of the plant that are not in strict compliance with NFPA 72E, "Automatic Fire Detectors". Following is a description of the violations for each identified area and recommendations/justifications for each area. Specifics on the code deviations can be found in the Impell Code Compliance Report, No. 09-0120-0123.

These evaluations (justifications) are written against the specific deviations stated in each fire zone's opening paragraph. These justifications are primarily based on the engineering judgement of the author. The author (a qualified fire protection engineer) conducted a field walkdwon of these areas to evaluate the deficiencies. The justifications should be used in conjunction with the existing evaluations performed by Impell Corp. Given the defense-in-depth fire protection philosophy used at D.C. Cook many of the same justifications used by Impell to evaluate other code deviations in a particular fire zone can be used to back up the justifications used in this report. The Impell evaluations are contained in their Report and in June 17, 1988 memo from D.E. Kipley of Impell to J.A. Kobyra, both of which can be found in Volume 1 of the Code Compliance Evaluation Report. In addition, partial detection/suppression evaluations may already exist for a particular fire zone. These evaluations may also be looked at in conjunction with the evaluations written in this report. The partial detection/suppression evaluations can be found in the FPPM Section 10.

Finally, the air flow calculation that Impell used in their air movement deviations can be found in the Impell Code Compliance Report (Calculation No. 0120-108-009).

<u>Fire Zone 1</u>

The Impell report identifies this area to be deficient in full detector coverage due to high air movement. Code Sections, 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2 and 4-3.7.3 (1974 and 1978), 4-4.2 (1974).

The Auxiliary Building - Basement is a non-sprinklered area of low combustible loading. The Impell calculations lead one to believe that this area has significantly high air movement. In reality, while the air change rate is high there is very little forced air movement. This is true due to the extremely large diffusers used as well as the fact that all diffusers are utilized for exhaust ventilation. It should also be noted that most diffusers exhaust air from this fire zone into the Containment Spray and RHR Pump Rooms which have adequate detection. Since virtually no forced air flow exists we can space detectors per the governing rule of every 30 feet. This rule (which is only a recommendation by the NFPA 72E committee 1974 edition) has been complied with. No new detectors will be installed for this area.

Fire Zone 3

The Impell report identifies this area to be deficient in full detector coverage since detectors are not provided in each bay as required for deep beam construction greater than eighteen inches. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2 and 4-3.7.3 (1974 and 1978).

The Drumming/Drum Storage area is considered a high radiation area; therefore, access and work activity is controlled. Placing additional detection within this room is undesirable from an ALARA standpoint. From a fire protection standpoint, two ionization detectors do exist over the drumming area (work area). In addition, a preaction sprinkler system exists throughout (all bays) the drumming area (but not over the drum storage area). The sprinkler system can be considered a fire detection system as it too will transmit alarms back to the continuously controlled fire alarm board upon actuation. Since combustible loading in this controlled access room is low and sprinklers and detection exist in the area where these combustibles could be exposed, it is felt that the existing detection system is adequate. No new detectors are required to be installed.

Fire Zone 4

The Impell report identifies this area to be deficient in full detector coverage since detection does not exist in the deep west end ceiling bay. code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978).

The Sampling Room is a non-sprinklered area of low combustible loading. The said bay is extremely deep and could prevent detection of a fire for a fairly long time. Since some combustibles do exist under this bay, a new detector should be installed for this area. This detector will be installed by RFC-12-3004.

Fire Zone 5

The Impell report identifies this area to be deficient in full detector coverage since detection does not exist in two areas of deep bay construction (near existing detectors 2-25 and 2-3). Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2, and 4-3.7.3 (1974 and 1978).

The Auxiliary Building - Elevation 587 is a partially sprinklered area of low combustible loading. The bay near detector 2-25 is actually an equipment hatch. No detection can be placed here since this hatch will be used in the future. It should be noted that adequate detection and suppression exist in all adjacent areas. Since combustible loading is low and the hatch may need to be removed in the future, no additional detection will be installed here.

The bay near detection 2-3 is actually a stairwell. This bay is extremely deep and may cause a fire to burn undetected for quite some time. A detector should be installed at the top of this stairwell. This detector will be part of RFC-12-3004.

Impell also had a concern with a lack of reduced detector spacing in greater than eight inch but less than eighteen inch deep bays. While this situation is correct, one must look at the automatic suppression systems also installed in these areas. In the unlikely event that the ionization detectors do not alarm during a fire, the dry pilot preaction sprinkler system which also acts as a heat detection system, would sound alarms at the central control board once the system is activated. Because of this existing suppression system, no new detectors are required for these areas. It is felt that the two systems combined (sprinklers and detectors) provide overall system reliability far greater than what can be achieved by a single detection system installed within strict compliance of NFPA 72E.

Fire Zone 6N

The Impell report identifies this area to be deficient in full detection coverage due to high air movement and inadequate spacing. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2, and 4-3.7.3 (1974 and 1978), 4-4.2 (1974).

This area is of low combustible loading and is partially sprinklered. Areas where either detection or suppression do not exist are radiation areas. Placing additional detectors within these area would be undesirable from an ALARA standpoint. It should be noted that the existing dry pilot preaction sprinkler system also acts as a heat detection system by sounding alarms at the central control board upon activation. This sprinkler system is located throughout all normally accessible areas of the fire zone. Since the sprinklers also act as a detection system, there is no need to install additional ionization detectors in this area. It is felt that the two systems combined (sprinklers and detectors) provide overall system reliability far greater than what can be achieved by a single detection system installed within strict compliance of NFPA 72E.

Fire Zone 6M

The same arguments justifying Fire Zone 6N are applicable for this fire zone. No changes are needed for this fire detection system.

Fire Zone 6S

The same arguments justifying Fire Zone 6N are applicable for this fire zone. No changes are needed for this fire detection system.

Fire Zone 7

The Impell report identifies this area to be deficient in full detector coverage since detection is not provided for each bay as required for deep beam construction greater than eighteen inches. The report also identifies infrared detectors as being blocked by obstructions. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978), 4-4.1, 4-4.5.2, 4-5.1.5 and 9-3.3 (1974 and 1982), 4-4.6, 4-3.7.2, and 4-3.7.3 (1974 and 1978), 5-3.2, 5-4.1, 5-4.2, and 5-5.1 (1974).

It should be noted that infrared detectors do respond to reflected radiation. Keeping this in mind, the location of the infrared detectors are adequate. Due to the inherent characteristics of this cable tunnel, obstructions to the detectors would occur in any location. It is felt that these detectors would alarm when subjected to either direct or reflected infrared radiation emitted from a fire in any location. No changes need to be made to the infrared detectors.

The area lacking detectors within deep beam pockets has a ceiling height of 38 feet. This area is protected by ionization and infrared detectors. If in the unlikely event that the ionization detectors do not alarm, the infrared detectors would sound an alarm as soon as flaming combustion begins. Sufficient infrared detectors exist to sense any fire within this area. Since infrared detectors exist along with the ionization detectors, no additional ionization detectors need be installed within this fire zone.

Fire Zone 8

The Impell report identifies this area to be deficient in detector coverage since the infrared detectors are obstructed and not enough ionization detectors exist for the high air flow conditions within this area. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978), 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

It should be noted that infrared detectors do respond to reflected light. Keeping this in mind, the location of the infrared detectors are adequate. Due to the inherent characteristics of this room, the infrared detectors would have obstructions no matter where they were installed. Since no object completely blocks the existing infrared detectors, the existing detectors would respond to any fire in its respective area.

The Impell calculations show that due to high air movement within this room, eight ionization detectors should be installed. Currently, six ionization detectors exist. It should be noted that besides the six ionization detectors, there are five infrared detectors installed in this area. Since two zones of detectors exist, a more than adequate number of detectors are already installed. No new detectors need be added as it is felt that the two systems combined provide overall system reliability far greater than what can be achieved by a single zone of detectors installed within strict compliance of NFPA 72E.

Fire Zone 10

The Impell report identifies this area to be deficient in full detector coverage due to infrared detector obstructions and not enough existing ionization detectors for the current high air flow movement within this area. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978), 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

The same arguments justifying the existing condition for Fire Zone 8 apply to this zone. No new detectors need be added.

Fire Zone 11

The Impell report identifies this area to be deficient in detector coverage since the infrared detectors are obstructed. Code Sections 2-6.5, 2-6.7, and 4-1.2 (1974 and 1978), 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

It should be noted that infrared detectors do respond to reflected light. Keeping this in mind, the location of the infrared detectors are adequate. Due to the inherent characteristics of this room, the infrared detectors would have obstructions no matter where they were installed. Since no object completely blocks the existing infrared detectors, the existing detectors would respond to any fire in its respective area. Thus, no changes need to be made to this fire detection system.

Fire Zone 23

The Impell reports identifies this zone to be deficient in full fire detection coverage due to infrared detector obstruction. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978)

The same justifications used in Fire Zone 11 are applicable for this fire zone. No new detectors need to be added.

Fire Zone 24

The Impell report identifies this zone to be deficient in full detection coverage due to infrared detector obstructions and not enough ionization detectors for the high air flow conditions of the zone. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978).

The same justifications used in evaluating fire detection coverage in Fire Zone 8 are also applicable for this fire zone. No new detectors need to be added.

Fire Zone 25

The Impell report identifies this zone to be deficient in full detection coverage due to infrared detector obstructions. Code Sections 2-6.5, 2-6.7, and 4-1.2 (1974 and 1978), 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

The same justifications used in evaluating fire detection coverage in Fire Zone 11 are also applicable for this fire zone. No new detectors need to be added.

Fire Zone 26

The Impell report identifies this zone to be deficient in full detector coverage due to infrared detector obstructions and not enough ionization detection for the high air flow conditions of the zone. Code Sections 2-6.5, 2-6.7, and 4-1.2 (1974 and 1978), 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

The same justifications used in evaluating fire detection coverage in Fire Zone 7 are also applicable for this fire zone. No new detectors need to be added.

Fire Zone 27

The Impell report identifies this zone to be deficient in full detector coverage due to infrared detector obstruction. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978), 4-4.1, 4-4.5.2, 4-5.1, 4-5.1.5, 9-3.3 (1974 and 1982), 4-4.6, 4-3.7.2 and 4-3.7.3 (1974 and 1978), 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

The same arguments justifying Fire Zone 11 are applicable for this fire zone. No changes are needed for this fire detection system.

Fire Zone 32

The Impell report identifies this zone to be deficient in full detection coverage due to high ceilings and lack of detection in all the beam pockets. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2, 4-3.7.3 (1974 and 1978), 4-3.1, 4-3.2 (1974, 1978 and 1982), 4-4.1, 4-4.5.2, 4-5.1, 4-5.1.5 and 9-3.3 (1974 and 1982).

The Cask Handling area is a fully sprinklered area of low combustible loading. Sprinklers, which also act as a heat detection system, exist in all beam pockets. In the unlikely event that the ionization detectors do not alarm during a fire, the suppression system would sound an alarm once the sprinklers were actuated by heat. Only ionization and heat detectors can be used in this area due to the large

industrial cranes that are located at the roof. These cranes have the potential of blocking the sight of infrared detectors. Since the existing suppression system is installed in all ceiling pockets and six ionization detectors are already installed for this area, no new detectors need to be added. It is felt that the existing fire protection equipment already meets the intent of the code.

Fire Zone 33

The Impell report identifies this area to be deficient in detector coverage since detectors are not installed on the ceiling. Code Sections 2-6.5, 2-6.7 and 4-1.2 (1974 and 1978) 4-4.1, 4-4.5.2, 4-5.1, 4-5.1.5 and 9-3.3 (1974 and 1982), 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

The ceiling height for the Unit 1 Main Valve Enclosure is extremely high and mostly inaccessible. Due to the inherent characteristics of this room, the upper portions often have elevated temperatures. Placing ionization detectors in strict compliance with NFPA 72E would cause delays in detector actuation due to stratification, dissipation and horizontal movement of the smoke. Hence, detectors were located at the various elevations within the fire zone so as to be as close as possible to the combustibles. In addition, there are twenty ionization and four infrared detectors already existing in this fire zone which was approximately 1,000 sq. ft. of floor area. It is felt that the high number of detectors combined with the strategic existing locations provide the best fire detection coverage. No additional detectors will be added.

Fire Zone 34

The same arguments justifying Fire Zone 33 are applicable for this fire zone. No changes are needed for this fire detection system.

Fire Zone 38

The same arguments justifying Fire Zone 11 are applicable for this fire zone. No changes are needed for this fire detection system.

Fire Zone 39

The same arguments justifying Fire Zone 11 are applicable for this fire zone. No changes are needed for this fire detection system.

Fire Zone 40A

The Impell report identifies this zone to be deficient in full fire detector coverage due to beam construction and an insufficient number of ionization detectors for the high air movement conditions within the zone. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-3.5.1.1 (1984), 4-4.2 (1974).

It should be noted that the infrared detectors located within this room are not affected by high air movement. The Impell report states that three ionization detectors are needed for this room. Currently, the two ionization detectors combined with the three infrared detectors provide more than adequate coverage. It should also be noted that the two ionization detectors (one in each beam pocket) provide adequate coverage per NFPA 72E for no air flow conditions. Therefore, no new detectors need be added to this zone. It is felt that the two systems combined provide overall system reliability far greater than what can be achieved by a single zone of detectors installed within strict compliance of NFPA 72E.

Fire Zone 40B

The same deviations and justifications identified in Fire Zone 40A are applicable for this fire zone. No new detectors will be added to Fire Zone 40B.

Fire Zone 41 & 45

These zones are said to be deficient in full detector coverage due to detection not being in all areas of the zones. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-3.5.1.1 (1984), 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

Since the Impell walkdown, these fire zones have had their detection systems completely revised by RFC-12-2868. New detectors have been added so that now all areas are covered by fire detection equipment. No additional changes are necessary. The new detection systems for these fire zones meet the requirements of NFPA 72E, 1987 Edition. See AEPSC calculation Nos. DCC-FP12-DT09F and DCC-FP01-DT10F.

Fire Zone 42A

This zone is said to be deficient in full detection coverage due to air movement within the zone. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978) 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

Since the Impell walkdown, this fire zone's detection system has been revised by RFC-12-2868. New detectors have been added to compensate for high air flows. No additional changes are needed. The new detection system meets the requirements of NFPA 72E, 1987 edition. See AEPSC calculation No. DCC-FP01-DT10F.

Fire Zone 42B

This area is said to be deficient in full detection coverage due to air movement within the zone. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

According to the Impell calculations, five ionization detectors are needed for this fire zone during full air flow conditions. There are now two ionization detectors and one infrared detector for this zone. The two ionization detectors are adequate for minimal air flow conditions, and the infrared detector is adequate under any air flow condition. In addition, RFC-12-2868 has installed new ionization detectors just outside the normal vent path (door opening) from this room. If in the unlikely event that the two ionization detectors within the zone do not alarm during the incipient stages of a fire, the infrared detector would alarm shortly after flaming combustion begins. Once the infrared detector alarms, the fire brigade would be summoned to the scene where they would assist the fixed pipe carbon dioxide fire extinguishing system in suppressing the fire. Combustible loading in the fire zone is very low, making it highly unlikely that a fire could spread into adjacent fire zones prior to detection and extinguishment. Since two separate types of fire detectors are installed and the infrared detector is not affected by air flow, it is felt that the existing fire detection system is more than adequate for this zone. No additional detectors will be installed for this zone.

Fire Zone 42C

This area is said to be deficient in full detection coverage due to air movement within the zone. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974).

According to the Impell calculations, four ionization detectors are needed for this fire zone during full air flow conditions. There are now three ionization and two infrared detectors for this zone. The three ionization detectors are adequate for minimal air flow conditions, and the infrared detectors are adequate under any air flow conditions. In addition, RFC-12-2868 has installed new ionization detectors just outside the normal vent path (open passageway) from this room. If in the unlikely event that the ionization detectors within the zone do not alarm during the incipient stages of a fire, the infrared detector would alarm shortly after flaming combustion begins. Once the infrared detector alarms, the fire brigade would be called to the scene where they would assist the fixed pipe CO_2 suppression system in extinguishing the fire. Combustible loading in this fire zone is extremely low, making it highly unlikely that a fire could spread into adjacent fire zones prior to detection and extinguishment. Since two separate types of fire detectors are installed and the infrared detectors are not affected by air movement, it is felt that the existing fire detection system is more than adequate for this zone. No additional detectors will be installed for this zone.

Fire Zone 43

The Impell report identifies this area as being deficient in full detector coverage due to high air movement within the zone. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-4.1, 4-4.5.2, 4-5.1, 4-5.1.5, 9-3.3 (1974 and 1982), 4-4.2 (1974).

The Access Control Area is a non sprinklered area of moderate combustible loading. The Impell calculations show that the Counting Room within this zone needs an additional ionization detector. Currently this 212 sq. ft. room has one ionization detector in it and adequate ionization detectors in all adjacent areas. Since this room is extremely small and forced air movement would move smoke out into the adequately protected hallways no additional detectors will be installed. It is apparent that if in the unlikely event that the detector within the Counting Room does not actuate during a fire, the detectors in the adjacent corridors would alarm with very little delay.

Impell also has a concern with detectors being located too close to air supply diffusers, in all the identified cases the detectors are located in extremely small areas (ie: offices). To move the detectors may help a little, but some delay could still be expected due to the proximity to the diffusers. It is felt that the existing fire protecton equipmetn is adequate and meets the intent of the code.

Fire Zone 44N

The Impell report identifies this area to be deficient in full detector coverage since detection does not exist in a deep bay near detector 3-4. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978).

The Auxiliary Building - Elevation 609 is a partially sprinklered area of low combustible loading. The bay near detector 3-4 is actually an equipment hatch. No detection can be placed here since this hatch will be used in the future. It should be noted that adequate detection and suppression exist in all adjacent areas. Since combustible loading is low and the hatch may need to be removed in the future, no additional detection will be installed here.

Fire zone 44S

The Impell report identifies this zone to be deficient in full detector coverage due to detectors 3-27 and 3-28 being located on the bottom of ceiling beams rather than in the beam pockets. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978).

The Auxiliary Building - Elevation 609 is a partially sprinklered area of low combustible loading. Sprinklers, which also act as a heat detection system, also exist in the bays surrounding detectors 3-27 and 3-28. In the unlikely event that the ionization detectors do not alarm during a fire, the dry pilot preaction sprinkler system would sound alarms at the central alarm board once the sprinklers were actuated by heat. Because of the existing suppression system in these bays, no new detectors need be added to these areas. It is felt that the two systems combined provide overall system reliability far greater than what can be achieved by a single zone of detectors installed within strict compliance of NFPA 72E.

Fire Zone 46A & 46B & 46C

The Impell report identifies these zones to be deficient in full detector coverage due to high air movement. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-4.2 (1974).

The same justifications used in evaluating fire detection coverage in Fire Zones 42A, 42B and 42C are applicable for these fire zones. No new detectors need to be added. However, for Fire Zone 42A the calculation No. is DCC-FP01-DT09F.

Fire Zone 47A & 47B

The Impell report identifies these zones to be deficient in full detector coverage due to high air movement and beam construction. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-3.5.1.1 (1984), 4-4.2 (1974).

The same justifications used in evaluating fire detection coverage in Fire Zones 40A and 40B are also applicable for these fire zones. No new detectors need to be added.

Fire Zone 48

The Impell report identifies this zone to be deficient in full fire detector coverage due to the fact that detection is not installed within every deep beam pocket. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2 and 4-3.7.3 (1974 and 1978).

The New Fuel Storage room has no combustibles within it. Four ionization detectors do exist for this approximately 1,7000 sq. ft. room. It is felt that no new detectors are needed for this area since the combustible loading is zero.

Fire Zone 49 & 50

The Impell report identifies these areas to be deficient in full detection coverage due to lack of fire detection within each deep beam pocket. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2, 4-3.7.3 (1974 and 1978) 4-3.1, 4-3.2 (1974 and 1982).

Impell has already written a justification for the existing detection conditions. Their conclusion is that no new detectors need be installed. A review of the area by this author was performed and it was determined that the Impell Evaluation was correct.

Fire Zone 51

The Impell report identifies this zone to be deficient in full detector coverage due to lack of detection within two deep beam pockets. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978).

It is recognized that both of the identified areas do not have fire detection installed within the pockets. It should be noted, however, that a dry pilot preaction sprinkler system is installed in these areas. The sprinklers, which also act as a heat actuated detection system, will sound alarms at the central panel once heat from the fire actuates the sprinklers. Since sprinklers are already installed within these extremely small pockets, no additional detection will be installed.

Fire Zone 52

The Impell report identifies this zone to be deficient in full detector coverage due to poor detector spacing. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2, 4-3.7.3 (1974 and 1978), 4-3.5.1.1 (1984), 4-3.1, 4-3.2 (1974, 1978 and 1982).

It is recognized that the areas in question do not have optimum detector spacing. However, it should be noted that all identified areas also contains a dry pilot preaction sprinkler system. The sprinklers, which also act as a heat actuated detection system, will sound alarms at the central panel once heat from a fire actuates a sprinkler. Since sprinklers are already installed within these identified areas, no additional detectors will be installed.

Fire Zones 55 & 60

The Impell report identifies these zones to be deficient in full detection coverage due to infrared detector obstructions and high air movement within the zones. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-4.2, 5-3.2, 5-4.1, 5-4.2 and 5-5.1 (1974) 4-3.5.1.1 (1984).

It should be noted that infrared detectors do respond to reflected infrared radiation. Keeping this in mind, the location of the infrared detectors are adequate. Due to the inherent characteristics of these cable vaults, obstructions to the detectors would occur in any location. It is felt that these detectors would alarm when subjected to either direct or reflected infrared radiation emitted from a fire in any location. No changes need to be made to the infrared detectors.

We agree with all other identified deficiencies and will install new detectors via RFC-12-3004.

Fire Zone ~~58~~ 57 BJH 11-15-91

The Impell report identifies this area to be deficient in full detector coverage since two detectors are located too close to a ceiling beam. Code Sections 2-6.5, 2-6.7, 4-1.2 (1974 and 1978), 4-3.1, 4-3.2 (1974, 1978 and 1982).

There are 65 ionization detectors located in this 4,410 sq. ft. zone. More than ample detection exists so that no delay will occur in detecting a fire in its incipient stage. One must remember that two complete zones of detectors exist in this room. No changes will be made to this zone.

Fire Zone 69

The Impell report identifies this zone to be deficient in full fire detection coverage due to high ceilings and lack of detection within all deep beam pockets. Code Sections 2-6.5, 2-6.7, 4-1.2, 4-4.6, 4-3.7.2, 4-3.7.3 (1974 and 1978), 4-4.1, 4-4.5.7, 4-5.1, 4-5.1.5, 9-3.3 (1974 and 1982), 4-3.1, 4.3.2 (1974, 1978 and 1982).

The Auxiliary Building - Elevation 650 ft. is a non-sprinklered area of extremely low combustible loading. Currently 28 ionization detectors exist for this area (approximately 1 detector every 650 sq. ft.). The ceiling height for this area is extremely high. Infrared detectors can not easily be installed on the ceiling due to the large industrial cranes located in this area. These cranes would have the potential to block the view of infrared detectors. Additional ionization or heat detectors give us no more assurance that a detector will alarm in a fire scenario. This is true because of the extremely high ceiling heights and the expected horizontal movement of smoke due to stratification and dissipation. Since the combustible loading is low (complete combustion of exposed combustibles has an equivalent fire severity of less than four minutes) no new detectors are to be installed.

Patrick J. Russell

Patrick J. Russell

B.J. Gerwe

Concurrence: B.J. Gerwe
Fire Protection Engineer

PJR/jmf

cc: J.D. Grier/J.A. Kobyra/B.J. Gerwe/P.J. Russell (PHF 89-0060)
File: RFC-12-3004

AMERICAN ELECTRIC POWER

Date February 8, 1989

Subject Donald C. Cook Nuclear Plant
Automatic Sprinkler Systems

From P.J. Russell PJR 2-8-89

To Impell Code Compliance Walkdown

Impell Corporation has identified several areas of the plant that are not in compliance with NFPA 13 "Sprinkler Systems", sections 4-1.1.1, 4-1.1.4 and 4-2.4.6. These sections require that the water discharge pattern of the sprinklers be clear from obstructions. Following is a list of all identified fire zones and our (AEPSC) recommendations/justifications for each zone.

1. Fire Zone 6N:

   Convert the four identified sprinklers from upright heads to pendant heads. This work should be accomplished by RFC-12-3003.

2. Fire Zone 44N:

   Currently a sidewall sprinkler located near column lines 15 and WL-L is blocked by a fire main. Extend this sprinkler out (horizontally) six inches so that the head clears the fire protection cross main.

   Currently an upright head located at column lines WL-L and 16 has its' theoretical water discharge pattern obstructed by ductwork. While this condition remains true, it should be noted that a sidewall head exists approximately 7 ft. to the East of this head. This sprinkler will more than adequately provide coverage to the floor space that would receive a marginal supply of water from the obstructed head. This existing condition will adequately protect this area from the spread of fire. It is therefore felt that strict compliance to the code for this particular sprinkler is not necessary and no changes will be made.

3. Fire Zone 52:

   The Impell Report states that the sidewall sprinkler heat collection plates will interfere with discharge patterns.

This condition is being extended by AEPSC to include all sidewall sprinkler heat collection plates in the plant (not just Fire Zone 52). This condition will be fixed by modifying the heat collection plates. This work will be performed in RFC-12-3003.

The Impell Report identified a distorted heat collection plate at a sidewall sprinkler located at WL-5 and WL-L. This condition will no longer be the case once the modifications to the heat collection plates are performed under RFC-12-3003. Therefore, no work need be performed for this identified deviation.

The Impell Report stated that a sprinkler located at column lines WL-L and WL-8 will have sprinkler discharge obstructed by numerous conduits. This sprinkler is located near the ceiling in an extremely congested area. It was noted that the said conduits are located below the head. These conduits do not form a concealed space therefore, we can expect water to drop onto the floor area below. It is agreed that a theoretical discharge will not be achieved from this sprinkler but it is noted that the best available location has been chosen for this head. Therefore, it is felt that this sprinkler is within the guidelines of NFPA 13 and no changes need to be made.

The Impell Report identified a temporary curtain installed too close to a head at column lines WL-L.5 and WL-8.5. It was noted that this curtain is no longer installed. Therefore, no sprinkler discrepancies exist at this location and no changes need be made.

The Impell Report identifies sprinklers located at the North end of this fire zone (at column line WL-L) as being too close to a beam. This author recognized the sprinklers in this area to be marginally close to a beam. Due to the construction of this area's ceiling (beam construction) a more than adequate number of sprinklers are located in this area, as each bay has a branch line of heads. Since the branch lines (located on each side of the beam) are spaced close together the floor area below would receive total coverage regardless of the marginal spacing of each individual head to the ceiling beams. It appears that the sprinkler contractor took into consideration the obstruction problem caused by the beams and compensated by placing a row of heads on each side of the beam. It is concluded that the existing sprinkler system for this area is adequate and no additional changes need be made.

4. Fire Zone 17C:

It was reported that a sprinkler was installed too close to a pipe. This condition was verified to be true and will be fixed by installing a four inch nipple for the sprinkler. This work will be accomplished in RFC-12-3003.

5. Fire Zone 17E:

It was reported that an upright sprinkler in this room was obstructed by conduit. This author noticed a 3/4 inch conduit in the vertical position located approximately 8 inches South of the head. This conduit (which supplies a cable to a light in this room) will provide only minimal interference. It is stated in NFPA 13 section 4-2.4.5 that sprinklers shall be at least 6 inches laterally from web members not exceeding 1 inch in diameter. It is recognized that the conduit is not a web member but the same rules can be applied. It is also noted that a sprinkler located approximately 10 feet to the South will more than adequately cover any area missed by the obstructed sprinkler. Therefore, this area is adequately covered by the existing sprinkler system and no changes will be made.

6. Fire Zone 105

It was stated in the Impell Report that sprinklers in the SW corner of the lower level of the Contractors Access Area are installed too close to a beam. It is agreed that looking at these sprinklers individually a problem with compliance to NFPA 13 exists. Since this area (approximately 16 ft. by 14 ft.) contains four sprinklers it is felt that the area should be reviewed as a whole. It appears that the sprinkler contractor took into consideration the obstruction problem caused by the beams and compensated by placing sprinklers on each side of the beam. The SW corner of this room contains very few combustibles. It acts as a passageway into the storage area of Anti-Cs. Due to radiological concerns (all personnel must be frisked in the SW corner) it is believed that this area will remain low in combustibles as frisking equipment is installed in this corner. The four sprinklers installed in this area more than adequately cover the floor space below. It is felt that the existing sprinklers are adequate and no changes need to be made.

This author identified the area above the non-combustible shed installed in this area to be deficient in sprinkler coverage. Since the area above this shed is used for storage, sprinklers are required per NFPA 13. Sprinklers will be installed per RFC-12-3003.

Patrick J. Russell

Patrick J. Russell

cc: R.L. Shoberg
A.B. Auvil
J.D. Grier/J.A. Kobyra/B.J. Gerwe/P.J. Russell
RFC-12-3003

AEP
AMERICAN ELECTRIC POWER

Date January 30, 1989

Subject Donald C. Cook Nuclear Plant
Impell Code Compliance Walkdowns
NFPA-14 "Standpipes and Hose Stations"

NFPA 14, SECTION 651
1971 EDITION

SEE 9-4-90 MEMO A.K.DEY
TO P.J.RUSSELL, ITEM 2
FOR CLOSEOUT

From P.J. Russell PJR 1-30-89

To M.J. Noronha

The Impell Report identifies the lack of lateral restraints for the six inch fire protection main located in the Auxiliary Building, elevation 587 feet, as a deficiency to NFPA 14. It is Impell's belief that without these restraints, the fire protection main would not remain in place under water flow conditions.

Please verify that the existing conditions are adequate to support and retain the pipe securely in position or provide us with a suitable design. We can place the new hangers (if needed) in with open RFC-12-3003.

If you should have any questions, please contact me at extension 2532.

PJR/gf

cc: R.L. Shoberg
J.D. Grier/J.A. Kobyra/B.J. Gerwe/P.J. Russell
File: RFC-12-3003
Impell Code Compliance Walkdown

Uni-System

AMERICAN ELECTRIC POWER

Date January 25, 1989

Subject D.C. Cook Nuclear Plant
NFPA 12A Code Compliance Walkdown
Impell Report No. 09-0120-0123

From P.J. Russell

To RFC-3003

Impell Report No. 09-0120-0123 identified the Unit 1 and 2 Control Room Cable Vault Halon Systems to be deficient with section 1-8.3.6 of NFPA Code No. 12A "Halon 1301 Fire Extenguishing Systems". This section requires all automatically operated valves controlling agent release and distribution be provided with an independent means for emergency manual operation. The following report will show that the system as designed will perform as expected. In addition, it will be shown that this deviation is a calculated one, and one that need not be changed.

The fire protection requirements needed for the Control Room Cable Vaults are unique. First of all, it is readily appearant that the most likely fire to occur in these rooms would be a Class A type fire. It has long been a practice of the fire protection community to use water or Halon as an extinguishing mechanism for Class A type fires. In this case, Halon is by far the more appropriate choice since it is non corrosive, non conductive, and in some cases non life threatening. In fact, the only negative aspect of the installation of a total flooding Halon system for these rooms is that due to the inherent characteristics of the rooms (spreading area for thousands of cables) the very real possibility of a deep-seated fire exists. Per NFPA 12A, the use of a Halon 1301 system for control or extinguishment of a deep-seated fire is unattractive.

A deep-seated fire is defined in NFPA 12A as a fire that still exists after a 5 percent concentration of Halon 1301 has been applied for 10 minutes. It is for this reason that NFPA 12A requires a test to be performed for all Halon 1301 systems to prove that the protected area can hold a 5% concentration for 10 minutes. During startup of this system, tests proved that the original design would provide a 5% concentration almost immediately, but the room would not hold it for the entire 10 minutes. It is for this reason that the extended discharge cylinders were installed. They are designed to provide a concentration boost into the room three minutes and forty-five seconds after initial discharge. Tests since the installation of these cylinders have proved that a 5 percent concentration will now be held within the Cable Vaults for the required ten minutes.

If for some reason the automatic actuation of the Halon 1301 system did not work, then it could be manually set off by the fire brigade. It is true that they then would not be able to set off the extended discharge cylinders. This is true, because if the extended cylinders were tripped (accidentally or purposely) with the original cylinders, a design concentration of greater than 7 percent would exist within the room. If personnel were within the room at the time of discharge, they would not be able to exit within one minute. Halon concentrations of greater than 7% will render an individual unconscious within 1 minute. This then could possibly lead to death by fire or asphyxiation. Therefore, installation of a manual switch on the extended discharge cylinders is unacceptable.

Therefore, the acceptable fire protection for this area is the existing fire protection. The existing conditions will extinguish any Class A fire (smoldering or flaming) with a "controlled" dump of Halon 1301. If a deep seated fire was to occur then CO2 could be manually dumped into the area to extinguish this type of fire. Also available for fire fighting is manual equipment (water hose stations as well as portable extinguishers).

Based on the above, it is felt that the existing fire protection equipment protecting these rooms is adequate to protect the fire safety of the plant. Installation of a manual discharge for the extended discharge cylinders can not possibly be justified due to the potential life safety concerns of plant personnel.

P.J. Russell/kk Patrick J Russell

cc: Impell Code Compliance Walkdown File
~~J.D. Grier/J.A. Kobyra~~/B.J. Gerwe/P.J. Russell
BJH

AEP
AMERICAN ELECTRIC POWER

Date January 25, 1989

Subject D.C. Cook Nuclear Plant
Impell Code Compliance Walkdown
NFPA 10 "Portable Fire Extinguishers"

From P.J. Russell PJR 1-25-89

To A.B. Auvil

Attached Please find three (3) letters which collectively close out the remaining NFPA 10 open items contained in Impell Report No. 09-0120-0123.

If you should have any questions, please contact me at extension 2532.

P.J. Russell/kk

cc: R.L. Shoberg
J.D. Grier/J.A. Kobyra/B.J. Gerwe/P.J. Russell

BJG

FILE: IMPELL CODE COMPLIANCE WALKDOWN

3 LETTERS ARE: 1-24-89 & 1-23-89 MEMO FROM P.J. RUSSELL TO IMPELL CODE COMPLIANCE WALKDOWN AND 1-23-89 MEMO FROM P.J. RUSSELL TO P.H. JACQUES

AMERICAN ELECTRIC POWER

Date January 24, 1989

Subject Donald C. Cook Nuclear Plant
Portable Fire Extinguishers

From P.J. Russell

To Impell Code Compliance Walkdown

Impell Corporation has identified several areas of the plant that are not in compliance with NFPA 10, "Portable Fire Extinguishers," Sections 3-1.2 and 3-1.2.2. These sections require that all fire zones with Class A occupancies have suitable Class A extinguishers. Following is a list of all identified fire zones and our (AEPSC) recommendations/justifications for each zone.

1. Fire Zone 112

   Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

2. Fire Zone 113

   Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

3. Fire Zone 29G

   Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

4. Fire Zone 22

   Revision 2 of the Fire Hazard Analysis added an ABC dry chemical extinguisher within this fire zone. This extinguisher, coupled with hose station number 215, assures us of extinguishing a postulated Class A type fire. This manual fire fighting equipment is installed per NFPA 10; therefore, no new extinguishers need be installed.

5. <u>Fire Zone 12</u>

   Revision 2 of the Fire Hazard Analysis added an ABC dry chemical extinguisher within this fire zone. This extinguisher, coupled with hose station number 213, assures us of extinguishing a postulated Class A type fire. This manual fire fighting equipment is installed per NFPA 10; therefore, no new extinguishers need be installed.

6. <u>Fire Zone 111</u>

   Revision 2 of the Fire Hazard Analysis added an ABC dry chemical extinguisher within this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be installed.

7. <u>Fire Zone 18</u>

   Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

8. <u>Fire Zone 19</u>

   Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

9. <u>Fire Zone 20</u>

   Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

10. <u>Fire Zone 21</u>

    The ABC extinguisher installed in Fire Zone 19 also meets all NFPA 10 requirements for this fire zone. Therefore, no new extinguishers need be added to this zone.

11. <u>Fire Zone 13</u>

    The ABC extinguisher installed in Fire Zone 15 also meets all NFPA 10 requirements for this fire zone. Therefore, no new extinguishers need be installed in this zone.

12. Fire Zone 14

Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

13. Fire Zone 15

Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

14. Fire Zone 110

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

15. Fire Zone 64A

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher outside of this fire zone. This extinguisher meets all requirements of NFPA 10 for Fire Zone 64A; therefore, no new extinguishers need be added to this zone.

16. Fire Zone 64B

See the letter from P.J. Russell to Impell Code Compliance Walkdown, dated January 24, 1989, for the justification against installation of a portable extinguisher within this fire zone.

17. Fire Zone 6N

See the letter from P.J. Russell to Impell Code Compliance Walkdown, dated January 24, 1989, for the justification against installation of additional portable extinguishers within this fire zone.

18. Fire Zone 17A-17G

Replace three BC type fire extinguishers with ABC type fire extinguishers.

19. Fire Zone 29A-29F

Replace three BC type fire extinguishers with ABC type fire extinguishers.

20. Fire Zone 40A

Replace a BC type fire extinguisher with an ABC type fire extinguisher.

21. Fire Zone 40B

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 42A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 40B; therefore, no new extinguishers need be added to this zone.

22. Fire Zone 41

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 42A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 41; therefore, no new extinguishers need be added to this zone.

23. Fire Zone 42A

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

24. Fire Zone 42B

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 42A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 42B; therefore, no new extinguishers need be added to this zone.

25. Fire Zone 42C

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 42A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 42C; therefore, no new extinguishers need be added to this zone.

26. Fire Zone 42D

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 42A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 42D; therefore, no new extinguishers need be added to this zone.

27. Fire Zone 45

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 46A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 45; therefore, no new extinguishers need be added to this zone.

28. Fire Zone 46A

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

29. Fire Zone 46B

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 46A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 46B; therefore, no new extinguishers need be added to this zone.

30. Fire Zone 46C

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 46A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 46C; therefore, no new extinguishers need be added to this zone.

31. Fire Zone 46D

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 46A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 46D; therefore, no new extinguishers need be added to this zone.

32. Fire Zone 47A

Replace a BC dry chemical extinguisher with an ABC dry chemical extinguisher.

33. Fire Zone 47B

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 46A. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 47B; therefore, no new extinguishers need be added to this zone.

34. Fire Zone 108

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

35. Fire Zone 109

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

36. Fire Zone 53 and 54

Revision 2 of the Fire Hazard Analysis added Halon 1211 extinguishers to this fire zone. These extinguishers have been shown to extinguish small Class A fires. Because of the inherent characteristics of the Control Rooms, it has been policy not to install liquid (because of its conductivity) or dry chemical (because of its corrosive properties) in these areas. No new extinguishers will be installed in these fire zones.

37. Fire Zone 70

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

38. <u>Fire Zone 71</u>

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 70. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 71; therefore, no new extinguishers need be added to this zone.

39. <u>Fire Zone 72</u>

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to Fire Zone 73. This extinguisher also meets all requirements of NFPA 10 for Fire Zone 72; therefore, no new extinguishers need be added to this zone.

40. <u>Fire Zone 73</u>

Revision 2 of the Fire Hazard Analysis added an ABC extinguisher to this fire zone. This extinguisher meets all requirements of NFPA 10; therefore, no new extinguishers need be added to this zone.

P.J. Russell

PJR/gf

cc: Fire Hazard Analysis Rev. 4
J.D. Grier/J.A. Kobyra/B.J. Gerwe/P.J. Russell
RFC-3002

BJH

AMERICAN ELECTRIC POWER

Date January 23, 1989

Subject Donald C. Cook Nuclear Plant
Portable Fire Extinguisher Code Compliance

From P.J. Russell

To Impell Code Compliance Walkdown

Impell Corporation has identified several areas of the plant that are not in compliance with NFPA-10, "Portable Fire Extinguishers," sections 3-2.1, 3-3.1 and 3-3.3. These sections require that all areas be within 75 feet of a Class A extinguisher and 50 feet of a Class B extinguisher. The fire zones identified to be deficient in these requirements are 4, 5, 6N, 6S, 62B, 62C, 63C, 64B, 37 and 44N. The following evaluations (performed by AEPSC) are to determine if, in fact, new portable extinguishers are necessary for the identified fire zones.

1. Fire Zone 4, "Sampling Room"

According to Impell Report #09-0120-0123, Fire Zone 4 is said to be deficient to section 3-2.1 of NFPA 10. Section 3-2.1 requires that the maximum travel distance to a Class A extinguisher be 75' or less.

According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, a 20 lb. ABC extinguisher is located on the south side of the sampling room's east fire door. Our calculations show this extinguisher to be well within 75' of the most remote area of this fire zone. In addition, two extinguishers rated for Class B or C fires are located within this 40' by 25'room. While these extinguishers are not rated for Class A fires, they do provide the ability to knockdown and under certain conditions extinguish a small Class A type fire. Therefore, no new extinguishers need to be added to this room.

2. Fire Zone 5, "Auxiliary Building - El. 587'"

The Impell Report identified two areas of this fire zone (Spent Resin Storage Tank Area and 2 GPM Waste Evaporator Area) to be deficient in the fire extinguisher placement criteria as defined in NFPA 10.

According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, a 20 lb. ABC extinguisher is located within 50' of the most remote section of the 2 GPM Waste Evaporator Room. Therefore, no new extinguishers need be added to protect this area as it already meets the distribution criteria set forth in NFPA 10.

The Spent Resin Storage Tank Room is classified as an "Extreme High Radiation Area." Access to this area is under strict control. Placing an extinguisher within this room is undesirable from an ALARA standpoint. According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, a 20 lb. ABC extinguisher is located within 75' of the most remote section of this room. This extinguisher does meet distribution requirements for Class A type protection, but exceeds the distance requirements for Class B, C protection. Because this room contains no exposed combustibles and placement of a B, C extinguisher within this room is an ALARA concern, it is felt that the existing extinguishers are adequate. No new extinguishers will be added to this room.

3. <u>Fire Zone 6N, "Auxiliary Building - El. 587'"</u>

The Impell Report identified two areas of this fire zone (Gas Decay Tank Area and the area which contains the concentrate filters and the boric acid evap. feed ion exch. filters) to be deficient in the fire extinguisher placement criteria as defined in NFPA 10.

According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, a 20 lb. ABC extinguisher is located within 50' of the most remote sections of the room containing the concentrate and boric acid filters. The pipe tunnel behind these rooms exceeds the distance limitations for B, C extinguishers by approximately 20'. Very few combustibles exist in the pipe tunnel, and all combustibles that do exist are Class A. Therefore, the possibility of a Class B or C fire in this area is extremely low. The above mentioned ABC extinguisher is within 75' (the distance required for a Class A type fire) of the most remote section of the pipe tunnel. In addition, this area is considered a high radiation area and placement of a portable extinguisher within this area is undesirable from an ALARA standpoint. No new fire extinguishers need be added to this area as it is felt that the existing extinguishers are adequate to extinguish a normally postulated fire.

The Gas Decay Tank Area is not lit so the installation of a new extinguisher is undesirable as it would not be easily located in a fire scenario. The probability of a fire in this area is extremely low since no exposed combustibles exist in this room.

In addition, this area is considered a high radiation area and placement of a portable extinguisher within this area is undesirable from an ALARA standpoint. It is felt that the two B, C type extinguishers located at the entrance to this room provide adequate protection even though the distance requirements per NFPA 10 are exceeded. Therefore, no new extinguishers will be added to this room.

4. Fire Zone 6S, "Auxiliary Building - El. 587'"

   The Impell Report identifies the Gas Decay Tank Area of this fire zone to be deficient in the fire extinguishers placement criteria as defined in NFPA 10.

   For the same reasons explained in the evaluation of the Gas Decay Tanks in Fire Zone 6N, no new extinguishers will be added to this room.

5. Fire Zones 62B, 62C and 63C, "Centrifugal Charging Pump Room"

   The Impell Report identifies these three Charging Pump Rooms as being deficient in the fire extinguisher placement criteria as defined in NFPA 10.

   Due to the inherent purpose of these pumps (pumping radioactive fluids), these rooms tend to become contaminated while the units are "on-line." Placing a portable fire extinguisher within these rooms is undesirable from an ALARA standpoint. According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, an ABC extinguisher is located outside the accessway to this room. Since very few exposed combustibles are within these rooms and access is controlled because of ALARA concerns, it is felt that the existing extinguishers are adequate. No new extinguishers will be added to these fire zones.

6. Fire Zone 64B, "Safety Injection Pump Room"

   The Impell Report identifies this zone to be deficient in the fire extinguisher placement criteria as defined in NFPA 10.

   Fire Zone 64B is classified as a Radiation Area. Placing a fire extinguisher within 50' of all portions of this room is undesirable from an ALARA standpoint. According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, sufficient fire extinguishers are located outside the accessway to this room.

Since very few exposed combustibles are within this room and access is controlled because of ALARA concerns, it is felt that the existing extinguishers are adequate. No new extinguishers will be added to this fire zone.

7. Fire Zone 37, "Valve Gallery - El. 617'"

The Impell Report identifies this zone to be deficient in the fire extinguisher placement criteria as defined in NFPA 10.

Fire Zone 37 is classified as a High Radiation Area. Placing fire extinguishers within this room is undesirable from an ALARA standpoint. According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, sufficient fire extinguishers exist outside the accessway to this room. Since this room contains no combustibles and access is controlled because of ALARA concerns, it is felt that the existing extinguishers are adequate. No new extinguishers will be installed in this fire zone.

8. Fire Zone 44 N, "Auxiliary Building North - El. 609'"

The Impell Report identifies the Waste Gas Compression Area of this fire zone to be deficient in the fire extinguisher placement criteria as defined in NFPA 10.

This portion of Fire Zone 44N is classified as a Radiation Area. Installation of a fire extinguisher within strict compliance of NFPA 10 is undesirable due to ALARA concerns. According to the Fire Facility Drawings and Plant Procedure 12SHP2270FIRE.001, Revision 1, sufficient fire extinguishers exist outside the accessway to this room. Since this room contains very few exposed combustibles and access is controlled because of ALARA concerns, it is felt that the existing extinguishers are adequate. No new extinguishers will be installed in this fire zone.

Patrick J. Russell

PJR/gf

cc: FHA Rev. 4 File
J.D. Grier/J.A. Kobyra/B.J. Gerwe/P.J. Russell

AMERICAN ELECTRIC POWER

Date January 23, 1989

Subject Donald C. Cook Nuclear Plant
Plant Portable Fire Extinguishers

NFPA 10
SECTIONS 3-1.2, 3-1.2.2
CODE COMPLIANCE REPORT
IMPELL 09-0120-0123

From P.J. Russell PJR 1/23/89

To P.H. Jacques

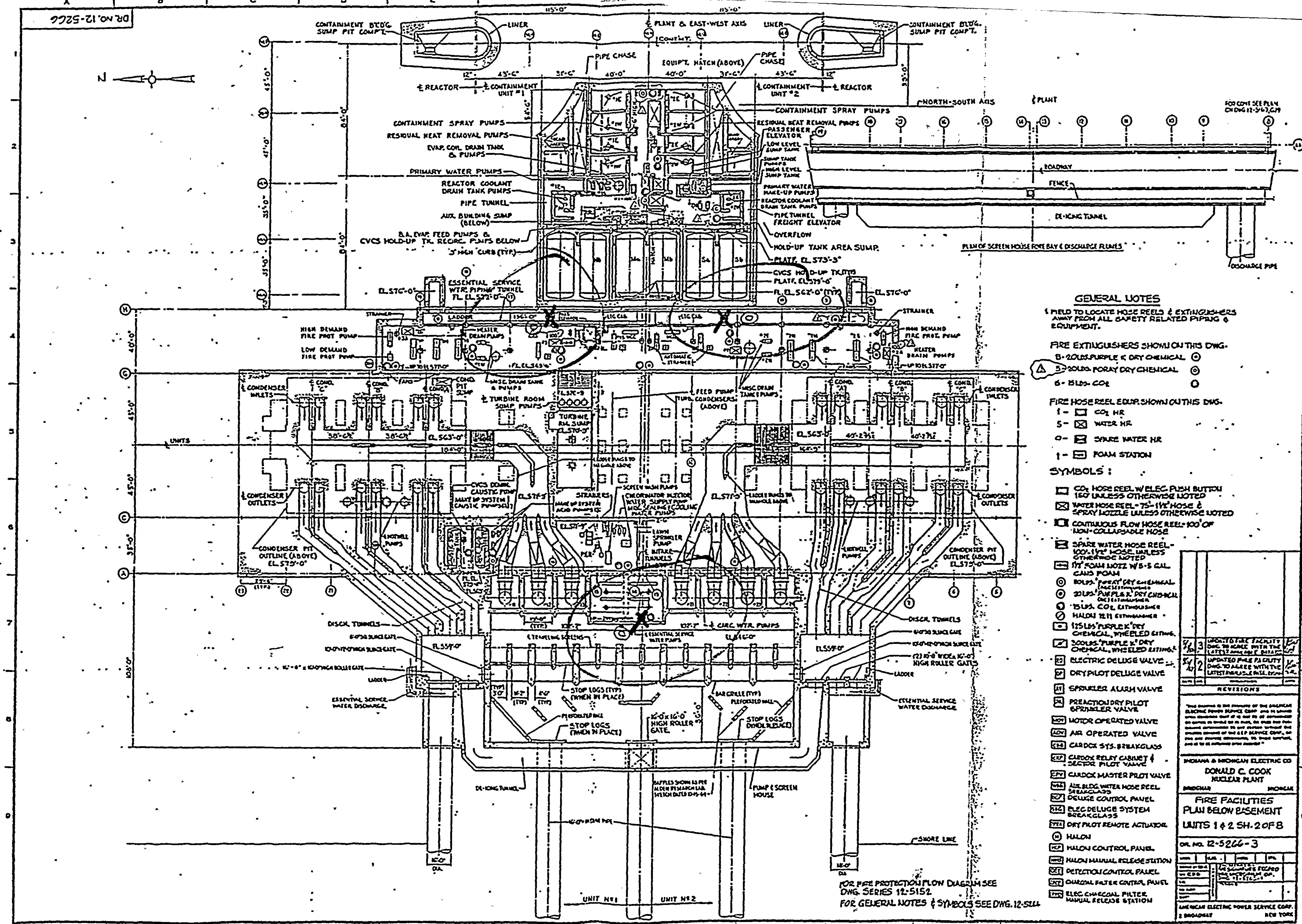
In order to meet the NFPA 10 "Portable Fire Extinguisher" placement criteria for Class A type fires, the following eleven extinguishers (shown on the attached drawings) should be changed from Type BC dry chemical to Type ABC. If you should have any questions, please contact me at extension 2532.

PJR/gf

Attachments

cc: W.G. Smith, Jr. - Bridgman
R.L. Shoberg
J.D. Grier/J.A. Kobyra/P.J. Russell
File: FHA Rev. 4
File: Impell Code Compliance

Wra-System


DR. NO. 12-5266
GENERAL NOTES
1. FIELD TO LOCATE HOSE REELS & EXTINGUISHERS AWAY FROM ALL SAFETY RELATED PIPING & EQUIPMENT.
FIRE EXTINGUISHERS SHOWN ON THIS DWG.
8 - 20LBS. PURPLE K DRY CHEMICAL
5 - 20LBS. FORAY DRY CHEMICAL
6 - 15LBS. CO2
FIRE HOSE REEL EQUIP. SHOWN ON THIS DWG.
1 - CO2 HR
5 - WATER HR
0 - SPARE WATER HR
1 - FOAM STATION
SYMBOLS :
CO2 HOSE REEL W/ELEC. PUSH BUTTON 150' UNLESS OTHERWISE NOTED
WATER HOSE REEL - 75 - 1½" HOSE & SPRAY NOZZLE UNLESS OTHERWISE NOTED
CONTINUOUS FLOW HOSE REEL - 100' OF NON-COLLAPSABLE HOSE
SPARE WATER HOSE REEL - 100'-1½" HOSE UNLESS OTHERWISE NOTED
1½" FOAM NOZZ. W/5-5 GAL. CANS FOAM
20LBS. FORAY DRY CHEMICAL
20LBS. PURPLE K DRY CHEMICAL
15LBS. CO2 EXTINGUISHER
HALON 1211 EXTINGUISHER
125LBS. PURPLE K DRY CHEMICAL, WHEELED EXTING.
300LBS. PURPLE K DRY CHEMICAL, WHEELED EXTING.
ELECTRIC DELUGE VALVE
DRY PILOT DELUGE VALVE
SPRINKLER ALARM VALVE
PREACTION DRY PILOT SPRINKLER VALVE
MOTOR OPERATED VALVE
AIR OPERATED VALVE
CARDOX SYS. BREAKGLASS
CARDOX RELAY CABINET & SECTOR PILOT VALVE
CARDOX MASTER PILOT VALVE
AUX. BLDG. WATER HOSE REEL BREAKGLASS
DELUGE CONTROL PANEL
ELEC. DELUGE SYSTEM BREAKGLASS
DRY PILOT REMOTE ACTUATOR
HALON
HALON CONTROL PANEL
HALON MANUAL RELEASE STATION
DETECTION CONTROL PANEL
CHARCOAL FILTER CONTROL PANEL
ELEC. CHARCOAL FILTER MANUAL RELEASE STATION
REVISIONS
3 UPDATED FIRE FACILITY DWG. TO AGREE WITH THE LATEST AS-BUILT DATA
2 UPDATED FIRE FACILITY DWG. TO AGREE WITH THE LATEST AS-BUILT DATA
INDIANA & MICHIGAN ELECTRIC CO.
DONALD C. COOK NUCLEAR PLANT
BRIDGMAN MICHIGAN
FIRE FACILITIES
PLAN BELOW BASEMENT
UNITS 1 & 2 SH. 2 OF 8
DR. NO. 12-5266-3
AMERICAN ELECTRIC POWER SERVICE CORP.
2 BROADWAY NEW YORK
FOR FIRE PROTECTION FLOW DIAGRAM SEE DWG. SERIES 12-5152
FOR GENERAL NOTES & SYMBOLS SEE DWG. 12-5266
CONTAINMENT BLDG. SUMP PIT COMPT.
LINER
PLANT & EAST-WEST AXIS
PIPE CHASE
EQUIPT. HATCH (ABOVE)
REACTOR
CONTAINMENT UNIT #1
CONTAINMENT UNIT #2
NORTH-SOUTH AXIS
CONTAINMENT SPRAY PUMPS
RESIDUAL HEAT REMOVAL PUMPS
PASSENGER ELEVATOR
EVAP. COIL DRAIN TANK & PUMPS
PRIMARY WATER PUMPS
REACTOR COOLANT DRAIN TANK PUMPS
PIPE TUNNEL
AUX. BUILDING SUMP (BELOW)
B.A. EVAP. FEED PUMPS & CVCS HOLD-UP TK. RECIRC. PUMPS BELOW
FREIGHT ELEVATOR
OVERFLOW
HOLD-UP TANK AREA SUMP
ROADWAY
FENCE
DE-ICING TUNNEL
PLAN OF SCREEN HOUSE FORE BAY & DISCHARGE FLUMES
DISCHARGE PIPE
ESSENTIAL SERVICE WTR. PIPING TUNNEL
HIGH DEMAND FIRE PROT. PUMP
LOW DEMAND FIRE PROT. PUMP
HEATER DRAIN PUMPS
STRAINER
CONDENSER INLETS
CONDENSER OUTLETS
CONDENSER PIT OUTLINE (ABOVE) EL. 575'-0"
TURBINE ROOM SUMP PUMPS
FEED PUMP TURB. CONDENSERS (ABOVE)
MISC. DRAIN TANK PUMPS
CVCS DOMIN. CAUSTIC PUMP
SCREEN WASH PUMPS
CHLORINATOR INJECTOR WATER SUPPLY PUMP
LAWN SPRINKLER PUMP
INTAKE TUNNELS
DISCH. TUNNELS
CIRC. WTR. PUMPS
ESSENTIAL SERVICE WATER PUMPS
TRAVELING SCREENS
HIGH ROLLER GATES
STOP LOGS (TYP) (WHEN IN PLACE)
BAR GRILLE (TYP)
16'-0" x 16'-0" HIGH ROLLER GATE
ESSENTIAL SERVICE WATER DISCHARGE
LADDER
DE-ICING TUNNEL
PUMP & SCREEN HOUSE
SHORE LINE
UNIT NO 1
UNIT NO 2

GENERAL NOTES

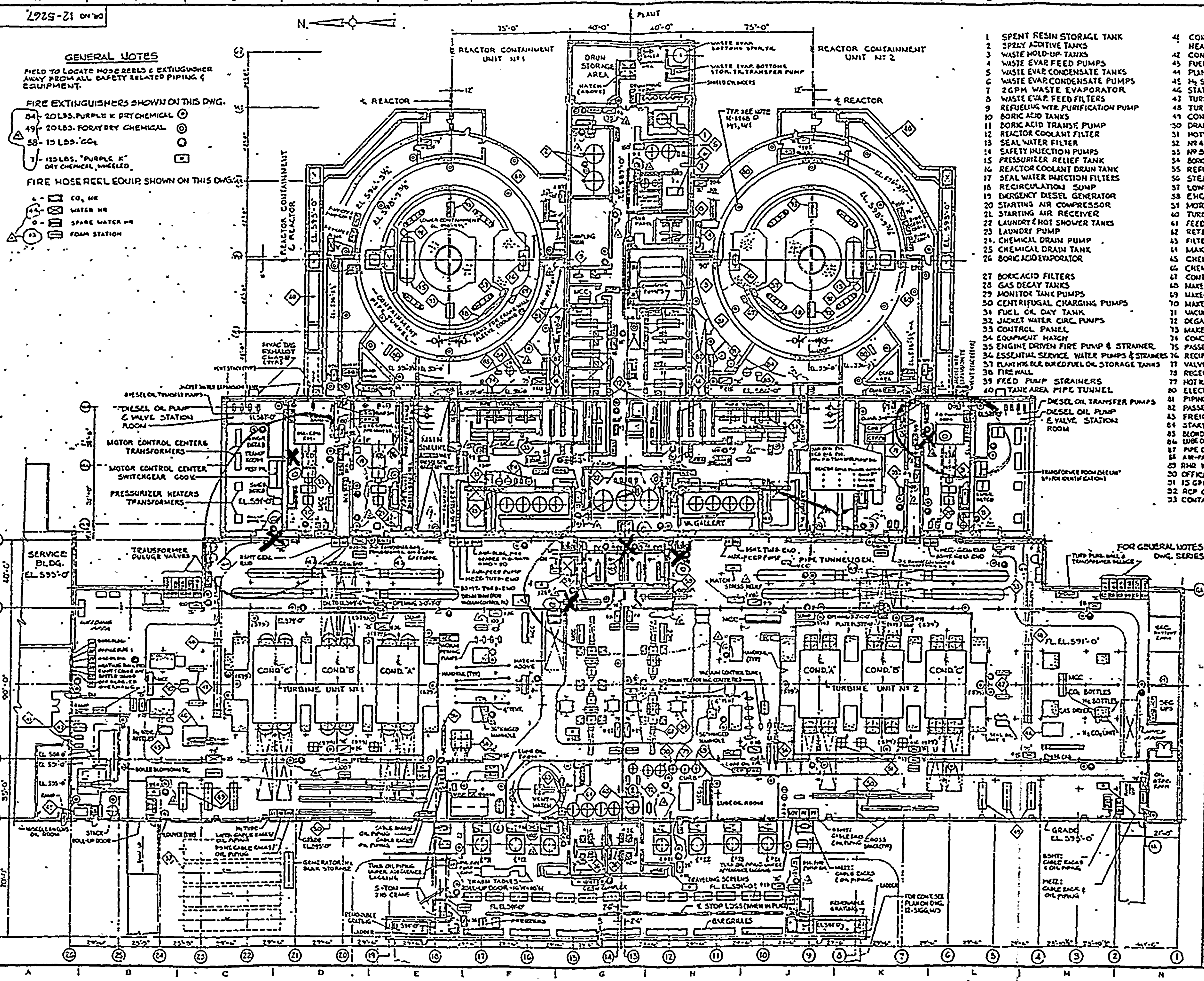
FIELD TO LOCATE HOSE REELS & EXTINGUISHER AWAY FROM ALL SAFETY RELATED PIPING & EQUIPMENT.

FIRE EXTINGUISHERS SHOWN ON THIS DWG.

- 84 - 20 LBS. PURPLE K DRY CHEMICAL
- 49 - 20 LBS. FORAY DRY CHEMICAL
- 58 - 15 LBS. CO_2
- 7 - 125 LBS. "PURPLE K" DRY CHEMICAL, WHEELED

FIRE HOSE REEL EQUIP. SHOWN ON THIS DWG.

- 6 - CO_2 HR
- 44 - WATER HR
- 0 - SPARE WATER HR
- 13 - FOAM STATION



1 SPENT RESIN STORAGE TANK
2 SPRAY ADDITIVE TANKS
3 WASTE HOLD-UP TANKS
4 WASTE EVAP. FEED PUMPS
5 WASTE EVAP. CONDENSATE TANKS
6 WASTE EVAP. CONDENSATE PUMPS
7 2GPM WASTE EVAPORATOR
8 WASTE EVAP. FEED FILTERS
9 REFUELING WTR. PURIFICATION PUMP
10 BORIC ACID TANKS
11 BORIC ACID TRANSF. PUMP
12 REACTOR COOLANT FILTER
13 SEAL WATER FILTER
14 SAFETY INJECTION PUMPS
15 PRESSURIZER RELIEF TANK
16 REACTOR COOLANT DRAIN TANK
17 SEAL WATER INJECTION FILTERS
18 RECIRCULATION SUMP
19 EMERGENCY DIESEL GENERATOR
20 STARTING AIR COMPRESSOR
21 STARTING AIR RECEIVER
22 LAUNDRY & HOT SHOWER TANKS
23 LAUNDRY PUMP
24 CHEMICAL DRAIN PUMP
25 CHEMICAL DRAIN TANK
26 BORIC ACID EVAPORATOR
27 BORIC ACID FILTERS
28 GAS DECAY TANKS
29 MONITOR TANK PUMPS
30 CENTRIFUGAL CHARGING PUMPS
31 FUEL OIL DAY TANK
32 JACKET WATER CIRC. PUMPS
33 CONTROL PANEL
34 EQUIPMENT HATCH
35 ENGINE DRIVEN FIRE PUMP & STRAINER
36 ESSENTIAL SERVICE WATER PUMPS & STRAINERS
37 PLANT HTG. BLR. BURIED FUEL OIL STORAGE TANKS
38 FIRE WALL
39 FEED PUMP STRAINERS
40 TANK AREA PIPE TUNNEL
41 CONDENSATE PUMPS (PLANT HEATING BOILER)
42 CONDENSATE RECEIVER
43 FUEL OIL PUMPS
44 PLANT HEATING BOILER
45 H_2 SEAL OIL UNIT
46 STATOR COOLING UNIT
47 TURBINE AUX. COOLING PUMPS
48 TURBINE AUX. COOLER
49 CONDENSATE BOOSTER PUMP
50 DRAIN COOLERS
51 HOTWELL PUMPS
52 Nº 4 L.P. HEATERS
53 Nº 5 L.P. HEATER
54 BORIC ACID [illegible] FILTER
55 REFUELING WATER FILTER
56 STEAM PACKING EXHAUSTER
57 LOWER CONTAINMENT SUMP
58 EHC POWER UNIT
59 MOTOR DRIVEN AUX. FEED PUMP
60 TURB. DRIVEN AUX. FEED PUMP
61 FEEDPUMP TURBINE CONDENSER
62 RETENTION TANK
63 FILTER SUPPLY PUMPS
64 MAKEUP WATER FILTERS
65 CHEMICAL CLEANING TANK
66 CHEMICAL CLEANING PUMP
67 CONTAINMENT PIPE TUNNEL SUMP
68 MAKE-UP WATER SUB-PANEL
69 MAKE-UP WATER MIXED BED DEMINS.
70 MAKE-UP WATER ANION EXCHANGERS.
71 VACUUM DEGASSIFIER
72 DEGAS WATER PUMPS
73 MAKEUP WATER CATION EXCHANGERS.
74 CONCENTRATES FILTERS
75 PASSENGER ELEVATOR
76 RECIPROCATING CHARGING PUMP
77 VALVE PIT
78 REGENERATION CABINET (MAKEUP WATER SYS.)
79 HOT WATER TANK (CAUSTIC HEATING) MAKE UP WATER SYS.
80 ELECT. PENETRATION AREA
81 PIPING PENETRATION AREA (VESTIBULE)
82 PASSENGER ELEVATOR
83 FREIGHT ELEVATOR
84 START-UP STEAM GEN. BLOWDOWN TANK
85 BLOWDOWN DEMIN PUMP
86 LUBE OIL COOLER & JACKET WATER HEAT EXCH'GR.
87 PIPE CHASE.
88 AIR-PARTICLE RADIO. GAS DETECTOR.
89 RHR VALVES
90 OFFICE BLDG. CONDENSER WATER PUMP
91 15 GPM WASTE EVAPORATOR
92 RCP OIL CONNECTION TANKS
93 CONTAINMENT AUXILARY CHARCOAL FILTER

FOR GENERAL NOTES & SYMBOLS SEE DWG. SERIES 12-5266

[illegible]	4	UPDATED FIRE FACILITY DWG. TO AGREE WITH THE LATEST AVAILABLE DATA	[illegible]
[illegible]	3	UPDATED FIRE FACILITY DWG. TO AGREE WITH THE LATEST AVAILABLE INFO.	[illegible]

REVISIONS

INDIANA & MICHIGAN ELECTRIC CO.

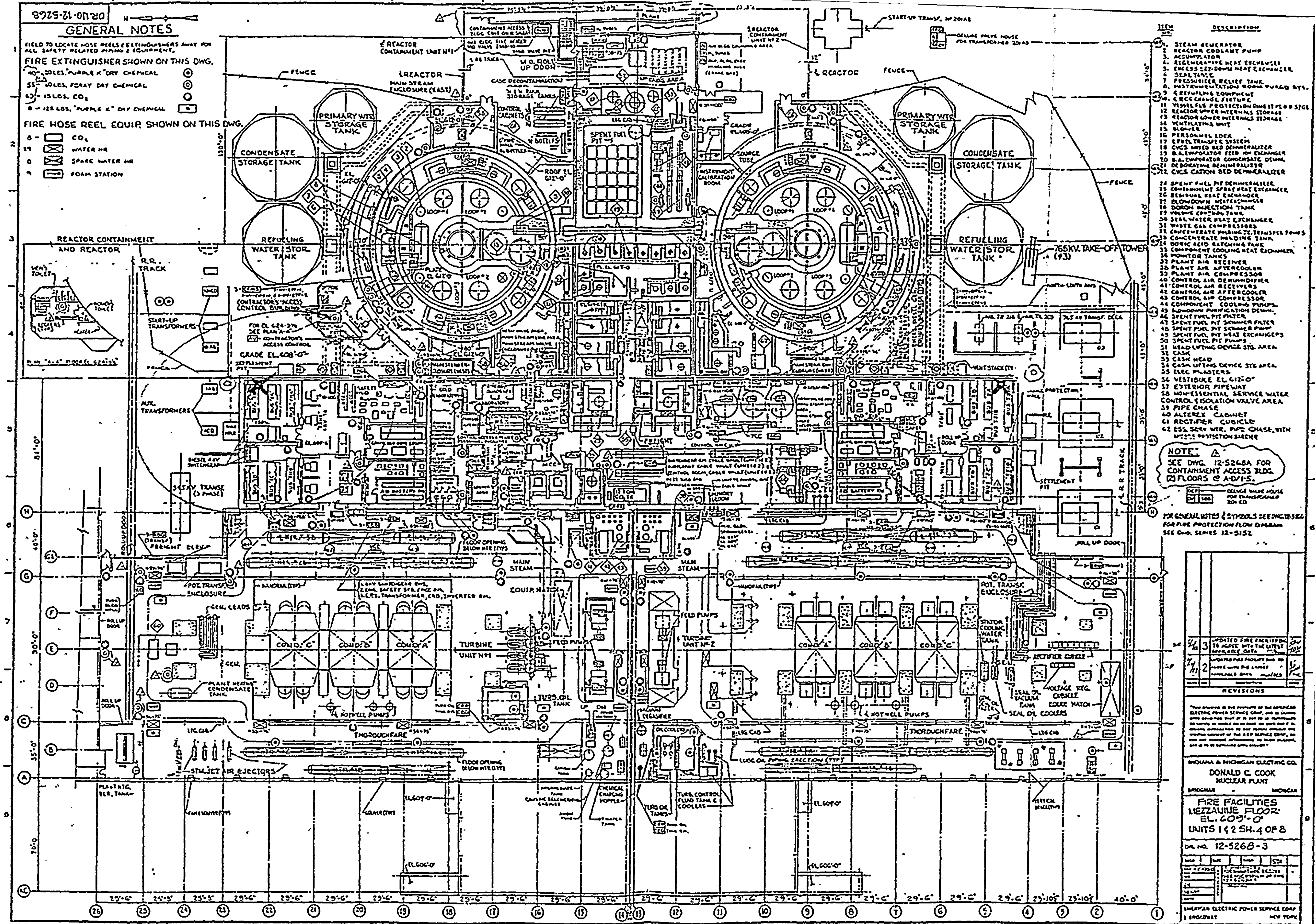
DONALD C. COOK NUCLEAR PLANT

BRIDGMAN MICHIGAN

FIRE FACILITIES
BASEMENT PLAN
EL. 591'-0" & EL. 587'-0"
UNIT 1 & 2 SH. 3 OF 8

DR. NO. 12-5267-4

AMERICAN ELECTRIC POWER SERVICE CORP.
2 BROADWAY NEW YORK



DR.UO-12-5268
GENERAL NOTES
FIELD TO LOCATE HOSE REELS & EXTINGUISHERS AWAY FOR ALL SAFETY RELATED PIPING & EQUIPMENT.
FIRE EXTINGUISHER SHOWN ON THIS DWG.
40 - 30 LBS. "PURPLE K" DRY CHEMICAL
55 - 30 LBS. FORAY DRY CHEMICAL
63 - 15 LBS. CO2
8 - 125 LBS. "PURPLE K" DRY CHEMICAL
FIRE HOSE REEL EQUIP. SHOWN ON THIS DWG.
8 - CO2
29 WATER HR
8 SPARE WATER HR
9 FOAM STATION
REACTOR CONTAINMENT AND REACTOR
CONDENSATE STORAGE TANK
PRIMARY WTR STORAGE TANK
REFUELING WATER STOR. TANK
SPENT FUEL PIT
765 KV. TAKE-OFF TOWER (#3)
TURBINE UNIT No 1
TURBINE UNIT No 2
COND. "A"
COND. "B"
COND. "C"
THOROUGHFARE
HOTWELL PUMPS
STM. JET AIR EJECTORS
NOTE: SEE DWG. 12-5268A FOR CONTAINMENT ACCESS BLDG. (2) FLOORS @ A-0/1-5.
REVISIONS
INDIANA & MICHIGAN ELECTRIC CO.
DONALD C. COOK NUCLEAR PLANT
BRIDGMAN MICHIGAN
FIRE FACILITIES MEZZANINE FLOOR EL. 609'-0"
UNITS 1 & 2 SH. 4 OF 8
DR. NO. 12-5268-3
AMERICAN ELECTRIC POWER SERVICE CORP.
2 BROADWAY NEW YORK

AEP

AMERICAN ELECTRIC POWER

Date November 30, 1988

Subject COOK NUCLEAR PLANT
NFPA 72D Code Compliance
Sections 2032, 2212 and 3111

From B. J. Gerwe BJG

To 1. ~~J. A. Kobyra~~ JDG
2. A. B. Auvil

This memo is intended to complete the closeout of Item 4 of my July 18, 1988 memo to you on NFPA 72D Code Compliance deviations. My memo of November 29, 1988 to Messrs. Kobyra/Brewer/Auvil/Smith, Jr. on the subject of "NFPA 72D Circuit Supervision Requirements" provides the balance of the closeout for Item 4.

Item 4 concerned the deviations found by Impell in their code compliance review of NFPA 72D. The Impell identified deficiencies included lack of an automatic means to record alarm signals received by the EF panel and the lack of a UL listing for certain manual alarm stations. The attached technical justification provides the basis for our acceptance of the above deficiencies.

BJG/bma

cc: S. J. Brewer
W. G. Smith, Jr. - Bridgman
J. R. Sampson/P. H. Jacques - Bridgman
M. Gallagher, Operations - Bridgman
P. G. Schoepf (MED 88-20-10 completion)
J. A. ~~Kobyra~~/J. D. Grier/B. J. Gerwe/Code Compliance
File: Appendix R Audit Preparation

Inva-System

TECHNICAL JUSTIFICATION FOR NFPA 72D

1967 EDITION CODE SECTIONS 2032, 2212 & 3111

Deviations

The unapproved fire alarm devices have been compared against the applicable Underwriters Laboratory (U.L.) Test Standard to verify if these devices would meet the requirements of the applicable standard and could therefore be considered equivalent to a U.L. Listed device. Based on the evaluation performed, the devices listed did not meet the requirements of the applicable standard for the following reason(s):

Device	Deviation
Rochester "EF" Annunciator Panel	NFPA 72D requires that an automatic means of recording signals be provided to record all signals received by the central supervising station control panel. Since this panel is not provided with this recording device, it cannot be considered equivalent for use as an NFPA 72D fire alarm signaling system.
Hose System Manual Stations and the ACI Model 446002 Manual Start/ Stop Stations for the charcoal filter units	These manual stations did not meet the requirements of this U. L. Test Standard due to the lack of a latching feature of the alarm contacts and the activation mechanism to provide a positive indication that the device has been activated.

The U.L. Test Standards referenced include the following:

a. U.L. Standard 864 for the Rochester "EF" Panel.

b. U.L. Standard 38 for the Manual Alarm Stations.

Justifications

1. The automatic recording of all signals is required by the code in order to provide a permanent record of all signals as well as a means of reconstructing the series of events during a fire when signals may be received very rapidly. While these are important features, the lack of automatic recording of all signals received by the central supervising station control panel (the Emergency Fire (EF) panel located in each control room) does not jeopardize the safety of the plant. The control rooms are constantly manned areas. As fire, system actuation or system failure signals are received, under plant administrative procedure OHI-2211 the control room operators manually log the incoming signals. An incoming signal

provides both a visual and audible alarm. The visual alarm is displayed on the EF panel annunciator. A unique audible alarm is located in each control room. In addition, the EF panel has a red lamp above each group of annunciator windows. This lamp lights whenever any alarm appears on the panel. Upon acknowledging the alarm, this lamp goes off.

The plant has advised that certain incoming signals are not logged. These include situations where an investigation of a fire detection signal shows no evidence of a fire, when there are repeated problems with a detection signal (this type of signal problem is passed onto the next shift in turnover information), or during surveillance testing of a system when many testing signals are received in the control room (Note: the start and stop of the surveillance testing is logged).

Under an existing standing (previously acknowledged) fire detection alarm signal, a new incoming fire detection alarm signal will be visually annunciated on the EF panel but will not provide the audible alarm. In these instances, the control room operators visually check the EF panel every half hour. This check is performed under plant administrative procedures, in order to verify that no new signals have been received and gone unnoticed while the standing fire detection alarm exists.

We believe our present arrangement for the recording of signals is an acceptable alternative to the NFPA 72D code requirement.

This situation of not having an automatic means of recording all signals received by the EF panel is not unique to only Cook Nuclear Plant. Other plants of similar age also lack this automatic recording function. They have also taken a similar position to ours. In at least one instance, this position appears to have been acceptable to the NRC.

2. The lack of a latching feature for the alarm contacts and activation mechanism for the auxiliary building hose system manual stations and Alison manual start/stop stations does not jeopardize the safety of the plant. While the noted deficiency is an important feature, it was probably intended for more commercial operations where a less complex fire logic system would exist and a staff of plant operators, who also double as fire brigade personnel, are not on duty 24 hours a day.

The function of the auxiliary building hose system manual stations is to send a command signal to open two isolating valves and was never intended to be for alarm signaling purposes. Therefore, the manual stations do not require the latching feature of the alarm contacts and activation mechanism. These manual stations are of the breakglass momentary push button design. Operation of these manual

stations will actuate the auxiliary building fire header isolation valves, ZMO-10 and ZMO-20. Operation of these valves will pressurize the header and give alarm annunciation on the EF panels which includes header pressurization and valves open. Upon receipt of these signals, the operators would begin the necessary fire investigations and dispatch the fire brigade. Annunication of the ZMO valve operation on the EF panels provides the required positive indication in the control room that the device has sent the required command signal and that the system has been activated. This remote indication in the control room is over and above the local indication given by the breaking of the glass plate and flow of water through the hose. In addition, because of the design of the annunciation system, these alarms cannot be removed without operator action to close the valve control switches. Closure of these control switches would only occur after confirmation that the danger of fire no longer exists. Additionally, signs at each hose station warns against their use by people other than the fire brigade, which is comprised of plant operators. In these instances, only a fire brigade member should be actuating the manual stations who would insure that proper fire suppression activities are undertaken no matter what the circumstances.

The Alison manual start/stop stations for the charcoal filter suppression systems are remote monemtary push button stations located near each of the protected charcoal filter units. They are intended for manual operation of the suppression system by the fire brigade. The water suppression systems must be manually operated after receipt of a fire signal in the control room from the charcoal filter unit's thermistor detection system. Operation requires the manual opening of the system controlling valve upstream of the system air operated three-way valve. The three-way valve is opened automatically by the thermistor detection system or by operation of the Alison start/stop stations. Since a fire brigade member must be on hand to open the system controlling valve, the rush of water traveling through the piping downstream of the three-way valve will be heard. The water discharge is designed to shut off at a predetermined time in order to minimize the amount of water which must be treated following extinguishment. It is for this reason that the start/stop station must be of the non-latching design. A latching type design would automatically restart the discharge cycle and increase the volume of water that must be treated. The present design allows complete freedom of action that the fire brigade must use in extinguishing the fire. As the three-way valve is closed, water can be seen draining through the drain line sight glass. The above methods provide positive indication that the Alison start/stop station has sent the required command. Also, the necessity of manual action by the fire brigade member ensures that proper fire suppression activities are undertaken no matter what the circumstances.

JLC

AEP
AMERICAN ELECTRIC POWER

Date November 29, 1988

Subject DONALD C. COOK NUCLEAR PLANT
NFPA 72D Circuit Supervision Requirements

NFPA 72D
1967 EDITION
SECTIONS 2411, 2422

From B. J. Gerwe BJG

To
1) J. A. ~~Kobyra~~ 11/30/88
2) S. J. Brewer/A. B. Auvil
3) W. G. Smith, Jr., - Bridgman

Summary

The NFPA code compliance review conducted by Impell identified a deficiency in that the annunciator circuits associated with the EF panels are not electrically supervised to detect wire breaks. A review of our licensing documents indicates that we have committed to comply with this requirement only for fire detection systems and the NRC accepted this position in the Appendix A SER. We are not currently in full compliance with this licensing basis. Therefore, a monthly surveillance program for the technical specification required Alison panel alarm annunciator circuits is recommended to be established as soon as possible. No interim corrective action is required at this time.

Licensing Chronology

Paragraph II.E.1.(a) of Appendix A to BTP 9.5-1 (Attachment 1) requires that fire detection systems comply with NFPA 72D, and that deviations be identified and justified. The AEP response to Appendix A (Attachment 2) stated that the fire detection systems at Cook complied with NFPA 72D except for testing frequencies for fire detectors inside containment.

Two of the fifty-three Appendix A follow-up questions posed by the NRC addressed circuit supervision. Question 16b (Attachment 3) specifically asked whether the complete fire alarm system, including valve and water flow supervision, conformed with NFPA 72D with respect to fire detection systems and that our compliance would be limited to "fire detection/suppression system control." NRC question 48 (Attachment 4) addressed circuit supervision associated with the EF panel annunciators. NFPA 72D circuit supervision includes detection of open circuits (wiring breaks) and ground faults preventing required circuit operation. The EF panel annunciator circuits are supervised for ground faults as discussed in the response, but not for open circuits as identified by Impell as a code deficiency.

The Appendix A SER (Attachment 5) states that the NRC "reviewed the fire detection system's design criteria and the basis to ensure that it conforms to the applicable sections of NFPA 72D, for Class B supervised circuits."

Discussion of Licensing Basis

Statements are made in the AEP responses to NRC questions and the Appendix A SER which are ambiguous if taken out of context. It would certainly appear that sufficient information was presented to the NRC for them to determine which portions of the overall fire alarm system were supervised.

The Appendix A requirement for circuit supervision is limited to fire detection systems, and this was the position taken by AEP. The Appendix A SER refers to circuit supervision only in the context of fire detection systems. It is, therefore, our interpretation that NFPA 72D requirements for circuit supervision are only committed to for fire detection systems.

Conformance

The initiating device circuits on the high and low voltage Pyrotronics (smoke and flame detection) and Alison (thermistor heat detection) local control panels are Class B supervised circuits as documented in the Impell code compliance review. The Technical Specification required low voltage Pyrotronics detection panels transmit alarms back to the control room on supervised high voltage Pyrotronics initiating device circuits. NFPA 72D also requires the signalling circuits which transmit a detection alarm from the local panel to the control room annunciator panel to be supervised. The high voltage Pyrotronics local control panels are mounted in the back plane of the EF panel, and the zone indicating lamps are duplicated on the front of the vertical board. This wiring is not supervised; however, Paragraph 2-7.1 of NFPA 72D-1986 does not require supervision of wiring within a common enclosure. Since we consider the control room horseshoe panel to be a common enclosure, this wiring need not be supervised.

The Alison local panels transmit to annunciator logic cabinets located within the control room horseshoe panel enclosure. As discussed earlier, the annunciator field circuits are supervised for ground faults, but not for open circuits (wire break). A program should be implemented to provide assurance that annunciator field circuits serving Technical Specification thermistor circuits are intact. An unsupervised prewired jumper runs from the annunciator logic cabinet to the annunciator drop lamps mounted on the front of the EF panel vertical board. This jumper runs through the common enclosure of the control room horseshoe panel and is therefore not required to be supervised.

Corrective Action

Monthly surveillances should be implemented to test the integrity of unsupervised annunciator circuits serving Technical Specification thermistor fire alarms. (Note: Electrical supervision of abnormal/trouble alarms is not required by NFPA 72D). The testing would entail jumpering the alarm relay contacts and verifying that the annunciator registers on the EF panel. Annunciator circuits to be tested would include the diesel generator rooms, fuel oil transfer pump room, charcoal filter units and containment 100 point panel common alarm, for each unit. All of the panels are located in the Reactor Cable Tunnels, Turbine Building or general floor areas of the Auxiliary Building. In order to satisfy our regulatory commitment, we request that the plant implement a monthly surveillance program as soon as possible for the Technical Specification required Alison panel alarm annunciator circuits. Table 1 identifies the required systems.

Bruce J. Gerwe

Bruce J. Gerwe

BJG/bma

Attachments

cc: P. G. Schoepf (MED 88-20-10 Partial) - w/o attachment
J. A. Kobyra/J. D. Grier/B. J. Gerwe
M. P. Alexich - w/o attachment
File: NFPA 72D Code Compliance

TABLE I
ALISON CONTROL PANEL ALARM ANNUNCIATORS
NFPA 72D CIRCUIT SUPERVISION REQUIREMENTS

Item/Area Protected	Unit	Annunciator Drop	Annunciator Panel	Reference Drawing(s)
1-HV-AES-1	1	97	101	95909, 98969, 92003
1-HV-AES-2	1	98	101	95909, 98969, 92003
1-HV-ACRF	1	87	101	95910, 98969, 92003
1-HV-CPR	1	99	101	95910, 98969, 92003
1-HV-CIPX	1	85	101	95911
1-HV-CFT-1	1	91,95	101	95926, 98978
1-HV-CFT-2	1	91,96	101	95926
2-HV-AES-1	2	97	201	95909, 98969, 92003
2-HV-AES-2	2	98	201	95909, 98969, 92003
2-HV-ACRF	2	87	201	95910, 98969, 92003
2-HV-CPR	2	99	201	95910, 98969, 92003
2-HV-CIPX	2	85	201	95911
2-HV-CFT-1	2	91,95	201	95926, 98978
2-HV-CFT-2	2	91,96	201	95926
Diesel Gen. 1AB	1	53	101	98981, 95936
Diesel Gen. 1CD	1	52	101	98981, 95936
Diesel Gen. 2AB	2	53	201	98981, 95936
Diesel Gen. 2CD	2	52	201	98981, 95936
Fuel Oil Trans. Pump Room AB	1	51,54	101	98981, 95936, 98982, 95937
Fuel Oil Trans. Pump Room CD	1	51,54	101	98981, 95936, 98982, 95937

Item/Area Protected	Unit	Annunciator Drop	Annunciator Panel	Reference Drawing(s)
Fuel Oil Trans. Pump Room AB	2	51,54	201	98981, 95936, 98982, 95937
Fuel Oil Trans. Pump Room CD	2	51,54	201	98981, 95936, 98982, 95937
Containment 100 Pt. Panel	1	92,93	101	98977, 92335
Containment 100 Pt. Panel	2	92,93	201	98977, 92335
Reactor Coolant Pumps Nos. 11, 12, 13 & 14	1	94	101	98612, 98979
Reactor Coolant Pumps Nos. 21, 22, 23 & 24	2	94	201	98612, 98979

NFPA 72D CIRCUIT SUPERVISION REQUIREMENTS

APPLICATION DOCKETED BUT CONSTRUCTION PERMIT NOT RECEIVED AS OF 7/1/76	PLANTS UNDER CONSTRUCTION AND OPERATING PLANTS
(b) Suitable sealed beam battery powered portable hand lights should be provided for emergency use.	
(c) Fixed emergency communication should use voice powered head sets at pre-selected stations.	
(d) Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage.	
E. Fire Detection and Suppression	E. Fire Detection and Suppression
1. Fire Detection	1. Fire Detection
(a) Fire detection systems should as a minimum comply with NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems."	SAME. Deviations from the requirements of NFPA 72D shoul be identified and justified.
(b) Fire detection system should give audible and visual alarm and annunciation in the control room. Local audible alarms should also sound at the location of the fire.	
(c) Fire alarms should be distinctive and unique. They should not be capable of being confused with any other plant system alarms.	
(d) Fire detection and actuation systems should be connected to the plant emergency power supply.	
2. Fire Protection Water Supply Systems	2. Fire Protection Water Supply Systems
(a) An underground yard fire main loop should be installed to furnish anticipated fire water requirements. NFPA 24 - Standard for Outside Protection - gives necessary guidance for such installation. It references other design	(a) SAME. Visible location marking signs for underground valves is acceptable. Alternative valve position indicators should also be provided.

ATTACHMENT 2

NFPA 72D CIRCUIT SUPERVISION REQUIREMENTS

E. Fire Detection and Suppression

1. Fire Detection

(a) Fire detection systems at the Cook Plant conform to the appalicable portions of NFPA 72D except for the testing frequency specified in Paragraph 1232. The requirements for testing in certain areas, particularly in - containment, must conform to accessibility when radiation levels are within allowable limits. In such cases, the test frequency may be less than that specified by NFPA 72D.

(b) All fire detection system alarms sound and are visually displayed on the emergency fire panel in the respective control room. Local alarms are furnished only where the detection also actuates a gas-type suppression system.

(c) Bells are used for such local alarm of actuation of gas-type systems and are the only bells used for any alarm function. The overall plant fire alarm system employs motor-operated horns which is the only use of this type device.

(d) All fire detection and suppression system power supplies are from the plant batteries, which are redundant, or from the batteries through inverters which are also redundant.

NFPA 72D CIRCUIT SUPERVISION REQUIREMENTS

Question 16:

a. Provide the results of system tests or analyses which substantiates that the sensitivity of fire detection devices, and that the number and placement of detectors are sufficient to provide a prompt alarm and/or actuation of the automatic fire protection systems.

b. Show that the complete fire alarm system, including waterflow and valve supervision, conforms to applicable guidance in NFPA 72D.

c. Describe the detector system circuitry (from the detectors to the main control room fire panel). Supplement this description with selected elementary wiring drawings and typical cable routing diagrams. Also, provide an electrical single line diagram which shows the main source and if applicable the alternate source of power for these systems.

d. Identify any significant differences between the Unit 1 fire detection system and the Unit 2 fire detection system.

Response to Question 16a:

Each ionization detector in Unit 1 was checked for proper sensitivity, following installation, by I&M relay engineers and a technical representative of the supplier. This latter check also included cleaning and verification of operation of each detector. This will be done on Unit 2 once the installation is complete.

Following the check by the supplier, ionization detectors are cleaned twice yearly and checked for sensitivity and operation yearly by I&M personnel who have attended Pyralarm service courses and are qualified by Pyralarm to service such systems. Manufacturer technicians may be called in for assistance at any time, if required.

Thermistor detection systems in Unit 1 were checked for proper sensitivity and operation, following installation, by I&M relay engineers. This will also be done on Unit 2 once installation is complete. Following the above initial check, yearly operational checks are performed by I&M personnel who are thoroughly familiar with the equipment. Manufacturer technicians may be called in for assistance at any time, if required.

Ionization and thermistor detectors have been located by the supplier's engineers, in quantities and spacing to agree as a minimum with NFPA 72E and the UL listing for these devices. We rely, as do other utilities and industries, on the results of UL and/or FM testing to determine the effectiveness of a device or system, the parameters affecting its use, and the quantities to be used.

Response to Question 16b:

We feel that NFPA 72D is an extremely poor guide to be used for nuclear power plants since it is much too general in nature. However, we recognize that it is, at this time, the only guidance available.

We also note that this question has apparently expanded in scope to include waterflow and valve supervision, whereas Appendix A to B.T.P. APCSB 9.5-1 only referred to NFPA 72D in Item E.1.(a) for fire detection. In responding to Appendix A to B.T.P. APCSB 9.5-1 we compared the requirements of NFPA 72D to the fire detection/suppression system control at the Cook Nuclear Plant. As stated therein we are in agreement with all the applicable portions of NFPA 72D except for the testing frequency.

Response to Question 16c:

The detector system circuitry is described below for the two types of fire detection in use at the Cook Nuclear Plant.

(i) Ionization (product of combustion) Fire Detection:

The ionization detector utilizes the principle wherein air is made electrically conductive (ionized) by exposure to a minute source of alpha radiation emitting material, Americium 241. The ionizing material is located in the outer or detecting chamber of the detector which is open to the atmosphere, and in an inner or compensating chamber of the detector which, except for a small vent to compensate for temperature and pressure changes, is essentially closed to prevent entrance of combustion products. The outer and inner chambers are connected in parallel with the anode and cathode of a special gas discharge (cold cathode) tube. The junction between the outer and inner chambers is connected to a starter electrode of the cold cathode tube.

A voltage is applied across the outer and inner ionization chambers causing a minute electrical current flow. When products of combustion enter the exposed outer chamber, the resistance to current flow increases and the voltage between the cold cathode tube starter electrode and the cathode increases and fires the tube. The current which then passes between the anode and cathode of the tube is sufficient to energize a zone relay and a corresponding alarm relay in the main ionization control unit.

The zone relay is a special 3-position relay incorporated in the detector circuit to give an alarm in case of fire and to supervise the system against defective detector heads, broken wires, or a similar failure that would make the system inoperative. Such a failure will de-energize the relays and close

contacts to energize an auxiliary relay that:

(1) lights an amber lamp on the Emergency Fire Panel (EF) in the Control Room and on the main ionization control unit.

(2) energizes an annunciator, "Pyr-A-Larm System Trouble-Fire", on the Emergency Fire Panel in the Control Room.

(3) lights a white lamp on the Emergency Fire Panel in the Control Room and the Zone Relay Unit which will identify the protected zone in which the failure occurred. If the failure occurs in the power supply portion, none of the white lamps will light.

In the normal position of the supervisory relay, a low current flows through its coils due to a resistor in its circuit. This low current is sufficient to partially pick up the relay and keep the contacts, which energize the auxiliary relay described above, from making contact. If a fire occurs, the resistor is bypassed and a larger current flows through the relay coil causing it to pick up completely. Then other contacts close to energize a second auxiliary relay which:

(1) lights red lamps on the Emergency Fire Panel in the Control Room and on the main ionization control unit.

(2) again energizes the "Pyr-A-Larm System Trouble-Fire" annunciator on the Emergency Fire Panel in the Control Room.

(3) lights the appropriate white lamp on the Emergency Fire Panel in the Control Room and on the Zone Relay Unit to identify the zone in which the fire occurred.

(4) operates any connected CO_2 or Halon 1301 Fire extinguishing system.

The Emergency Fire Panel in each Control Room is equipped with green, red and amber lamps for Pyr-A-Larm systems which indicate respectively; power available, fire, and trouble. There are also groups of white lamps to indicate the individual Pyr-A-Larm zones.

A fire condition would be indicated by lighting one of the red lamps and operation of the annunciator "Pyr-A-Larm System Trouble-Fire" plus lighting one or more of the white indicating lamps for the respective zone.

A trouble condition would be indicated by lighting one of the amber lamps and operation of the annunciator "Pyr-A-Larm System Trouble-Fire" plus lighting one, or more, of the white indicating lamps for the respective zone.

A reset switch is located directly below the green, red, and amber lamps on the Emergency Fire Panel. Once a trouble or a fire alarm has been received, it is necessary to operate the switch to reset the system, but as long as the trouble or fire condition remains, the system cannot be reset. Following the fire, there may be a period during which the system cannot be reset due to the residual products of combustion in the room or in the exposed air chamber of the detector. When the atmosphere is cleared, the system can be reset in the normal manner.

The reset switch is duplicated on the main ionization control unit and serves also as the main power switch. This is the location from which the system would normally be turned "On" and "Off".

Fire and Trouble alarm silencing switches are also located on this unit from which the audible alarms can be silenced until the system is reset or the trouble corrected.

These switches are supervised in such a manner that the annunciator and indicating lamps cannot be cleared until the switches are returned to their normal position.

There is a neon pulse lamp on the side of each detector base. When a detector operates, the pulse lamp on its base will flash, indicating that it is the device which has operated. The pulse circuit is controlled from the main ionization control unit.

The ionization fire detection system power supplies are as follows:

(a) Unit No. 1 and Auxiliary Building - 120 vac distribution cabinet 1-CRP1, circuits 1 and 3.

(b) Unit No. 2 - 120 vac distribution cabinet 2 - CRP1, circuits 1 and 3.

(c) Office and Service Building - 120 vac distribution cabinet 1-CRP2, circuits 15 and 20.

(ii) Thermistor Heat Sensing Detection:

Continous strip thermistor type sensing is adaptable to general area or specific equipment detection. It can be made as sensitive as desired to suit the ambient conditions in the detection area and is used where rapidly developing fires

(hydro-carbons or gases) could be expected, such as oil rooms and transformers. It is also used where precise temperature measurement is desired such as in cable trays and charcoal filters.

The continuous thermistor sensor consists of a small centered wire embedded in a ceramic thermistor core enclosed in either an inconel or a stainless steel tubing sheath. The centered wire and the outer sheath are connected at hermetically sealed fittings used to join sections of the sensor. Electrical resistance is measured across the centered wire and the sheath through the ceramic core. As the ceramic core is heated, the resistance between the centered wire and sheath decreases and the current flow increases to the point where a relay is operated. This relay, in turn, operates the fire extinguishing or alarm system. Heat detection can be achieved at any point along the thermistor sensor.

The sensor has only two failure modes, open circuit and short circuit, both of which can be caused only by mechanical means. Even though the above failure modes are unlikely to occur, the sensor circuits are supervised for such situations by relays in the control equipment.

Companion equipment for the sensor includes control equipment, mounting hardware of various types, junction (terminal) boxes, and electrical terminator for supervision.

When the alarm relay in the thermistor control is operated due to heat from a fire lowering the resistance between the central wire and outer sheath of the thermistor sensor, a contact of the alarm relay is closed to energize either the release solenoid coil in the water deluge valve and the equipment relay in the deluge valve electric control panel in the case of an electric water spray deluge system, or the hazard relay located in the CO_2 relay cabinet in the case of a low pressure CO_2 protected area.

When energized, the deluge valve release solenoid coil operates the mechanical linkage causing the valve clapper to open, releasing the water. The equipment relay in the deluge valve electric control panel when energized, operates the Emergency Fire Logic System to start fire pumps, sound the Plant Fire Horn Alarm System, and operate annunciators.

The Cardox relay cabinet hazard relay, when energized, operates the predischarge alarm timer and the discharge timer; and auxiliary relays to open the master and selector valves, operate local and remote alarms and annunciators and, through the Logic System, operate the Plant Fire Horn Alarm System.

In the case of the Diesel Generator Rooms, two thermistor detection circuits are used to minimize the possibility of a

spurious operation. One circuit has an alarm setpoint of 190°F and the other, 250°F. The alarm relay contacts in each circuit are wired in series so that both must operate before the CO_2 system hazard relay can energize to release CO_2.

The Containment Detection System control units monitor thermistor sensor circuits located in the containment cable trays and at the reactor coolant pumps. Each control unit monitors 100 zones for alarm and short circuit conditions by means of combined alarm and short circuit printed circuit boards (PCB) which are adjustable. Each PCB must be individually adjusted, in accordance with the suppliers instructions, due to varying sensor circuit lengths, alarm temperature setpoints, and short circuit setpoints.

Each control unit has 100 alarm and 100 trouble indicating lights, one of each for every zone. The units are mounted on the Containment Auxiliary Subpanels outside each Control Room in the Auxiliary Building.

A group of 100 acknowledging switches corresponding in location to the alarm and trouble indicating lamps are located at the upper right hand corner of the control unit. When one of these lamps is energized, the corresponding acknowledge switch should be moved to the down position. This action clears the control to receive additional alarm or trouble signals on the remaining indicating lamps but holds signals already received. All alarms should be checked and acknowledged promptly.

Directly below the acknowledge switches is a group of indicating lamps and switches in the system control section. The three green lamps indicate power available. The "On-Off" switch is the main power switch. The "Lamp Test" switch, when operated, verifies the condition of all normally-extinguished indicating lamps. The "Alarm Test" switch illuminates all red alarm indicating lamps in the upper left hand corner. The "Trouble Test" switch illuminates all amber trouble indicating lamps.

When the thermistor sensor resistance falls below the alarm setpoint for a particular PCB, the corresponding red alarm indicator will light and Annunciator 91 "Containment Area Fire" on the Emergency Fire Panel will be energized. The operator should then go to the control unit and turn the corresponding acknowledge switch to the down position. This action will energize Annunciator 93 "Containment Area Alarm Acknowledged" on the Emergency Fire Panel. The operator should then reset the Emergency Fire Panel annunciator to clear Annunciator 91 for any subsequent alarm. After the alarm condition has been checked and cleared, the acknowledge switch must be returned to the normal up position and the Emergency Fire Panel Annunciator, reset to clear Annunciator 93.

A trouble condition such as an open or short circuit in the sensor or failure of the circuiting will operate the corresponding amber trouble indicator on the control unit and Annunciator 92 "Containment Area-Fire System Abnormal" on the Emergency Fire Panel Operator response is identical to the alarm situation.

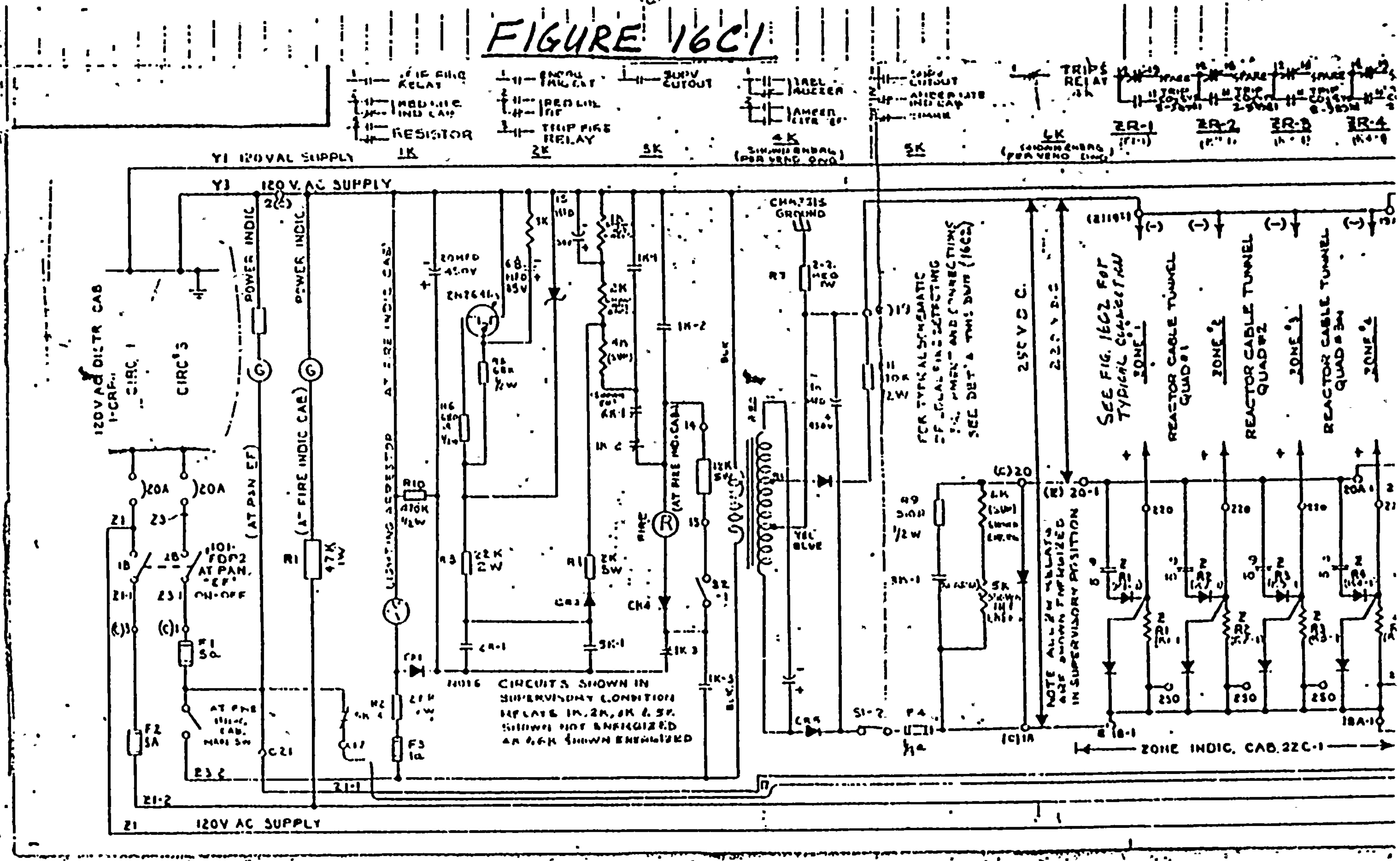
Selected electrical drawings, as indicated below, are attached and these drawings supplement the response to this question. These drawings are:

- Figures 16C1 and 16C2 wiring diagrams showing typical detector type.
- Figure 16C3 electrical single line diagram, showing main and alternate AC sources to the detector relay circuits.
- Figure 16C4 electrical single-line diagram showing source of power for battery circuits.
- Figure 16C5 cable routing diagram derived from physical drawings.

Response to Question 16d:

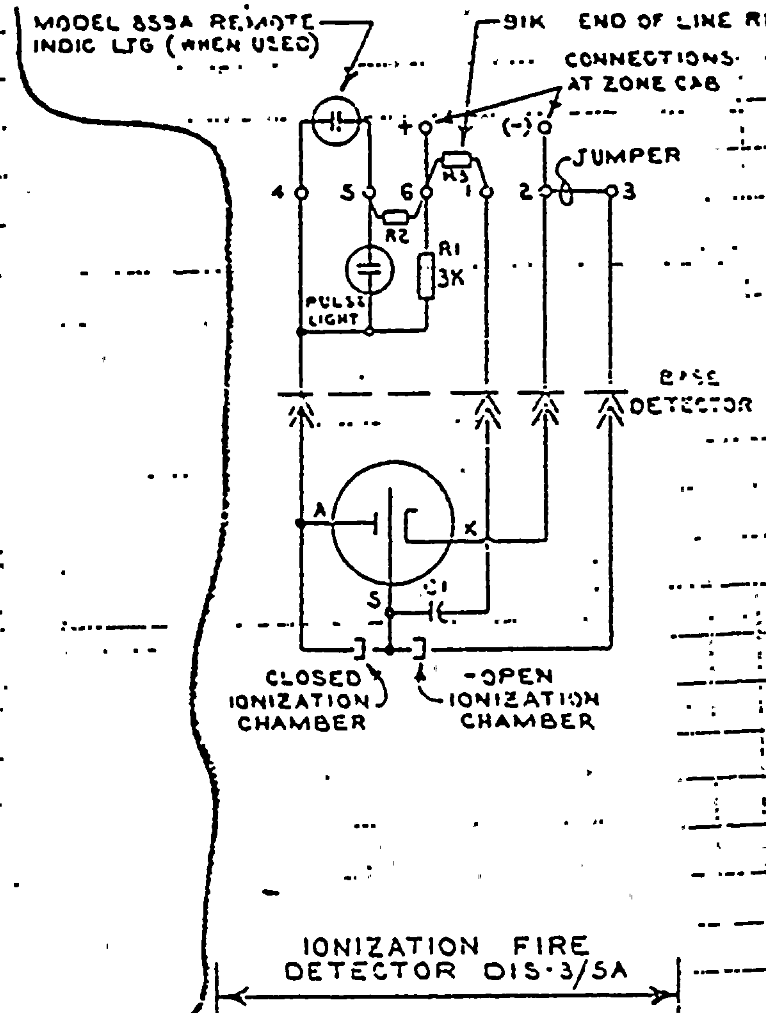
There are no differences between Unit 1 and Unit 2 fire detection systems.

FIGURE 16C1



Y1 120VAC SUPPLY
Y3 120 V. AC SUPPLY
1K
2K
3K
4K
5K
6K
ZR-1
ZR-2
ZR-3
ZR-4
RESISTOR
TRIP FIRE RELAY
CHASSIS GROUND
POWER INDIC
250 V D C
SEE FIG. 16C2 FOR TYPICAL CIRCUIT IN ZONE 1
REACTOR CABLE TUNNEL QUAD #1
REACTOR CABLE TUNNEL QUAD #2
REACTOR CABLE TUNNEL QUAD #3
REACTOR CABLE TUNNEL QUAD #4
ZONE 1
ZONE 2
ZONE 3
ZONE 4
120V AC DISTR CAB
CIRC 1
CIRC 3
20A
AT PAN. "EF" ON-OFF
F1 5a
F2 5A
F3 1a
R1 47K 1W
R10 470K 1/2W
R3 22K 2W
NOTE CIRCUITS SHOWN IN SUPERVISORY CONDITION RELAYS 1K, 2K, 3K & 5K SHOWN NOT ENERGIZED & 4K & 6K SHOWN ENERGIZED
ZONE INDIC. CAB. 22C-1
Z1
120V AC SUPPLY

FIGURE 76C2



DETAIL "A" - TYPICAL CONNECTION

SUBJECT: ELECTRICAL Single Line Diagram MAIN & ALTERNATE Source of AC Power

FIGURE 16C.

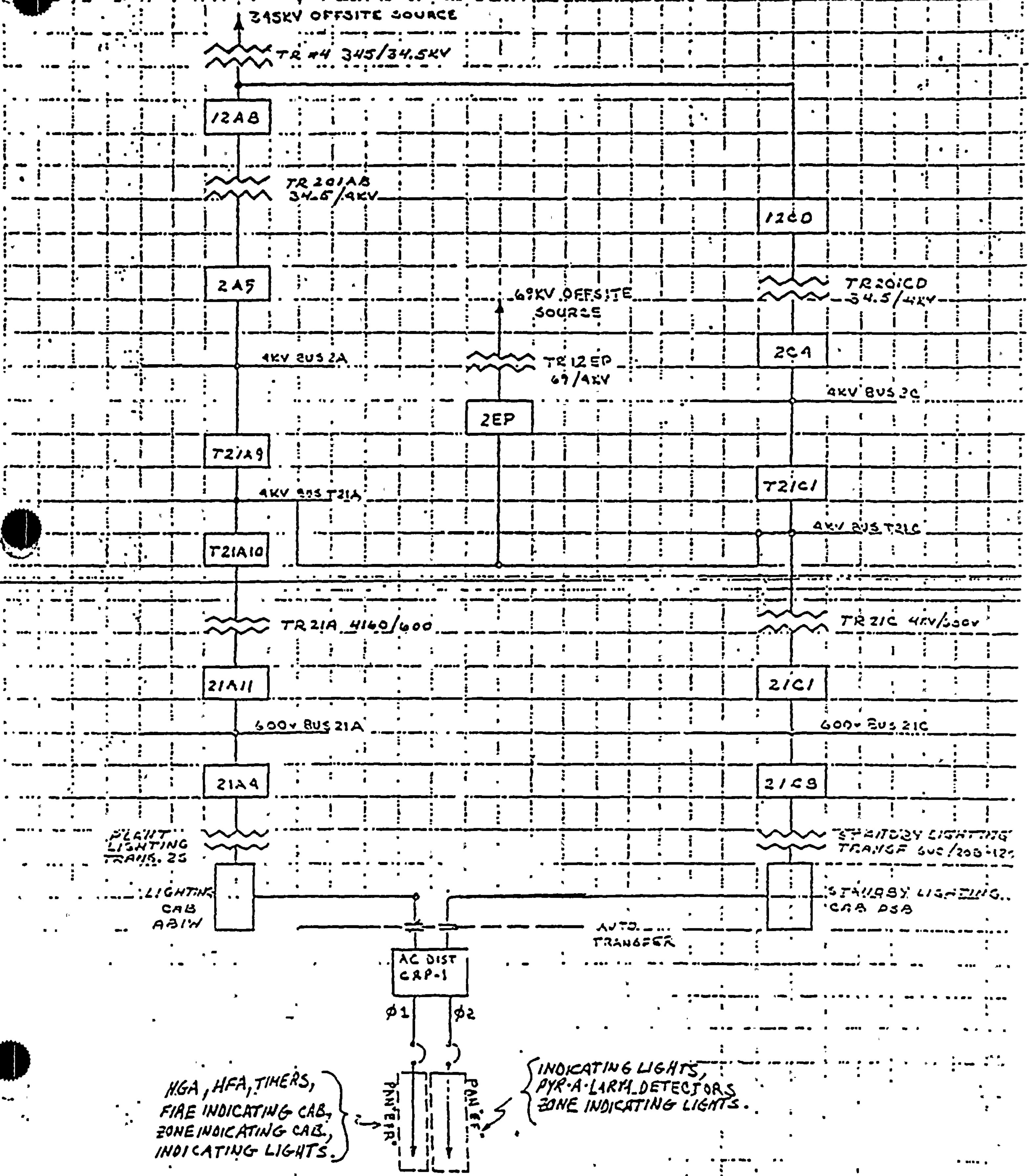
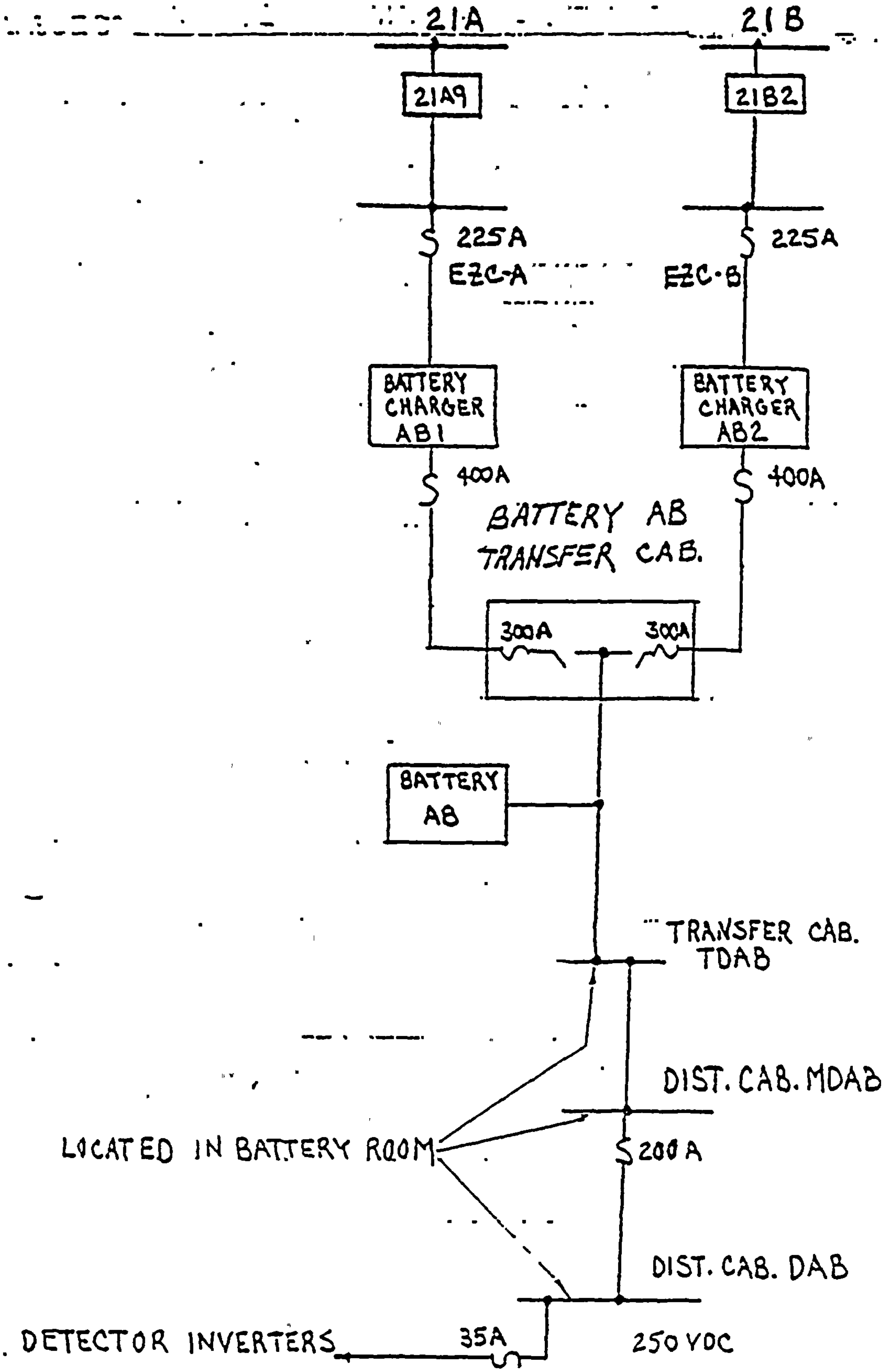


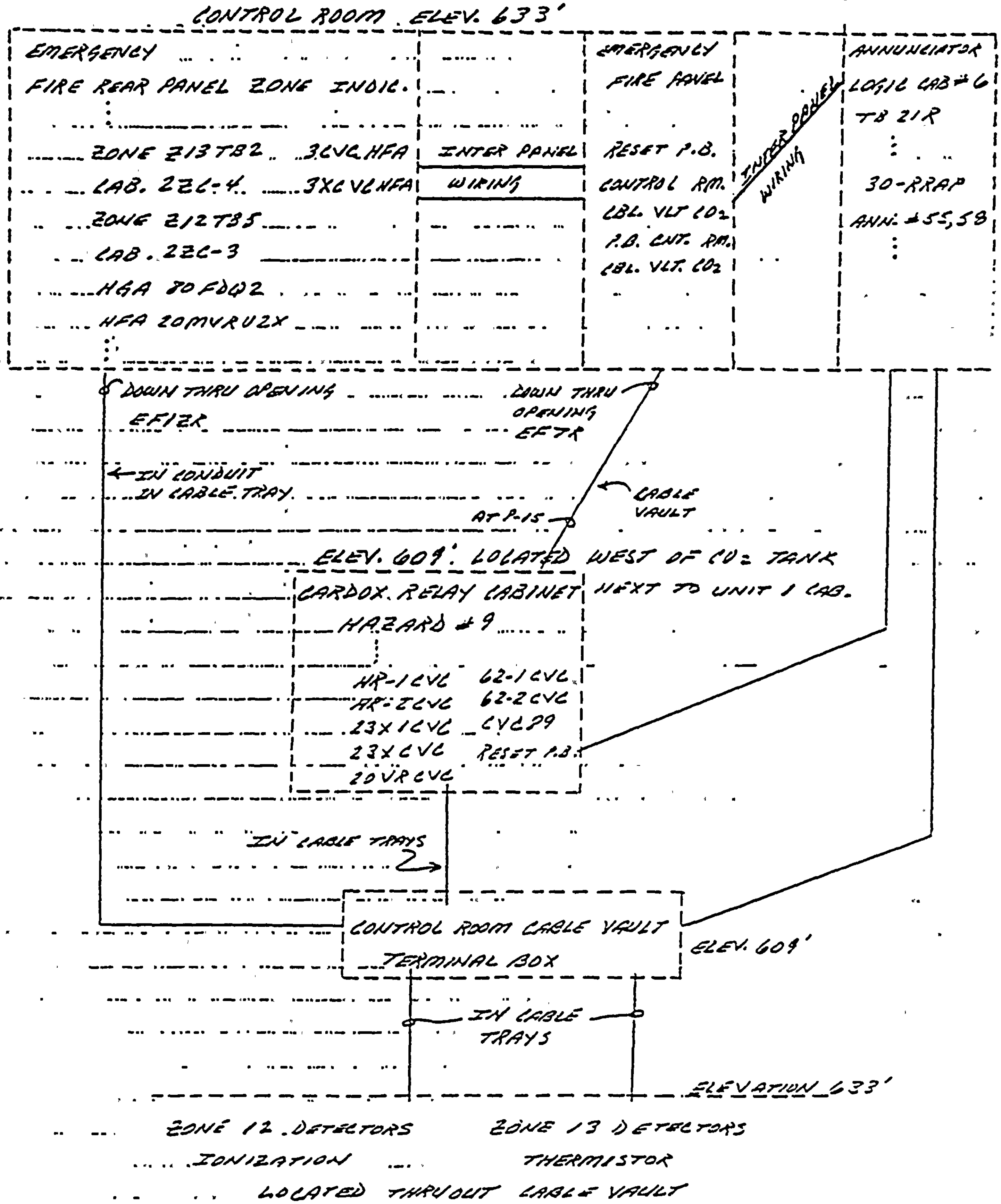
FIGURE 10.7

SUBJECT ELECTRICAL SINGLE LINE DIAGRAM

11/12



SUBJECT CABLE ROUTING DIAGRAM. FIGURE 16C5



NFPA 72D CIRCUIT SUPERVISION REQUIREMENTS

Question 48:

For the main control room(s) fire annunciator panel address or provide responses to the following items:

a. Provide a description of these panels and their associated electrical circuitry and devices. Supplement this description with electrical schematics which show the source of power for these panels and associated devices. (Also, include a wiring diagram which shows a typical circuit for this panel and includes the detector element(s) and associated circuitry as well as the final indicating light and/or alarm.) This description should also include a discussion of any form of supervisory circuity which is provided for this panel or its associated devices.

b. Identify any differences in the associated electrical design for the fire system panel of Unit 1 and that of Unit 2.

Response to Question 48a:

The "FIRE ANNUNCIATOR PANEL" consists of the annunciator logic cabinet and display panel. The logic cabinet and display panel are connected by prefabricated cables.

The logic cabinet contains the power supply unit, printed circuit cards and field connections. The power supply unit is fed from the 250V dc system. Each power supply consists of two inverter-rectifiers wired in series on the 250V dc side with the output connected in parallel. The output voltages are -12V dc, +12V dc and -28V dc which are used internally by the solid state logic cards and 125V dc which is used for field contacts. No metallic connection exists between batteries and annunciator voltages and therefore a ground on the annunciator would not result in the station battery ground. Ground detectors are provided for 125V dc output voltage which operate the annunciator in the event of an annunciator power supply ground. The output voltage of the power supply is monitored at window #60 of the display panel.

The internal circuitry of the annunciator panel is all solid state. Two annunciator points are arranged on each circuit card. The output of the solid state circuitry for each point is connected to its lamp on the front panel display unit. The lamp is lit for abnormal condition. Each annunciator can be either non seal-in (auto reset on return to normal) or seal-in (alarm retained on return to normal).

The display panel has 100 windows. Each window has its own push button on it to acknowledge the alarm. Window #50 is for test purposes. When the test button is pressed and held all the windows light and the audible alarm sounds. On releasing the button, all non seal-in windows which did not have any actuation signal will go off and the ones which have abnormal conditions would stay lit. All the seal-in windows would start flashing. On pressing the reset button, the seal-in windows which did not have an alarm condition before the test would go off, the other windows with alarm conditions

would continue flashing. On acknowledging these windows individually they would stop flashing and stay lit.

Window #70 is for resetting the seal-in alarms. All other windows when lit indicate an abnormal condition.

The display panel has a red lamp on top of it. This lamp lights whenever any alarm appears on the panel. On acknowledging the alarm, this lamp goes off.

Non Seal-In Alarm Sequence

In the event of an "ABNORMAL" condition, the actuating contact in the annunciator circuit would close. The particular window would start flashing and the audible alarm would sound. If the condition clears before the operator acknowledges it, the alarm and window would go off. If the operator acknowledges it, the audible alarm would go off and the window would stop flashing and stay lit. When the condition clears, this window would resume flashing and the audible alarm would sound. The operator would acknowledge it and the window and alrm would go off.

Seal-In Alarm Sequence

In the event of an "ABNORMAL" condition, the actuating contact in the annunciator circuit would close. The particular window would start flashing and the audible alarm would sound. The operator would have to acknowledge it. It would not go off even if the condition clears before the operator acknowledges it. When the operator acknowledges it, the alarm would go off, the window would stop flashing and stay lit. On pressing the reset button, if the condition has cleared, the window would resume flashing and the audible alarm would sound. On acknowledging it, the window and audible alarm would go off. If the condition has not cleared yet, the window would not resume flashing but would stay lit.

Figure 48A1 provides the electrical schematic which shows the power feed for the annunciator panel.

Figure 48A2 shows the front view of the "Fire Annunciator Display Panel." A list of annunciators is provided below.

Electrical Dwg. #2-98611 shows the "annunciator internal diagrams" and also applies to the "fire annunciator panel."

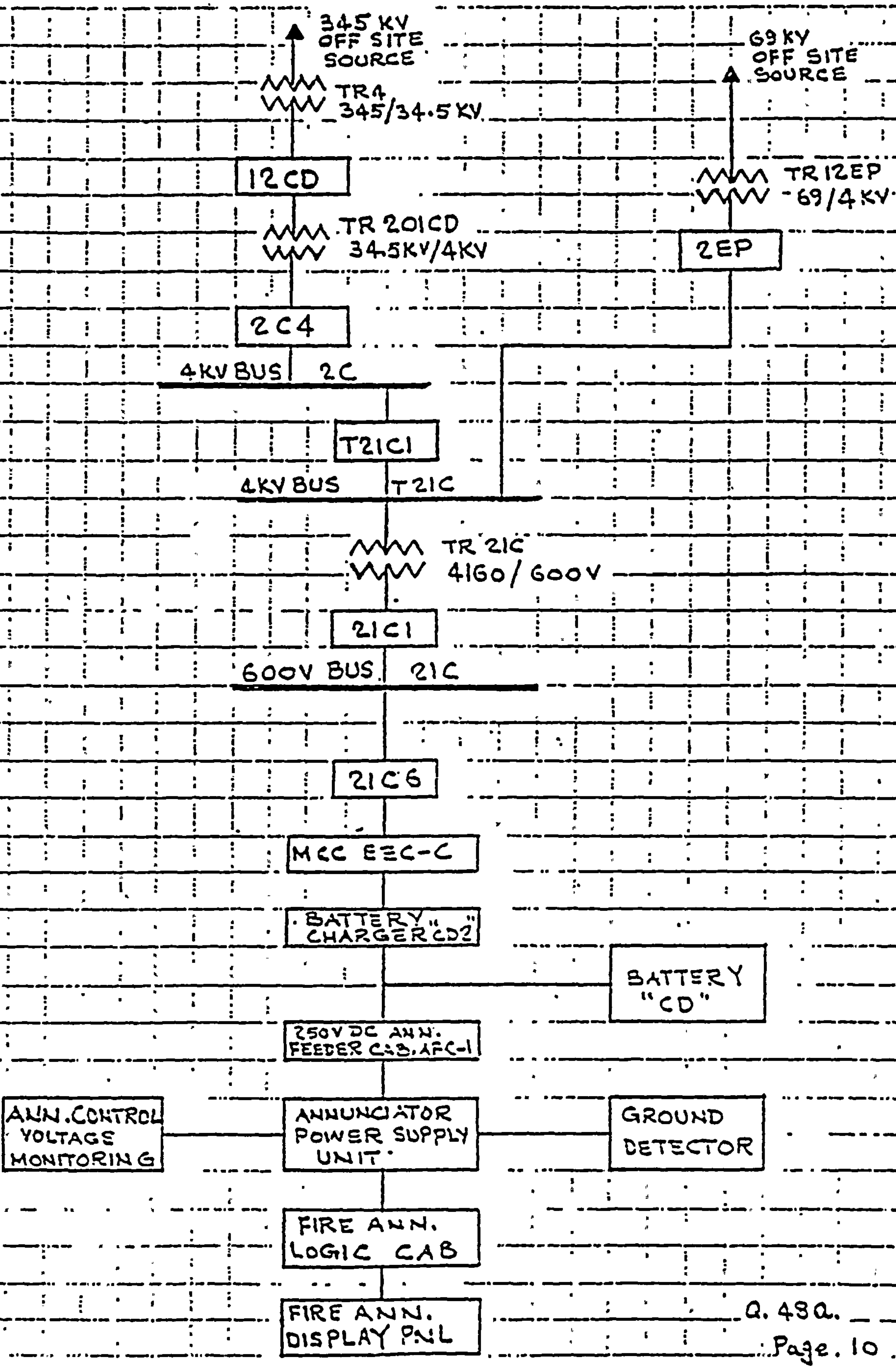
Elementary Dwg. 2-98612 is specifically for the fire annunciator panel. This drawing shows the actuating contacts for each annunciator.

Response to Question 48b:

There is no difference in the associated electrical design for the fire system panel of Unit 1 and that of Unit 2.

FIGURE 48A1

SUBJECT ELECTRICAL SCHEMATIC SHOWING POWER FEED FOR ANNUNCIATOR PANEL



PLANT FIRE SYSTEM ANNUNCIATOR
(30R-RAP)

FIGURE 18A2

ON PAN "EF" (LEFT SIDE) 2-S2003
EL EM. DIAG. 98612

(R) BULLS EYE

ITEM # 2335
B/M # 17B8W

1 MAIN TRANSF FIRE	11	21	31 FIRE HDR PRESSURE LOW	41 FIRE	51 [illegible]	61 LUBE OIL ROOM CO2 SYS OPERATING	71 EL PEN AREA Q#1 CO2 SYS OPERATING	81 AUX CTR RM & UNDRFL CO2 SYSTEM OPERATING	91 [illegible]
2 MAIN TRANSF #1 DELUGE OPERATING	12 [illegible]	22 [illegible]	32 [illegible]	42	52 DIESEL GEN RM "CD" CO2 SYS OPERATING	62 LUBE OIL ROOM CO2 SYS ABNORMAL	72 EL PEN AREA Q#2 CO2 SYS OPERATING	82 AUX CTR RM & UNDRFL. CO2 SYS. ABNORMAL	92 [illegible]
3 MAIN TRANSF #2 DELUGE OPER[illegible]	13 [illegible]	23 [illegible]	33 [illegible]	43 HI DEMAND ELEC PUMP STR DIFF PRESS HI	53 DIESEL GEN RM "AB" CO2 SYS OPERATING	63 TURB OIL TANK RM CO2 SYS OPERATING	73 EL PEN AREA Q#1,2 CO2 SYS ABNORMAL	83 [illegible]	93 [illegible]
4 [illegible]	14 [illegible]	24 [illegible]	34 [illegible]	44	54 DIESEL FP & GEN RMS CO2 SYS ABNORMAL	64 TURB OIL TANK RM CO2 SYS ABNORMAL	74 EL PEN AREA Q#3N CO2 SYS OPERATING	84 [illegible]	94
5 [illegible] DELUGE OPERATING	15	25 [illegible] FIRE	35 [illegible]	45 [illegible]	55 CTRL RM CBLE VAULT CO2 SYS OPER[illegible]	65 4KV SWGR ROOMS CO2 SYS OPERATING	75 EL PEN AREA Q#3M CO2 SYS OPERATING	85 [illegible]	95 [illegible]
6 [illegible] DELUGE OPERATING	16	26 FIRE [illegible] SYS [illegible]	36 [illegible]	46 HI DEMAND ELEC PUMP AUTO START	56 SWGR RM CBLE VAULT CO2 SYS OPERATING	66 [illegible] RM CO2 SYS OPERATING	76 EL PEN AREA Q#3S CO2 SYS OPERATING	86	96 [illegible]
7 [illegible]	17 [illegible]	27 [illegible]	37 [illegible]	47 [illegible]	57 [illegible] CO2 SYS. OPERATING	67 CRD EQUIP BATT & TR RM CO2 SYS OPERATING	77 EL PEN AREA Q#4 CO2 SYS OPERATING	87 [illegible]	97 [illegible]
8 [illegible]	18 AUX FEED PUMP SPRINKLER ABNORMAL	28	38	48 DIESEL ENG FIRE FP STR. DIFF PRESS HI	58 CABLE VAULTS CO2 SYS ABNORMAL	68 SWGR AREA CO2 SYS ABNORMAL	78 EL PEN Q'S 3N,3M,3S,4 CO2 SYS ABNORMAL	88	98 [illegible]
9	19 [illegible]	29 [illegible]	39 UNIT #2 EMERG FIRE SYS LOGIC VOLT FAIL	49 UNIT #2 FIRE FIGHT EQUIP VOLT FAILURE	59 [illegible]	69 [illegible]	79 [illegible]	89 [illegible]	99 [illegible]
10 [illegible]	20 [illegible]	30 [illegible]	40 [illegible]	50 TEST	60 ANNUN CONTROL	70 RESET	80 [illegible]	90 [illegible]	100

Point #	Description
1.	Main Transformer Fire
2.	Main Transformer ϕ1 Deluge Operating
3.	Main Transformer ϕ2 Deluge Operating
4.	Main Transformer ϕ3 Deluge Operating
5.	Auziliary Transformer 2AB Deluge Operating
6.	Auxiliary Transformer 2CD Deluge Operating
7.	Start Up Transformers 201AB, 201CD Deluge Operating
8.	Transformer Deluge Abnormal
9.	Spare
10.	Lube & Turbine Oil Room CO_2 Voltage Failure
11.	Spare
12.	Mezzanine Turbine End Cable & Oil Piping Sprinkler Operating
13.	Basement Turbine End Cable & Oil Piping Sprinkler Operating
14.	Turbine End Cable Tray & Oil Piping Sprinkler Abnormal
15.	Spare
16.	Spare
17.	Aux. Feed Pump Sprinkler Operating
18.	Aux. Feed Pump Sprinkler Abnormal
19.	Aux. Bldg. Fire Header Pressurized
20.	Hose Reel CO_2 System Voltage Failure
21.	Spare
22.	Mezzanine Generator End Cable & Oil Piping Sprinkler Operating
23.	Basement Generator End Cable & Oil Piping Sprinkler Operating
24.	Generator End Cable Tray & Oil Piping Sprinkler Abnormal

Point #	Description
25.	Turbine Fire
26.	Turbine Fire Water Spray Operating
27.	Turbine Water Spray/Detector Abnormal
28.	Spare
29.	Unit #2 Pyr-A-Larm System Trouble/Fire
30.	Fan Trip Bus "FEA" Voltage Failure
31.	Fire Header Pressure Low
32.	Mezzanine Turbine End Sprinkler Operating
33.	Basement Turbine End Sprinkler Operating
34.	Mezzanine/Basement Turbine End Sprinkler Abnormal
35.	Mezzanine Generator End Sprinkler Operating
36.	Basement Generator End Sprinkler Operating
37.	Mezzanine/Basement Generator End Sprinkler Abnormal
38.	Spare
39.	Unit #2 Emergency Fire System Logic Voltage Failure
40.	Fan Trip Bus "FEB" Voltage Failure
41.	Fire
42.	Spare
43.	High Demand Electric Pump Strainer Differential Pressure High
44.	Spare
45.	High Demand Electric Pump Motor Overload
46.	High Demand Electric Pump Auto Start
47.	Diesel Engine Fire Pump Trouble
48.	Diesel Engine Fire Pump Strainer Differential Pressure High

Point #	Description
49.	Unit #2 Fire Fighting Equipment Voltage Failure
50.	Test
51.	Diesel Oil Pump & Valve Station Room CO_2 System Operating
52.	Diesel Generator Room "2CD" CO_2 System Operating
53.	Diesel Generator Room "2AB" CO_2 System Operating
54.	Diesel Pump & Generator Rooms CO_2 System Abnormal
55.	Control Room Cable Vault CO_2 System Operating/Fire
56.	Switchgear Room Cable Vault CO_2 System Operating
57.	Cable Rack Enclosure CO_2 System Operating
58.	Cable Vaults CO_2 System Abnormal
59.	Control Room Cable Vault Doors Open
60.	Annunciator Control Voltage Failure
61.	Lube Oil Room CO_2 System Operating
62.	Lube Oil Room CO_2 System Abnormal
63.	Turbine Oil Tank Room CO_2 System operating
64.	Turbine Oil Tank Room CO_2 System Abnormal
65.	4KV Switchgear Room CO_2 System Operating
66.	Pressurized & Transformer Room CO_2 System Operating
67.	CRD Equipment Battery & Transformer Room CO_2 System Operating
68.	Switchgear Area CO_2 System Abnormal
69.	Switchgear Area CO_2 System Isolated
70.	Reset
71.	Electric Penetration Area Q#1 CO_2 System Operating
72.	Electric Penetration Area Q#2 CO_2 System Abnormal
73.	Electric Penetration Area Q#3 CO_2 System Operating

Point #	Description
74.	Electric Penetration Area Q#3N CO_2 System Operating
75.	Electric Penetration Area Q#3M CO_2 System Operating
76.	Electric Penetration Area Q#3S CO_2 System Operating
77.	Electric Penetration Area Q#4 CO_2 System Operating
78.	Electric Penetration Q's, 3N, 3M, 3S, 4 CO_2 System Abnormal
79.	Unit # 1 & 2 Oil Rooms CO_2 Header Pressurized
80.	Unit 1 & 2 CO_2 Tank Pressure High/Low
81.	Auxiliary Control Room & Under Floor CO_2 System Operating
82.	Auxiliary Control Room & Under Floor CO_2 System Abnormal
83.	Control Room Cable Vault Halon System Operating
84.	Control Room Cable Vault Halon System Abnormal
85.	Containment Instrument Room Purge Fan Charcoal Filter Trouble/Fire
86.	Spare
87.	Control Room Pressurized Charcoal Filter Trouble/Fire
88.	Spare
89.	Aux. Building CO_2 System Header Pressurized
90.	Hose Reel CO_2 System Header Pressurized
91.	Containment Area Fire
92.	Containment Area Fire System Abnormal
93.	Containment Area Alarm Acknowledged
94.	Spare
95.	Containment Aux. Charcoal Filter #1 Trouble/Fire
96.	Containment Aux. Charcoal Filter #2 Trouble/Fire
97.	ESS Equipment Area Fan Charcoal Filter #1 Trouble/Fi:
98.	ESS Equipment Area Fan Charcoal Filter #2 Trouble/Fi:

Point #	Description
99.	Containment Pressure Relief Fan charcoal Filter Trouble/Fire
100.	Spare

C. Fire Detection Systems

A fire detection system consists of the detectors, associated electrical circuitry, electrical power supplies, and the fire annuniciator panel. The three types of detectors used at the Cook Nuclear Plant are ionization (products of combustion), infrared (flame), and thermistor (heat) detectors. Certain fire detection circuits provide automatic initiation of fire protection systems. In addition, upon actuation of water flow devices associated with both the wet pipe and pre-action systems, alarms are provided on the Fire Annunciator Panel and throughout the plant.

All of the Fire detection systems, whether used for protection system automatic initiation or alarm only, provide an alarm on the fire annunciator panel in the control room of the affected unit. The fire annunciator display panels and the associated fire annunciator logic cabinet receive power from a 250 volt d-c annunciator feeder cabinet which is powered by a battery charger and battery. The battery charger's source of electrical power is the offsite electrical power system through step-down transformers, electrical circuit breakers, and a motor control center.

All fire detection and protection functions are displayed on the fire annunciator panel in the control room. An alarm system of motor operated horns is provided throughout the plant to alert personnel that a fire has occurred. The alarms are sounded automatically by actuation of any fixed fire protection system and the alarms can also be manually initiated from the control rooms.

Appendix A to Branch Technical Position 9.5-1 contains guidelines that detectors be provided in control room cabinets so that fires occurring in these cabinets may be detected rapidly. Almost all of the cabinets used in the control rooms at the Cook Nuclear Plant are open on top and at the back, thus permitting direct venting to existing ceiling detectors. We requested that detectors be placed in the remaining cabinets that are closed. The licensees have stated that if detectors are installed in these cabinets, or if the cabinets are modified, the cabinet seismic or Class 1E qualification may be affected.

The licensees will develop and conduct a test program to determine the response of the presently installed ceiling detectors to a fire, simulated by smoke generated, in a closed cabinet. Should additional detectors prove necessary, based on the results of this test, an engineered detector scheme will be provided and implemented by the completion of the first refueling outage of Unit 2. We find this approach to be acceptable.

We have reviewed the fire detection systems to ensure that fire detectors are located to provide detection and timely alarm of fires that could occur. We have also reviewed the fire detection system's design criteria and the basis to ensure that it conforms to the applicable sections of NFPA 72D, for Class B supervised circuits.

We have requested, and the licensees have agreed, to install additional detectors at various locations throughout the plant as identified in the installation schedule in the Conclusions Section of this report. We conclude that the design and installation of the fire detection system with the additional detectors to be installed meets the guidelines of the applicable portions of NFPA 72D, and Branch Technical Position APCSB 9.5-1 and is, therefore, acceptable.

ALTERNATE EMERGENCY SHUTDOWN METHOD

The licensee, in performing the Fire Hazards Analysis, recognized that a fire occurring in the cable vault of Unit 1 or Unit 2 could prevent the unit involved from being brought to a controlled safe shutdown condition. A system of local shutdown stations was installed and the procedures for operating them were developed to ensure that the units could always be brought to a controlled shutdown condition.

A separate control room cable vault is located beneath its respective control room and contains redundant divisions of safety related cable trays. The cable vault also contains a large amount of non-safety related cables which are resting on the floor.

The vault is a congested space with stacked cable trays making access difficult.

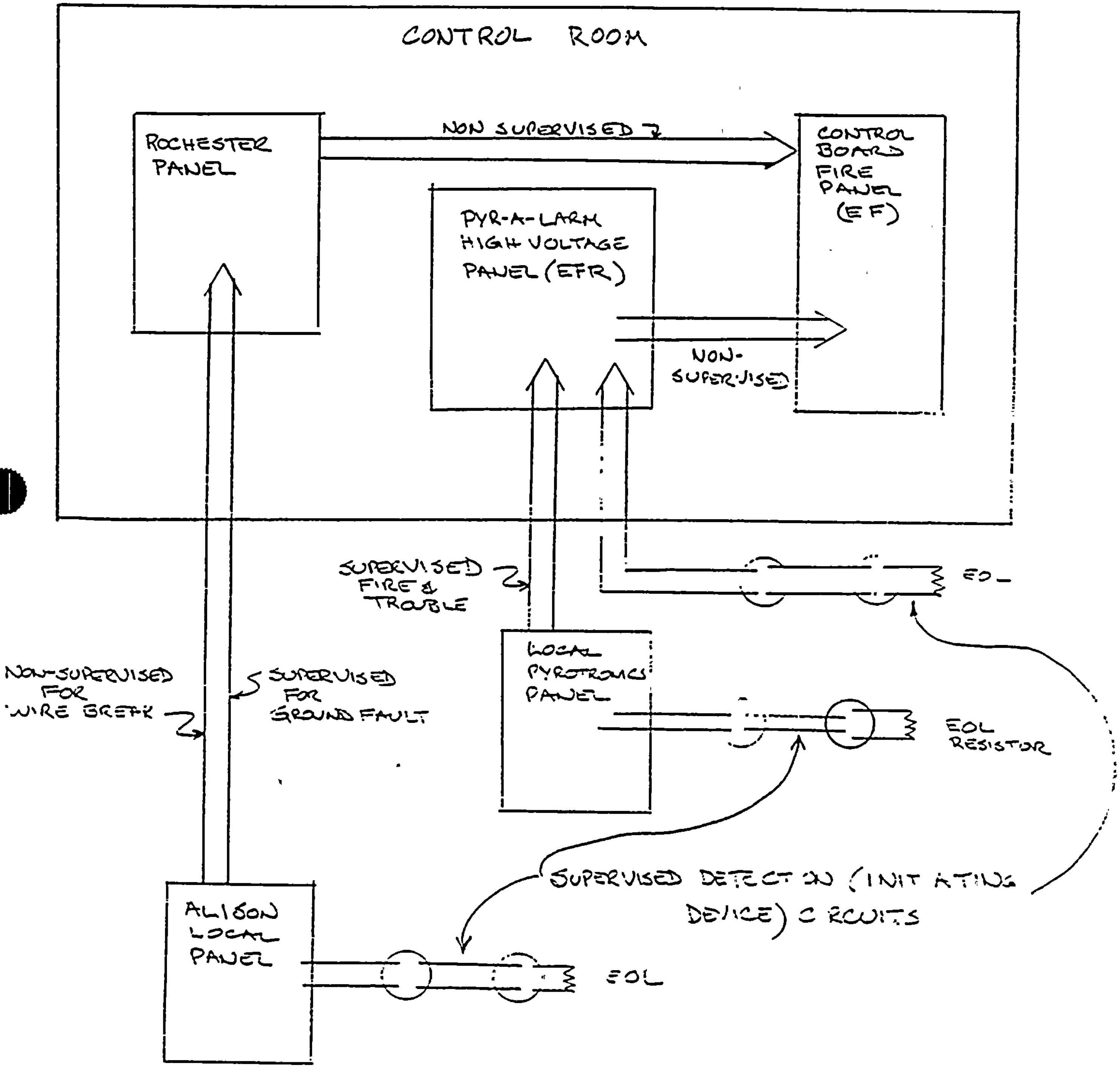
An automatically actuated Halon 1301 System and a manually operated carbon-dioxide extinguishing system are installed in the cable vault. Additionally there is an automatic activated sprinkler system in the Unit 2 cable vault. We have provided an evaluation of these systems in another section of this safety evaluation report.

223(9-83)
FORM GE-8 (C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET ______ OF ______
DATE ______ BY ______ CK. ______
COMPANY ______ G.O. ______
PLANT ______

SUBJECT ______



AMERICAN ELECTRIC POWER

Date September 20, 1988

Subject Cook Nuclear Plant
NFPA 14 Code Compliance
Justification for Reduced Hose Station Flow

From B.J. Gerwe BJG

To 1) J.A. ~~Kobyra~~ 9/21/88
2) A.B. Auvil

This memo identifies the status of Item 2 of my July 18, 1988 memo to you on two hydraulic calculations needed to support original NFPA 14 hose station designs. The initial calculations demonstrated a design inadequacy that required plant testing of the fire hose nozzle discharge patterns. The testing was necessary to make an evaluation that can help provide a basis for justification of our present design or if a modification to the low demand fire pump was required. It was determined that this testing, in conjunction with other support data, will provide the needed justification.

The plant has recently completed the necessary testing using the NFPA 14 code specified criteria of 100 gpm @ 65 psig inlet pressure through 100 feet of hose. In the Fire Protection Coordinator's opinion, the testing demonstrated an adequate nozzle discharge pattern for fire fighting purposes at pressures of 65 psig and higher.

The attached justification provides the basis for the calculation using a reduced, but safe, water flow requirement. The calculations are numbered DCC-FP-12-HS33-F and DCC-FP-12-HS34-F. Justifications are also provided for the remaining outstanding deviations to NFPA 14 noted by Impell.

BJG/gf

Attachment

cc: S.J. Brewer
W.G. Smith, Jr. - Bridgman (w/o attachment)
J.R. Sampson/P.H. Jacques - Bridgman
P.G. Schoepf (MED 88-20-8)
[redacted]
File: Appendix R Audit Preparation

JUSTIFICATION FOR NFPA 14

1971 CODE SECTIONS: 212, 212a, 217, 531, 541, 551, 671
1978 CODE SECTIONS: 1-11.3, 5-3.1, 5-3.2, 5-4.2, 5-5.2
1986 CODE SECTION: 2-1.3

Deviations

1. Documentation could not be found to verify that the Class III standpipes are sized to flow 500 gpm at a residual pressure of 65 psig from the topmost outlet of the most remote standpipe and 250 gpm per minute flowing from the topmost outlet of each additional standpipe to a maximum of 2,500 gpm for a minimum of 30 minutes.

2. Not all Class III standpipe risers are a minimum of 4 inches in diameter.

Hose Station No.	Elevation
62	609'
200, 201, 202, 204 & 205	596'
208	620'

3. Documentation could not be found to verify that Class II hose stations are sized for a minimum flow of 100 gpm.

4. As-built calculations were not available for the hose stations installed by Phoenix Contractors.

5. A 3 1/2 inch dial spring pressure gage is not located at the top of each standpipe.

Justifications

1. To satisfy the above code deviations 1 and 5, it was determined with Impell that two hydraulic calculations had to be performed. The hose stations were chosen as the worst case most remote situation that would satisfy any other standpipe configurations. The hose stations used were FHC Nos. 223, and 83 in conjunction with 84. The FHC 83 and 84 combination demonstrates flow from the topmost outlet of the most remote standpipes off Auxiliary Building distribution header at El. 650' plus flow from the topmost outlet of the other standpipe serving the same 650' elevation. FHC 223 demonstrates flow from the most remote hose station in the Auxiliary Building supplied from the Turbine Building distribution loop at El. 633'. This hose station calculation is intended to confirm the adequacy of the supply at the required flow and pressure.

The initial calculations were done in accordance with the criteria of NFPA 14. Hose station outlets can have one of three designs. Cook Nuclear Plant uses two of these designs, designated as Class II and Class III hose stations. A Class II hose station is intended for use by building occupants, while a Class III hose station is intended to be used by fire department personnel. Class II hose stations require a flow of 100 gpm @ 65 psig at the topmost outlet of each standpipe. Class III hose stations require a 500 gpm flow @ 65 psig at the topmost outlet of each standpipe. In addition, this flow and pressure is required at the most remote standpipe with 250 gpm @ 65 psig at the topmost outlet of each additional standpipe. The number of additional standpipes used was limited to only those which can also reach the same area being protected by the primary hose station. These initial calculations using the above NFPA 14 criteria failed to demonstrate that an adequate supply pressure was available to meet the demand.

In reviewing the calculations, it was obvious that our available supply could meet our demand by simply lowering the required flow from the first standpipe. Reduction in flow from 500 gpm to 350 gpm for all Class III standpipes can be justified as follows:

(a) Each Class III hose station has two outlets; one 1 1/2 inches and the other 2 1/2 inches. The 1 1/2 inch outlet is the same size that is required for a Class II hose station. As stated above, Class II hose stations are required to flow only 100 gpm. The needed flow for fire fighting purposes from a 2 1/2 inch outlet is normally projected to be between 250 gpm when used with the other 1 1/2 inch outlet and 350 gpm when used alone. The primary use for the 2 1/2 inch outlet at Cook Nuclear Plant is to supply long hose lengths with reduced pressure loss or in a catastrophic fire situation. Only a few of the hose stations will have permanently mounted 2 1/2 inch hose (RFC-12-2983) and only when long hose lengths are required to protect an area. Under a normal fire scenario, after the 2 1/2 inch supply hose has been laid, it will be further broken down into a 1 1/2 inch attack hose for use by the fire brigade. This hose would then supply water in excess of the normal 100 gpm requirement for 1 1/2 inch hose.

(b) The fire brigade is not currently trained to discharge water through a 2 1/2 inch nozzle inside the plant. As stated in NFPA 14, this size hose is intended for use by fire department personnel trained in the use of heavy hose streams. Additionally, no 2 1/2 inch nozzles are provided inside the plant at the hose stations.

(c) The NRC requirements given in BTP APCSB 9.5-1 only require hose stations to be equipped with 1 1/2 inch fire hoses or a Class II standpipe system. Our Class III hose stations exceed the NRC criteria. In addition, the size of the standpipe piping is required to be at least 4 inches in diameter for multiple hose connections and 2 1/2 inches for a single hose connection. Again, the piping for the Auxiliary Building standpipes generally exceed or meet this requirement. In those situations where the NRC criteria for pipe sizes are not met, hydraulic calculations have been performed to demonstrate their adequacy.

(d) A catastrophic fire situation is not anticipated at Cook Nuclear Plant because the combustible loadings are generally low and the high level of fire suppression and detection systems provided throughout the plant. Higher levels of combustibles are normally found only in areas containing oil hazards or heavy electrical cable installations. The oil hazards are located at the lower elevation and primarily in the Turbine Building. Likewise, the heavy electrical cable installations are found at the lower and intermediate elevations in the Auxiliary Building cable spreading areas. When ignited, the cable insulation propagates at a generally slow rate. The combustible loading values found in a generating facility are generally not representative of the types of combustibles and the higher combustible loading values upon which the NFPA 14 criteria for Class III hose station was originally based. The fire detection and suppression systems are provided throughout the plant wherever hazards warrant their protection, such as the oil hazard and heavy cable installation areas. Safe shutdown areas of the plant have also been evaluated for proper protection in accordance with our Appendix R analysis, SSCA. In most areas of the plant, the hose stations only serve as a backup means of manual suppression to the fixed fire suppression systems installed.

Based on the above discussion, the physical configuration of the fire hose stations and standpipes for fire fighting activities are considered acceptable.

<u>References</u>

- AEPSC Calculations:

  DCC-FP-12-HS33-F, Rev. 0, 9/15/88
  DCC-FP-12-HS34-F, Rev. 0, 9/15/88

2. Deviation 2 requires Class III standpipe risers to be a minimum of 4 inches in diameter. Hose Stations 62, 200, 201, 202, 204, 205 and 208 have been identified as not meeting this requirement. However, Hose Stations 200, 201, 202, 204, 205 and 208 are all Class II hose stations fed from a standpipe that also serves Class III hose stations. The Class III hose stations on these same standpipes are fed by piping at least 4 inches in size with the exception of Hose Station 62. Since the piping criteria for Class II hose stations is satisfied, the requirements of NFPA 14 have been met. Additionally, calculations have been performed for each of the above noted hose stations which demonstrates their ability to meet the criteria given in NFPA 14 for Class II hose stations.

   Based on the above discussion, the physical configuration of the fire hose stations and standpipes for fire fighting activities are considered acceptable.

   References

   - AEPSC Calculations:

     DCC-FP-02-H505-F, Rev. 0, 5/21/87
     DCC-FP-02-H506-F, Rev. 0, 5/22/87
     DCC-FP-01-HS15-F, Rev. 0, 6/4/87
     DCC-FP-01-HS18-F, Rev. 0, 6/30/87
     DCC-FP-01-HS21-F, Rev. 0, 6/3/87
     DCC-FP-02-HS26-F, Rev. 0, 7/9/87
     DCC-FP-01-HS27-F, Rev. 0, 7/9/87
     DCC-FP-01-HS29-F, Rev. 0, 12/31/86

   - RFC Packet No. 12-2983

3. Deviation 3 and 4 are satisfied through the review of existing hydraulic calculations. These calculations show that Class II hose stations are provided with adequate water flows and pressures to support fire fighting activities. The calculations were performed for only those hose stations and standpipes for which the piping arrangement differed from the NRC criteria given under Justification 1, Item (c). Since the NRC criteria of 4 inch piping for multiple hose connections and 2 1/2 inch piping for a single hose connection is in excess of the NFPA 14 criteria for Class II hose stations and standpipes, the NFPA 14 criteria is automatically satisfied.

   Based on the above discussion, the physical configuration of the fire hose stations and standpipes for fire fighting activities are considered acceptable.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-5.2	Dwellings and Residential Buildings Containing Not More Than Three Dwelling Units and Accompanying Attached and Detached Garages.	This chapter is not applicable to the Donald C. Cook Nuclear Plant.
4-5.3	Assembly Occupancies, Buildings Containing More Than Three Dwelling Units, and Hotels.	This chapter is not applicable to the Donald C. Cook Nuclear Plant.
4-5.4	Office, Educational, and Institutional Occupancies.	This chapter is not applicable to the Donald C. Cook Nuclear Plant.
4-5.5	Mercantile Occupancies, Retail Stores, and Other Related Areas Accessible to the Public.	This chapter is not applicable to the Donald C. Cook Nuclear Plant.
4-5.6	General Purpose Warehouses. (See 1-2, Definitions.)	This chapter is not applicable to the Donald C. Cook Nuclear Plant.
4-5.7	Liquid Warehouses. (See 1-2, Definitions.)	TITLE

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-5.7.1	Liquid warehouses shall be separate, detached buildings or shall be separated from other type occupancies by standard 4-hr fire walls, with communicating openings protected on each side of the wall with automatic-closing, listed 3-hr (A) fire doors. Fire doors shall be installed in accordance with NFPA 80, "Standard for Fire Doors and Windows."	OK, wall construction looks sound but author can't tell by field verification if they are rated. ✓ 3 hr. rated fire door - listed by U.L.
4-5.7.2	If the warehouse building is located more than 10 ft (3 m) but less than 50 ft (15 m) from an important building or line of adjoining property that can be built upon, the exposing wall shall have a fire-resistance rating of at least 2 hrs with each opening protected with a listed 1 1/2-hr (D) fire door.	N/A (see 4-5.7.1)
4-5.7.3	If the warehouse is located 10 ft (3 m) or less from an important building or line of adjoining property that can be built upon, the exposing wall shall have a fire-resistance rating of 4 hrs with each opening protected with a listed 3-hr (A) fire door.	N/A (see 4-5.7.1)

Code Section No.	Code Section	Walkdown Remarks
4-5.7.4	An attached warehouse, having communicating openings in the required 4-hr fire wall separation from the adjacent building area, shall have these openings protected by:	
	(a) Normally closed, listed 3-hr (A) fire doors on each side of the wall. These doors may be arranged to stay open during material handling operations, only if the doors are designed to close automatically in a fire emergency by provision of listed closure devices.	✓ 3-hr rated, UL listed fire doors
	(b) Noncombustible, liquidtight raised sills or ramps, at least 4 in. (10 cm) in height, or other design features to prevent flow of liquids to the adjoining area.	✓ 4" ramps
4-5.7.5	Fire doors shall be installed in accordance with NFPA 80, "Standard for Fire Doors and Windows."	[illegible], although installation looks to be correc
4-5.7.6	The total quantity of liquids within a liquid warehouse shall not be restricted. The maximum pile heights and maximum quantity per pile, arranged as palletized and/or solid pile storage, shall comply with Table 4-4.2.7, if	✓ no solid pile storage greater than 5 ft. in heigh at time of this inspection

Code Section No.	Code Section	Walkdown Remarks
4-5.7.6 Cont'd	unprotected, or Table 4-6.1(a) if protected, in accordance with Section 4-6. The storage heights of containers on protected racks shall comply with Table 4-6.1(b), as applicable.	
	Exception: An unprotected liquid warehouse located a minimum of 100 ft (30 m) from exposed buildings or adjoining property that can be built upon is not required to conform to Table 4-4.2.7, if there is protection for exposures. Where protection for exposures is not provided, a minimum 200 ft (61 m) distance is required.	N/A
4-5.7.7	Class I liquids shall not be permitted in the basement areas of liquid warehouses. Class II and Class IIIA liquids may be stored in basements provided that automatic sprinkler protection and other fire protection facilities are provided in accordance with Section 4-6.	N/A, ground floor storage area
4-5.7.8	Limited amounts of combustible commodities, as defined in the scope of NFPA 231, "Standard for General Storage," and NFPA 231C, "Standard for Rack Storage of Materials," may be stored in liquid warehouses if protection is provided	[illegible] combustible [illegible]

Code Section No.	Code Section	Walkdown Remarks
4-5.7.8 Cont'd	in accordance with Section 4-6, and the ordinary combustibles, other than those used for packaging the liquids, are separated a minimum of 8 ft (2.4 m) horizontally, by aisles or open racks, from the liquids in storage.	
4-5.7.9	Empty or idle combustible pallet storage shall be limited to a maximum pile size of 2500 sq ft (232 m^2) and to a maximum storage height of 6 ft (1.8 m). Idle pallet storage shall be separated from liquids by at least 8 ft (2.4 m) wide aisles. However, pallet storage in accordance with NFPA 231, "Standard for General Storage," shall be acceptable.	✓ no pallet storage was present at the time of this inspection
4-5.7.10	Containers in piles shall be separated by pallets or dunnage to provide stability and to prevent excessive stress on container walls. Portable tanks stored over one tier high shall be designed to nest securely, without dunnage. (See NFPA 386, "Standard for Portable Shipping Tanks for Flammable and Combustible Liquids," for information on portable tank design.) Materials handling equipment shall be suitable to handle containers and tanks safety at the upper tier level.	✓, all pile storage appears to be stable. No visual excessive stress was evident on container shells.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-5.7.11	No container or portable tank shall be stored closer than 36 in. (0.90 m) to the nearest beam, chord, girder, or other roof member in an unprotected warehouse.	N.A. - protected storage area.
4-5.7.12	Solid pile and palletized storage shall be arranged so that piles are separated from each other by at least 4 ft (1.2 m). Aisles shall be provided so that no container or tank is more than 12 ft (3.6 m) from an aisle. Where storage on racks exists as permitted in this Code, a minimum 4 ft (1.2 m) wide aisle shall be provided between adjacent rows of racks and any adjacent storage of liquids. Main aisles shall be a minimum of 8 ft (2.4 m) wide, and access shall be maintained to all doors required for egress.	✓
4-5.7.13	Mixed Storage. When two or more classes of liquids are stored in a single pile, the maximum quantity permitted in that pile shall be the smallest of the two or more separate maximum quantities and the heights of storage permitted in that pile shall be the least of the two or more separate heights as given in Tables 4-4.2.7 or 4-6.1(a), as applicable.	✓ all class III liquids.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-5.7.13 Cont'd	When two or more classes of liquids are stored in the same racks as permitted in this Code, the maximum height of storage permitted shall be the least of the two or more separate heights given in Table 4.6.1(b).	N/A, all class III
4-6	Protection Requirements for Protected Storage of Liquids	TITLE
4-6.1	Containers and portable tanks storing flammable and combustible liquids may be stored in the quantities and arrangements specified in Tables 4-6.1(a) and 4-6.1(b), provided the storage is protected in accordance with 4-6.2 and 4-6.5, as applicable.	✓, max. pile of containers was 4.5' high at time of this inspection. max. rack height was 10' at time of this inspection.
4-6.1.1	Other quantities and arrangements may be used where suitably protected and approved by the authority having jurisdiction.	I
4-6.2	Where automatic sprinklers are used, they shall be installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems," and approved by the authority having jurisdiction. (For additional information, see Appendix D.)	✓

Code Section No.	Code Section	Walkdown Remarks
4-6.2.1	Other systems such as automatic foam-water systems, automatic water-spray systems, or other combinations of systems may be considered acceptable if approved by the authority having jurisdiction. (For additional information, see Appendix D.)	N/A
4-6.3	Racks storing Class I or Class II liquids shall be either single-row or double-row as described in NFPA 231C, "Standard for Rack Storage of Materials."	only class III liquids are stored in this room.
4-6.4	Ordinary combustibles other than those used for packaging the liquids shall not be stored in the same rack section as liquids, and shall be separated a minimum of 8 ft (2.4 m) horizontally, by aisles or open racks, from liquids stored in racks.	No ordinary combustible storage was observed at the time of inspection.
4-6.5	In-rack sprinklers shall be installed in accordance with the provisions of NFPA 231C, "Standard for Rack Storage of Materials," except as modified by 4-6.2. Alternate lines of in-rack sprinklers shall be staggered. Multiple levels of in-rack sprinkler heads shall be provided with water shields unless otherwise separated by horizontal barriers, or unless the sprinkler heads are listed for such installations.	No racks for [illegible] [illegible]

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-7	Fire Control	
4-7.1	Suitable fire extinguishers or preconnected hose lines, either 1 1/2 in. (3.8 cm) lined or 1 in. (2.5 cm) hard rubber, shall be provided where liquids are stored. Where 1 1/2 in. (3.8 cm) fire hose is used, it shall be installed in accordance with NFPA 14, "Standard for the Installation of Standpipe and Hose Systems."	√, fire extinguishers & fire hose lines are available for this area.
4-7.1.1	At least one portable fire extinguisher having a rating of not less than 20-B shall be located outside of, but not more than 10 ft (3 m) from, the door opening into any separate inside storage area.	X, ≈ 25' away
4-7.1.2	At least one portable fire extinguisher having a rating of not less than 20-B shall be located not less than 10 ft (3 m), nor more than 50 ft (15 m), from any Class I or Class II liquid storage area located outside of a separate inside storage area.	N/A
4-7.1.3	In protected general purpose and liquid warehouses, hand hose lines shall be provided in sufficient number to reach all liquid storage areas.	[illegible]

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-7.1.4	The water supply shall be sufficient to meet the fixed fire protection demand, plus a total of at least 500 gal (1892 L) per minute for inside and outside hose lines. (See C-4-6.2.)	✓ 4 - 2000 gpm @ 150 psi pumps can supply ample water.
4-7.2	Control of Ignition Sources. Precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include but are not limited to: open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition, including heat-producing chemical reactions; and radiant heat.	✓ No sign of any of these activities at the time of the inspection.
4-7.3	Dispensing of Class I and Class II liquids in general-purpose or liquid warehouses shall not be permitted unless the dispensing area is suitably cut off from other ordinary combustible or liquid storage areas, as specified in Section 4-4, and otherwise conforms with the applicable provisions of Section 4-4.	N/A no dispensing of Class I and II liquids performed in [illegible] area
4-7.4	Materials with a water reacticity degree of 2 or higher, as outlined in NFPA 704, shall not be stored in the same area with other liquids.	[illegible] Verified [illegible] TMR
4-8	Outdoor Storage	

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-8.1	Outdoor storage of liquids in containers and portable tanks shall be in accordance with Table 4-8, as qualified by 4-8.1.1 through 4-8.1.4 and 4-8.2, 4-8.3, and 4-8.4.	N/A
4-8.1.1	When two or more classes of materials are stored in a single pile, the maximum gallonage in that pile shall be the smallest of the two or more separate gallonages.	N/A
4-8.1.2	No container or portable tank in a pile shall be more than 200 ft (60 m) from a 12 ft (3.6 m) wide access way to permit approach of fire control apparatus under all weather conditions.	N/A
4-8.1.3	The distances listed in Table 4-8 apply to properties that have protection for exposures as defined. If there are exposures, and such protection for exposures does not exist, the distances in column 4 shall be doubled.	N/A
4-8.1.4	When total quantity stored does not exceed 50 percent of maximum per pile, the distances in columns 4 and 5 may be reduced 50 percent, but to not less than 3 ft (0.90 m).	N/A

Code Section No.	Code Section	Walkdown Remarks
4-8.2	A maximum of 1,100 gal (4163 L) of liquids in closed containers and portable tanks may be stored adjacent to a building located on the same premises and under the same management provided that:	N/A
	(a) The building is limited to a one-story building of fire-resistive or noncombustible construction and is devoted principally to the storage and handling of liquids, or	N/A
	(b) The building has an exterior wall with a fire-resistance rating of not less than 2 hr and having no opening to above grade areas within 10 ft (3 m) horizontally of such storage and no openings to below grade areas within 50 ft (15 m) horizontally of such storage.	N/A
4-8.2.1	The quantity of liquids stored adjacent to a building protected in accordance with 4-8.2(b) may exceed that permitted in 4-8.2, provided the maximum quantity per pile does not exceed 1,100 gal (4163 L) and each pile is separated by a 10 ft (3 m) minimum clear space along the common wall.	N/A

Code Section No.	Code Section	Walkdown Remarks
4-8.2.2	Where the quantity stored exceeds the 1,100 gal (4163 L) permitted adjacent to the building given in 4-8.2(a), or the provisions of 4-8.2(b) cannot be met, a minimum distance in accordance with column 4 of Table 4-8 shall be maintained between buildings and the nearest container or portable tank.	N/A
4-8.3	The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures or shall be surrounded by a curb at least 6 in. (15 cm) high. When curbs are used, provisions shall be made for draining of accumulations of ground or rain water or spills of liquids. Drains shall terminate at a safe location and shall be accessible to operation under fire conditions.	N/A
4-8.4	The storage area shall be protected against tampering or trespassers where necessary and shall be kept free of weeds, debris, and other combustible materials not necessary to the storage.	N/A
CHAPTER 5	OPERATIONS (See Appendix F for Cross-Reference Tables)	TITLE
5-1	Scope	TITLE

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-1.1	This chapter applies to operations involving the use or handling of liquids either as a principal or incidental activity, except as covered elsewhere in this Code or in other NFPA Standards.	I
5-1.2	The provisions of this chapter relate to the control of hazards of fire involving liquids. These provisions may not provide adequate protection for operations involving hazardous materials or chemical reactions nor do they consider health hazards resulting from exposure to such materials.	I
5-2	General Liquid processing operations shall be located and operated so that they do not constitute a significant fire or explosion hazard to life, to property of others, or to important buildings or facilities within the same plant. Specific requirements are dependent on the inherent risk in the operations themselves, including the liquids being processed, operating temperatures and pressures, and the capability to control any liquid or vapor releases or fire incidents that might occur. The interrelationship of the many factors involved must be based on good engineering and management practices to establish suitable physical and operating requirements. (See 5-5.1.3.)	NA, no liquid processing occurs on [illegible]*

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5.3	Facility Design	TITLE
5-3.1	Location	TITLE
5-3.1.1	The minimum distance of a processing vessel to adjoining property or to the nearest important building on the same property shall be based on the stability of the liquid and vessel capacity and shall be in accordance with Table 5-3.1.1, except as modified in 5-3.1.2.	N/A, no processing activities
5-3.1.2	Where process vessels are located in a building and the exterior wall facing the exposure (line of adjoining property that can be built upon or nearest important building on the same property) is greater than 25 ft (7.6 m) from the exposure and is a blank wall having a fire-resistance rating of not less than 2 hrs, any greater distances required in Table 5-3.1.1 may be waived. Where a blank wall having a fire-resistance rating of not less than 4 hrs is provided, distance requirements may be waived. In addition, when Class IA or unstable liquids are handled, the wall shall have explosion resistance in accordance with good engineering practice. (See 5-3.2.7 relative to explosion relief of other walls of this building.)	N/A No processing activities

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-3.1.3	Other liquid processing equipment, such as pumps, heaters, filters, exchangers, etc., shall not be located closer than 25 ft (7.6 m) to property lines where the adjoining property is or can be built upon, or to the nearest important building on the same property that is not an integral part of the process. This spacing requirement may be waived where exposures are protected as outlined in 5-3.1.2. NOTE: Equipment operated at pressures over 1000 psig (7000 kPa) may require greater spacing.	n/a, no processing activities
5-3.1.4	Processing equipment in which unstable liquids are handled shall be separated from unrelated plant facilities that use or handle liquids by either 25 ft (7.6 m) clear spacing or a wall having a fire-resistance rating of not less than 2 hrs. The wall shall also have explosion resistance in accordance with good engineering practice.	n/a, no processing activities
5-3.1.5	Each process unit or building containing liquid-processing equipment shall be accessible from at least one side for fire fighting and fire control.	n/a, no processing activities

Code Section No.	Code Section	Walkdown Remarks
5-3.2	Construction	
5-3.2.1	Processing buildings or structures shall be of fire-resistive or noncombustible construction, except that combustible construction may be used when automatic sprinklers or equivalent protection is provided, subject to approval of the authority having jurisdiction. (See NFPA 220, "Standard on Types of Building Construction.")	N/A, no processing activities
5-3.2.2	Where walls are required for separation of processing operations from other occupancies or property lines, they shall have a fire-resistance rating of at least 2 hrs. In addition, when Class IA or unstable liquids are being stored or processed, the separating wall shall have explosion resistance in accordance with good engineering practice. (See 5-3.2.7 relative to explosion relief of other walls of this building or area.)	N/A, no processing activities
5-3.2.3	Class I liquids shall not be handled or used in basements. Where Class I liquids are handled or used above grade within buildings with basements or closed pits into which flammable vapors may travel, such below grade areas shall be provided with mechanical	N/A no Class I liquids [illegible] the area

Code Section No.	Code Section	Walkdown Remarks
5-3.2.3 Cont'd	ventilation designed to prevent the accumulation of flammable vapors. Means shall be provided to prevent liquid spills from running into basements.	
5-3.2.4	Provision for smoke and heat venting may be desirable to assist access for fire fighting. NFPA 204M, "Guide for Smoke and Heat Venting," provides information on this subject.	CN, although author reconizes This as a recommendation and Not mandatory
5-3.2.5	Areas shall have exit facilities arranged to prevent occupants from being trapped in the event of fire. NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures," provides information on the design of exit facilities. Exits shall not be exposed by the drainage facilities described in 5-3.4.	X
5-3.2.6	Adequate aisles shall be maintained for unobstructed movement of personnel and fire protection equipment.	
5-3.2.7	Areas where Class IA or unstable liquids are processed shall have explosion venting through one or more of the following methods: (a) open air construction; (b) lightweight	

Code Section No.	Code Section	Walkdown Remarks
4-5.7.11	No container or portable tank shall be stored closer than 36 in. (0.90 m) to the nearest beam, chord, girder, or other roof member in an unprotected warehouse.	N/A, - protected storage area.
4-5.7.12	Solid pile and palletized storage shall be arranged so that piles are separated from each other by at least 4 ft (1.2 m). Aisles shall be provided so that no container or tank is more than 12 ft (3.6 m) from an aisle. Where storage on racks exists as permitted in this Code, a minimum 4 ft (1.2 m) wide aisle shall be provided between adjacent rows of racks and any adjacent storage of liquids. Main aisles shall be a minimum of 8 ft (2.4 m) wide, and access shall be maintained to all doors required for egress.	✓
4-5.7.13	Mixed Storage. When two or more classes of liquids are stored in a single pile, the maximum quantity permitted in that pile shall be the smallest of the two or more separate maximum quantities and the heights of storage permitted in that pile shall be the least of the two or more separate heights as given in Tables 4-4.2.7 or 4-6.1(a), as applicable.	✓

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-5.7.13 Cont'd	When two or more classes of liquids are stored in the same racks as permitted in this Code, the maximum height of storage permitted shall be the least of the two or more separate heights given in Table 4.6.1(b).	✓
4-6	Protection Requirements for Protected Storage of Liquids	
4-6.1	Containers and portable tanks storing flammable and combustible liquids may be stored in the quantities and arrangements specified in Tables 4-6.1(a) and 4-6.1(b), provided the storage is protected in accordance with 4-6.2 and 4-6.5, as applicable.	✓, max. pile of containers was 5' high at the time of this inspection. max. rack height was 10' at the time of this inspection.
4-6.1.1	Other quantities and arrangements may be used where suitably protected and approved by the authority having jurisdiction.	I
4-6.2	Where automatic sprinklers are used, they shall be installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems," and approved by the authority having jurisdiction. (For additional information, see Appendix D.)	✓

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-6.2.1	Other systems such as automatic foam-water systems, automatic water-spray systems, or other combinations of systems may be considered acceptable if approved by the authority having jurisdiction. (For additional information, see Appendix D.)	N/A
4-6.3	Racks storing Class I or Class II liquids shall be either single-row or double-row as described in NFPA 231C, "Standard for Rack Storage of Materials."	✓
4-6.4	Ordinary combustibles other than those used for packaging the liquids shall not be stored in the same rack section as liquids, and shall be separated a minimum of 8 ft (2.4 m) horizontally, by aisles or open racks, from liquids stored in racks.	✓
4-6.5	In-rack sprinklers shall be installed in accordance with the provisions of NFPA 231C, "Standard for Rack Storage of Materials," except as modified by 4-6.2. Alternate lines of in-rack sprinklers shall be staggered. Multiple levels of in-rack sprinkler heads shall be provided with water shields unless otherwise separated by horizontal barriers, or unless the sprinkler heads are listed for such installations.	N/A No need for in-rack sprinklers.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-7	Fire Control	
4-7.1	Suitable fire extinguishers or preconnected hose lines, either 1 1/2 in. (3.8 cm) lined or 1 in. (2.5 cm) hard rubber, shall be provided where liquids are stored. Where 1 1/2 in. (3.8 cm) fire hose is used, it shall be installed in accordance with NFPA 14, "Standard for the Installation of Standpipe and Hose Systems."	√, fire extinguishers & fire hose lines are available for this area.
4-7.1.1	At least one portable fire extinguisher having a rating of not less than 20-B shall be located outside of, but not more than 10 ft (3 m) from, the door opening into any separate inside storage area.	√, 20 lb. ABC extinguisher located outside of entrance door.
4-7.1.2	At least one portable fire extinguisher having a rating of not less than 20-B shall be located not less than 10 ft (3 m), nor more than 50 ft (15 m), from any Class I or Class II liquid storage area located outside of a separate inside storage area.	N/A
4-7.1.3	In protected general purpose and liquid warehouses, hand hose lines shall be provided in sufficient number to reach all liquid storage areas.	√, hose line located outside of entrance door

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-7.1.4	The water supply shall be sufficient to meet the fixed fire protection demand, plus a total of at least 500 gal (1892 L) per minute for inside and outside hose lines. (See C-4-6.2.)	√, 4- 2000 gpm @ 152 psi pumps can supply ample water.
4-7.2	Control of Ignition Sources. Precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include but are not limited to: open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition, including heat-producing chemical reactions; and radiant heat.	√, No sign of any of these activities at the time of this inspection.
4-7.3	Dispensing of Class I and Class II liquids in general-purpose or liquid warehouses shall not be permitted unless the dispensing area is suitably cut off from other ordinary combustible or liquid storage areas, as specified in Section 4-4, and otherwise conforms with the applicable provisions of Section 4-4.	See Section 4-4 for specifics
4-7.4	Materials with a water reacticity degree of 2 or higher, as outlined in NFPA 704, shall not be stored in the same area with other liquids.	√, visually verified at the time of this inspection.
4-8	Outdoor Storage	

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-8.1	Outdoor storage of liquids in containers and portable tanks shall be in accordance with Table 4-8, as qualified by 4-8.1.1 through 4-8.1.4 and 4-8.2, 4-8.3, and 4-8.4.	N/A
4-8.1.1	When two or more classes of materials are stored in a single pile, the maximum gallonage in that pile shall be the smallest of the two or more separate gallonages.	N/A
4-8.1.2	No container or portable tank in a pile shall be more than 200 ft (60 m) from a 12 ft (3.6 m) wide access way to permit approach of fire control apparatus under all weather conditions.	N/A
4-8.1.3	The distances listed in Table 4-8 apply to properties that have protection for exposures as defined. If there are exposures, and such protection for exposures does not exist, the distances in column 4 shall be doubled.	N/A
4-8.1.4	When total quantity stored does not exceed 50 percent of maximum per pile, the distances in columns 4 and 5 may be reduced 50 percent, but to not less than 3 ft (0.90 m).	N/A

Code Section No.	Code Section	Walkdown Remarks
4-8.2	A maximum of 1,100 gal (4163 L) of liquids in closed containers and portable tanks may be stored adjacent to a building located on the same premises and under the same management provided that:	N/A
	(a) The building is limited to a one-story building of fire-resistive or noncombustible construction and is devoted principally to the storage and handling of liquids, or	N/A
	(b) The building has an exterior wall with a fire-resistance rating of not less than 2 hr and having no opening to above grade areas within 10 ft (3 m) horizontally of such storage and no openings to below grade areas within 50 ft (15 m) horizontally of such storage.	N/A
4-8.2.1	The quantity of liquids stored adjacent to a building protected in accordance with 4-8.2(b) may exceed that permitted in 4-8.2, provided the maximum quantity per pile does not exceed 1,100 gal (4163 L) and each pile is separated by a 10 ft (3 m) minimum clear space along the common wall.	N/A

Code Section No.	Code Section	Walkdown Remarks
4-8.2.2	Where the quantity stored exceeds the 1,100 gal (4163 L) permitted adjacent to the building given in 4-8.2(a), or the provisions of 4-8.2(b) cannot be met, a minimum distance in accordance with column 4 of Table 4-8 shall be maintained between buildings and the nearest container or portable tank.	N/A
4-8.3	The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures or shall be surrounded by a curb at least 6 in. (15 cm) high. When curbs are used, provisions shall be made for draining of accumulations of ground or rain water or spills of liquids. Drains shall terminate at a safe location and shall be accessible to operation under fire conditions.	N/A
4-8.4	The storage area shall be protected against tampering or trespassers where necessary and shall be kept free of weeds, debris, and other combustible materials not necessary to the storage.	N/A
CHAPTER 5	OPERATIONS (See Appendix F for Cross-Reference Tables)	
5-1	Scope	

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-1.1	This chapter applies to operations involving the use or handling of liquids either as a principal or incidental activity, except as covered elsewhere in this Code or in other NFPA Standards.	I
5-1.2	The provisions of this chapter relate to the control of hazards of fire involving liquids. These provisions may not provide adequate protection for operations involving hazardous materials or chemical reactions nor do they consider health hazards resulting from exposure to such materials.	I
5-2	General Liquid processing operations shall be located and operated so that they do not constitute a significant fire or explosion hazard to life, to property of others, or to important buildings or facilities within the same plant. Specific requirements are dependent on the inherent risk in the operations themselves, including the liquids being processed, operating temperatures and pressures, and the capability to control any liquid or vapor releases or fire incidents that might occur. The interrelationship of the many factors involved must be based on good engineering and management practices to establish suitable physical and operating requirements. (See 5-5.1.3.)	N/A, no liquid processing occurs at D.C. Cook.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5.3	Facility Design	
5-3.1	Location	
5-3.1.1	The minimum distance of a processing vessel to adjoining property or to the nearest important building on the same property shall be based on the stability of the liquid and vessel capacity and shall be in accordance with Table 5-3.1.1, except as modified in 5-3.1.2.	N/A, no processing activities
5-3.1.2	Where process vessels are located in a building and the exterior wall facing the exposure (line of adjoining property that can be built upon or nearest important building on the same property) is greater than 25 ft (7.6 m) from the exposure and is a blank wall having a fire-resistance rating of not less than 2 hrs, any greater distances required in Table 5-3.1.1 may be waived. Where a blank wall having a fire-resistance rating of not less than 4 hrs is provided, distance requirements may be waived. In addition, when Class IA or unstable liquids are handled, the wall shall have explosion resistance in accordance with good engineering practice. (See 5-3.2.7 relative to explosion relief of other walls of this building.)	N/A, no processing activities

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-3.1.3	Other liquid processing equipment, such as pumps, heaters, filters, exchangers, etc., shall not be located closer than 25 ft (7.6 m) to property lines where the adjoining property is or can be built upon, or to the nearest important building on the same property that is not an integral part of the process. This spacing requirement may be waived where exposures are protected as outlined in 5-3.1.2. NOTE: Equipment operated at pressures over 1000 psig (7000 kPa) may require greater spacing.	N/A, no processing equipment
5-3.1.4	Processing equipment in which unstable liquids are handled shall be separated from unrelated plant facilities that use or handle liquids by either 25 ft (7.6 m) clear spacing or a wall having a fire-resistance rating of not less than 2 hrs. The wall shall also have explosion resistance in accordance with good engineering practice.	N/A, no processing equipment
5-3.1.5	Each process unit or building containing liquid-processing equipment shall be accessible from at least one side for fire fighting and fire control.	N/A, no processing activities

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-3.2	Construction	
5-3.2.1	Processing buildings or structures shall be of fire-resistive or noncombustible construction, except that combustible construction may be used when automatic sprinklers or equivalent protection is provided, subject to approval of the authority having jurisdiction. (See NFPA 220, "Standard on Types of Building Construction.")	N/A, no processing activities
5-3.2.2	Where walls are required for separation of processing operations from other occupancies or property lines, they shall have a fire-resistance rating of at least 2 hrs. In addition, when Class IA or unstable liquids are being stored or processed, the separating wall shall have explosion resistance in accordance with good engineering practice. (See 5-3.2.7 relative to explosion relief of other walls of this building or area.)	N/A, no processing activities
5-3.2.3	Class I liquids shall not be handled or used in basements. Where Class I liquids are handled or used above grade within buildings with basements or closed pits into which flammable vapors may travel, such below grade areas shall be provided with mechanical	✓, ground floor storage area & no basement w/in building.

Code Section No.	Code Section	Walkdown Remarks
5-3.2.3 Cont'd	ventilation designed to prevent the accumulation of flammable vapors. Means shall be provided to prevent liquid spills from running into basements.	
5-3.2.4	Provision for smoke and heat venting may be desirable to assist access for fire fighting. NFPA 204M, "Guide for Smoke and Heat Venting," provides information on this subject.	✓
5-3.2.5	Areas shall have exit facilities arranged to prevent occupants from being trapped in the event of fire. NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures," provides information on the design of exit facilities. Exits shall not be exposed by the drainage facilities described in 5-3.4.	✓
5-3.2.6	Adequate aisles shall be maintained for unobstructed movement of personnel and fire protection equipment.	✓
5-3.2.7	Areas where Class IA or unstable liquids are processed shall have explosion venting through one or more of the following methods: (a) open air construction; (b) lightweight	N/A, no processing activities

Code Section No.	Code Section	Walkdown Remarks
5-3.2.7 Cont'd	walls and/or roof; (c) lightweight wall panels and roof hatches; (d) windows of explosion-venting type. NFPA 68, "Guide for Explosion Venting," provides information on this subject.	
5-3.3	Ventilation	
5-3.3.1	Enclosed processing areas holding or using Class I liquids, or Class II or Class III liquids above their flash points, shall be ventilated at a rate of not less than 1 cu ft per minute per sq ft (0.3 m^3) per min per m^2) of solid floor area. This shall be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside the building without recirculation.	N/A, no processing activities
	Exception: Recirculation is permitted where it is monitored continuously using a fail-safe system that is designed to automatically sound an alarm, stop recirculation, and provide full exhaust to the outside in the event that vapor-air mixtures in concentration over one-fourth of the lower flammable limit are detected.	N/A

Code Section No.	Code Section	Walkdown Remarks
5-3.3.1 Cont'd	Provision shall be made for introduction of make-up air in such a manner as to avoid short-circuiting the ventilation. Ventilation shall be arranged to include all floor areas or pits where flammable vapors may collect. Where natural ventilation is inadequate, mechanical ventilation shall be provided and shall be kept in operation while flammable liquids are being handled. Local or spot ventilation may be needed for the control of special fire or health hazards. Such ventilation, if provided, can be utilized for up to 75 percent of the required ventilation. NFPA 91, "Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying," and NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," provide information on this subject.	
5-3.3.2	Equipment used in a building and the ventilation of the building shall be designed to limit flammable vapor-air mixtures under normal operating conditions to the interior of equipment, and to not more than 5 ft (1.5 m) from equipment that exposes Class I liquids to the air. Examples of such equipment are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters, and surfaces of open equipment.	N/A, no processing equipment

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-3.4	Drainage	
5-3.4.1	Emergency drainage systems shall be provided to direct flammable or combustible liquid leakage and fire protection water to a safe location. This may require curbs, scuppers, or special drainage systems to control the spread of fire (see 2-2.3). Appendix A of NFPA 15, "Standard for Water Spray Fixed Systems for Fire Protection," provides information on this subject.	CN
5-3.4.2	Emergency drainage systems, if connected to public sewers or discharged into public waterways, shall be equipped with traps or separators.	CN
5-3.4.3	A facility shall be designed and operated to prevent the normal discharge of flammable or combustible liquids to public waterways, public sewers, or adjoining property.	CN
5-3.5	Electrical Equipment	
5-3.5.1	This section shall apply to areas where Class I liquids are stored or handled and to areas where Class II or Class III liquids are stored or handled at a temperature above their flash points (see 1-1.3).	I

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-3.5.2	All electrical equipment and wiring shall be of a type specified by, and installed in accordance with, NFPA 70, "National Electrical Code."	✓ (see Section 4-4.1.5)
5-3.5.3	So far as it applies, Table 5-3.5.3 shall be used to delineate and classify areas for the purpose of installation of electrical equipment under normal conditions. In the application of classified areas, a classified area shall not extend beyond an unpierced floor, wall, roof, or other solid partition. The designation of classes and divisions is defined in Chapter 5, Article 500, of NFPA 70, "National Electrical Code. (See NFPA 497A, "Recommended Practice for Classification of Class I Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas," and 497M, Manual for Classification of Gases, Vapors, and Dusts for Electrical Equipment in Hazardous (Classified) Locations," for guidance.)	✓
5-3.5.4	The area classifications listed in Table 5-3.5.3 are based on the premise that the installation meets the applicable requirements of this code in all respects. Should this not be the case, the authority having jurisdiction shall have the authority to classify the extent of the area.	I

Code Section No.	Code Section	Walkdown Remarks
5-3.5.5	Where the provisions of 5-3.5.1, 5-3.5.2, 5-3.5.3, and 5-3.5.4 require the installation of electrical equipment suitable for Class I, Division 1 or Division 2 locations, ordinary electrical equipment including switchgear may be used if installed in a room or enclosure that is maintained under positive pressure with respect to the classified area. Ventilation make-up air shall not be contaminated. NFPA 496, "Standard for Purged and Pressurized Enclosures for Electrical Equipment," provides details for these types of installations.	N/A
5-3.5.6	For marine terminals handling flammable liquids, Figure 5-3.5.6 shall be used as a minimum basis to delineate and classify areas for the purpose of installation of electrical equipment.	N/A
5.4	Liquid Handling, Transfer, and Use	
5.4.1	General	
5.4.1.1	Class I liquids shall be kept in closed tanks or containers when not actually in use. Class II and Class III liquids shall be kept in closed tanks or containers when ambient or process temperature is at or above their flash point.	✓

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-4.1.2	Where liquids are used or handled, provisions shall be made to promptly and safely dispose of leakage or spills.	✓ (good clenliness noted)
5-4.1.3	Class I liquids shall not be used outside closed systems where there are open flames or other ignition sources within the classified areas as set forth in Table 5-3.5.3.	✓
5-4.1.4	Transferring liquids by means of pressurizing the container with air is prohibited. Transferring liquids by pressure of inert gas is permitted only if controls, including pressure-relief devices, are provided to limit the pressure so it cannot exceed the design pressure of the vessel, tank, container, and piping system.	N/A
5-4.1.5	Positive displacement pumps shall be provided with pressure relief discharging back to the tank, pump suction, or other suitable location, or shall be provided with interlocks to prevent overpressure.	N/A
5-4.1.6	Piping, valves, and fittings shall be in accordance with Chapter 3, "Piping, Valves, and Fittings."	N/A

Code Section No.	Code Section	Walkdown Remarks
5-4.1.7	Listed flexible connectors may be used where vibration exists. Approved hose may be used at transfer stations.	N/A
5-4.2	Equipment. Equipment shall be designed and arranged to prevent the unintentional escape of liquids and vapors and to minimize the quantity escaping in the event of accidental release.	✓
5.4.3	Incidental Use of Liquids	
5.4.3.1	This section shall be applicable where the use and handling of liquids is only incidental to the principal business, such as automobile assembly, construction of electronic equipment, furniture manufacturing, or other similar activities.	I
5.4.3.2	Class I and Class II liquids shall be drawn from or transferred into ~~two~~ vessels, containers, or portable tanks in the following manner only:	
	(a) from original shipping containers with a capacity of 5 gal (19 L) or less,	✓

Code Section No.	Code Section	Walkdown Remarks
5-4.3.2 Cont'd	(b) from safety cans,	✓
	(c) through a closed piping system,	N/A
	(d) from portable tanks or containers by means of a device drawing through an opening in the top of the tank or container, or,	✓
	(e) by gravity through a listed self-closing valve or self-closing faucet, or	✓
	(f) if hose is used in the transfer operation, it shall be equipped with a self-closing valve without a hold-open latch in addition to the outlet valve. Only listed or approved hose shall be used.	N/A
5-4.3.3	Except as provided in 5-4.3.4 and 5-4.3.5, all storage shall comply with Chapter 4, "Container Storage."	See applicable sections
5-4.3.4	The quantity of liquid that may be located outside of storage cabinets, inside storage rooms, cut-off rooms and attached buildings, general purpose warehouses, liquid warehouses, or other specific processing areas that are	CN

Code Section No.	Code Section	Walkdown Remarks
5-4.3.4 Cont'd	cut off by at least a 2-hr fire-rated separation from the general plant area shall not exceed the greater of the quantity in either (a) or the sum of (b), (c), (d), and (e) below: (a) A supply for one day, or (b) 25 gal (95 L) of Class IA liquids in containers, (c) 120 gal (454 L) of Class IB, IC, II, or III, liquids in containers, (d) Two portable tanks each not exceeding 660 gal (2498 L) of Class IB, IC, Class II, or Class IIIA liquids, and (e) 20 portable tanks each not exceeding 660 gal (2498 L) of Class IIIB liquids.	
5-4.3.5	Where quantities or liquids in excess of the limits in 5-4.3.4 are necessary, storage shall be in tanks, which shall comply with the applicable requirements of Chapter 2, "Tank Storage," and Section 5.3, 5-4.1, and 5-4.2.	CN

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-4.3.6	Areas in which liquids are transferred from one tank or container to another container shall be separated from other operations that might represent an ignition source by distance or by fire-resistant construction. Drainage or other means shall be provided to control spills. Natural or mechanical ventilation shall be provided in accordance with 5-3.3, "Ventilation." NFPA 91, "Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying," provides information on the design and installation of mechanical ventilation.	✓ X ventilation
5-4.4	Loading and Unloading Operations. This chapter is not applicable to the Donald C. Cook Nuclear Plant.	N/A
5-4.4.2	Wharves. This chapter is not applicable to the Donald C. Cook Nuclear Plant.	N/A
5-5	Fire Prevention and Control	Title
5-5.1	General	Title

Code Section No.	Code Section	Walkdown Remarks
5-5.1.1	This section covers the commonly recognized management control systems and methods used to prevent or minimize the loss from fire or explosion in liquid processing facilities. NOTE: Other recognized factors of fire prevention and control, involving construction, location, separation, etc., are covered elsewhere in this chapter.	I NOTE: Since this storage area is not a liquid processing facility - this section does not apply.
5-5.1.2	The wide range in size, design, and location of liquid processing facilities precludes the inclusion of detailed fire prevention and control systems and methods applicable to all such facilities. The authority having jurisdiction may be consulted on specific cases, where applicable; otherwise, qualified engineering judgment shall be exercised per 5-5.1.3.	N/A
5-5.1.3	The extent of fire prevention and control provided for the liquid-processing facility shall be determined by an engineering evaluation of the operation, followed by the application of sound fire protection and process engineering principles. The evaluation shall include, but not be limited to:	N/A

Code Section No.	Code Section	Walkdown Remarks
5-5.1.3 Cont'd	(a) analysis of fire and explosion hazards of the liquid operations,	N/A
	(b) analysis of hazardous materials, hazardous chemicals, or hazardous reactions in the operations and the safeguards taken to control such materials, chemicals, or reactions,	N/A
	(c) analysis of facility design requirements in Section 5-3 of this chapter,	N/A
	(d) analysis of the liquid handling, transfer, and use requirements in Section 5-4 of this chapter,	N/A
	(e) analysis of local conditions, such as exposure to and from adjacent properties, flood potential, or earthquake potential,	N/A
	(f) consideration of fire department or mutual aid response.	N/A
5-5.2	Control of Ignition Sources	Title
5-5.2.1	Precautions shall be taken to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to:	✓

Code Section No.	Code Section	Walkdown Remarks
5-5.2.1 Cont'd	(a) open flames (b) lightning (c) hot surfaces (d) radiant heat (e) smoking (f) cutting and welding (g) spontaneous ignition (h) frictional heat or sparks (i) static electricity (j) electrical sparks (k) stray currents (l) ovens, furnaces, and heating equipment	✓
5-5.2.2	Smoking shall be permitted only in designated and properly identified areas.	✓
5-5.2.3	Welding, cutting, and similar spark-producing operations shall not be permitted in areas containing flammable liquids until a written permit authorizing such work has been issued. The permit shall be issued by a person in authority following his/her inspection of the area to assure that proper precautions have been taken and will be followed until the job is completed. (See NFPA 51B, "Standard for Fire Prevention in Use of Cutting and Welding Processes.")	✓

Code Section No.	Code Section	Walkdown Remarks
5-5.2.4	Static Electricity. All equipment such as tanks, machinery, and piping where an ignitable mixture may be present shall be bonded or connected to a ground. The bond or ground or both shall be physically applied or shall be inherently present by the nature of the installation. Electrically isolated sections of metallic piping or equipment shall be bonded to the other portions of the system or individually grounded to prevent hazardous accumulations of static electricity. NFPA 77, "Recommended Practice on Static Electricity," provides information on this subject.	✓
5-5.3	Inspection and Maintenance	
5-5.3.1	All fire protection equipment shall be properly maintained and periodic inspections and tests shall be done in accordance with both standard practice and equipment manufacturer's recommendations.	✓
5-5.3.2	Maintenance and operating practices shall control leakage and prevent spillage of flammable liquids.	✓
5-5.3.3	Combustible waste material and residues in operating areas shall be kept to a minimum, stored in covered metal containers, and disposed of daily.	✓

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-5.3.4	Ground areas around facilities where liquids are stored, handled, or used shall be kept free of weeds, trash, or other unnecessary combustible materials.	✓
5-5.3.5	Aisles established for movement of personnel shall be maintained clear of obstruction to permit orderly evacuation and ready access for manual fire fighting activities.	✓
5-5.4	Emergency Planning and Training	
5.5.4.1	An emergency action plan, consistent with the available equipment and personnel, shall be established to respond to fire or other emergencies. This plan shall include the following:	✓
	(a) Procedures to be used in case of fire, such as sounding the alarm, notifying the fire department, evacuating personnel, and controlling and extinguishing the fire.	✓
	(b) Appointment and training of persons to carry out fire safety duties.	✓
	(c) Maintenance of fire protection equipment.	✓
	(d) Holding fire drills.	✓

Code Section No.	Code Section	Walkdown Remarks
5-5.4.1 Cont'd	(e) Shutdown or isolation of equipment to reduce the escape of liquid.	✓
	(f) Alternate measures for the safety of occupants while any fire protection equipment is shut down.	✓
5-5.4.2	Personnel responsible for the use and operation of fire protection equipment shall be trained in the use of that equipment. Refresher training shall be conducted at least annually.	✓
5-5.4.3	Planning of effective fire control measures shall be coordinated with local emergency response agencies.	✓
5-5.4.4	Procedures shall be established to provide for safe shutdown of operations under emergency conditions. Provisions shall be made for periodic training, inspection, and testing of associated alarms, interlocks, and controls.	✓
5-5.4.5	The emergency procedure shall be kept readily available in an operating area and updated regularly.	✓

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-5.4.6	Where premises are likely to be unattended for considerable periods of time, a summary of the emergency plan shall be posted or located in a strategic and accessible location.	✓
5-5.5	Detection and Alarm	Title
5-5.5.1	An approved means for prompt notification of fire or emergency to those within the plant and to the available public or mutual aid fire department shall be provided.	✓
5-5.5.2	Those areas, including buildings, where a potential exists for a flammable liquid spill, shall be monitored as appropriate. Some methods may include:	✓
	(a) Personnel observation or patrol;	✓
	(b) Process monitoring equipment that would indicate a spill or leak may have occurred;	N/A
	(c) Provision of gas detectors to continuously monitor the area where facilities are unattended.	N/A
5-5.6	Portable Fire-Control Equipment	

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
5-5.6.1	Listed portable fire extinguishers shall be provided for facilities in such quantities, sizes, and types as may be needed for the special hazards of operation and storage as determined per 5-5.1.3. NFPA 10, "Standard for Portable Extinguishers," provides information on the suitability of various types of extinguishers.	✓
5-5.6.2	When the need is indicated per 5-5.1.3, water may be utilized through standpipe and hose systems (see NFPA 14, "Standard for the Installation of Standpipe and Hose Systems"), or through hose connections from sprinkler systems using combination spray and straight steam nozzles to permit effective fire control (see NFPA 13, "Standard for the Installation of Sprinkler Systems").	✓
5-5.6.3	When the need is indicated per 5-5.1.3, mobile foam apparatus shall be provided. NFPA 11C, "Standard for Mobile Foam Apparatus," provides information on the subject.	✓
5-5.6.4	Automotive and trailer-mounted fire apparatus, where determined necessary, shall not be used for any purpose other than fire fighting.	✓

Code Section No.	Code Section	Walkdown Remarks
5-5.7	Fixed Fire Control Equipment :	
5-5.7.1	A reliable water supply or other suitable fire control agent shall be available in pressure and quantity to meet the fire demands indicated by the special hazards of operation, storage, or exposure as may be determined by 5-5.1.3.	✓
5-5.7.2	Hydrants, with or without fixed monitor nozzles, shall be provided in accordance with accepted practice. The number and placement will depend on the hazard of the liquid-processing facility, storage, or exposure as may be determined by 5-5.3.1. See NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," for information on this subject.	✓
5-5.7.3	Where the need is indicated by the hazards of liquid processing, storage, or exposure as determined by 5-5.1.3, fixed protection may be required utilizing approved sprinkler systems, water spray systems, deluge systems, fire resistive materials, or a combination of these. See NFPA 13, "Standard for the Installation of Sprinkler Systems," and NFPA 15, "Standard for Water Spray Fixed Systems for Fire Protection," for information on these subject.	✓

Code Section No.	Code Section	Walkdown Remarks
5-5.7.4	The following fire control systems may be appropriate for the protection of specific hazards as determined per 5-5.1.3. If provided, such systems shall be designed, installed, and maintained in accordance with the following NFPA standards: (a) NFPA 11, "Standard for Low Expansion Foam and Combined Agent Systems," (b) NFPA 11A, "Standard for Medium and High Expansion Foam Systems," (c) NFPA 12, "Standard on Carbon Dioxide Extinguishing Systems," (d) NFPA 12A, "Standard on Halon 1301 Fire Extinguishing Systems," (e) NFPA 12B, "Standard on Halon 1211 Fire Extinguishing Systems," (f) NFPA 16, "Standard on Deluge Foam-Water Sprinkler and Foam Water Spray Systems," (g) NFPA 17, "Standard for Dry Chemical Extinguishing Systems."	N/A

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
Chapter 6	Referenced Publications This chapter is for information purposes only. Therefore, it is removed from this report.	N/A

MISCELLANEOUS OIL STORAGE ROOM

WALKDOWN CHECKLIST

CONDUCTED BY: P.J. RUSSELL

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

I = Information Only
CN = Can not verify by walkdown
N/A = Not Applicable
√ = Compliance
(X) = Non Compliance

Code Section No.	Code Section	Walkdown Remarks
CHAPTER 1	GENERAL PROVISIONS	
1-1	Scope and Application	
1-1.1	This code applies to all flammable and combustible liquids except those that are solid at 100°F (37.8°C) or above.	I
1-1.2	Requirements for the safe storage and use of the great variety of flammable and combustible liquids commonly available depend primarily on their fire characteristics, particularly the flash point, which is the basis for the several classifications of liquids as defined in Section 1-2. It should be noted that the classification of a liquid can be changed by contamination. For example, filling a Class II liquid into a tank which last contained a Class I liquid can alter its classification, as can exposing a Class II liquid to the vapors of a Class I liquid via an interconnecting vapor line (see 2-2.6.4 and 2-3.5.6). Care shall be exercised in such cases to apply the requirements appropriate to the actual classification.	I

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
1-1.3	The volatility of liquids is increased by heating. When Class II or Class III liquids are exposed to storage conditions, use conditions or process operations where they are naturally or artificially heated to or above their flash points, additional requirements may be necessary. These requirements include consideration for such items as ventilation, exposure to ignition sources, diking, and electrical area classification.	I
1-1.4	Additional requirements may be necessary for the safe storage and use of liquids that have unusual burning characteristics, that are subject to self-ignition when exposed to the air, that are highly reactive with other substances, that are subject to explosive decomposition, or have other special properties that dictate safeguards over and above those specified for a normal liquid of similar flash point classification.	I
1-1.5	In certain installations the provisions of this code may be altered at the discretion of the authority having jurisdiction after consideration of the special features such as topographical conditions, barricades, walls, adequacy of building exists, nature of	/

Code Section No.	Code Section	Walkdown Remarks
1-1.5 Cont'd	occupancies, proximity of buildings or adjoining property and character of construction of such buildings, capacity and construction of proposed tanks and character of liquids to be stored, nature of process, degree of private fire protection to be provided, and the adequacy of facilities of the fire department to cope with flammable or combustible liquid fires.	
1-1.6	Existing plants, equipment, buildings, structures, and installations for storage, handling, or use of flammable or combustible liquids that are not in strict compliance with the terms of this code may be continued in use at the discretion of the authority having jurisdiction provided they do not constitute a recognized hazard to life or adjoining property. The existence of a situation that might result in an explosion or sudden escalation of a fire, such as inadequate ventilation or confined spaces, lack of adequate emergency venting of a tank, failure to fireproof the supports of elevated tanks, or lack of drainage or dikes to control spills may constitute such a hazard.	I

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
1-1.7	This code shall not apply to:	Title
1-1.7.1	Transportation of flammable and combustible liquids. These requirements are contained in the U.S. Department of Transportation regulations or in NFPA 385, "Standard for Tank Vehicles for Flammable and Combustible Liquids."	I
1-1.7.2	Storage, handling, and use of fuel oil tanks and containers connected with oil burning equipment. These requirements are covered separately in NFPA 31, "Standard for the Installation of Oil Burning Equipment."	I
1-1.7.3	Storage of flammable and combustible liquids on farms and isolated construction projects. These requirements are covered separately in NFPA 395, "Standard for the Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects."	I
1-1.7.4	Liquids without flash points that can be flammable under some conditions, such as certain halogenated hydrocarbons and mixtures containing halogenated hydrocarbons. (See NFPA 321, "Standard on Basic Classification of Flammable and Combustible Liquids.")	I

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
1-1.7.5	Mists, sprays, or foams. (Except flammable aerosols in containers, which are included in Chapter 4.)	I
1-1.8	Installations are made in accordance with the applicable requirements of standards of the National Fire Protection Association: NFPA 32, "Standard for Drycleaning Plants;" NFPA 33, "Standard for Spray Application Using Flammable or Combustible Materials;" NFPA 34, "Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids;" NFPA 35, "Standard for the Manufacture of Organic Coatings;" NFPA 36, "Standard for Solvent Extraction Plants;" NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines;" NFPA 45, "Standard for Fire Protection for Laboratories Using Chemicals; and Chapter 10 of NFPA 99, "Standard for Health Care Facilities," shall be deemed to be in compliance with this code.	N/A
1-1.9	Metrication. If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is regarded as the requirement. The given equivalent value may be approximate.	

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
1-2	Definitions The scope of this chapter is not included in this report. Definitions are placed within NFPA 30 for information purposes only.	I
1-3	Storage Liquids shall be stored in tanks or in containers in accordance with Chapter 2 or Chapter 4.	Refer to Chapters 2 & 4
1.4	Pressure Vessel All new pressure vessels containing liquids shall comply with 1-4.1, 1-4.2, or 1-4.3, as applicable.	N/A
1-4.1	Fired pressure vessels shall be designed and constructed in accordance with Section 1 (Power Boilers), or Section VIII, Division 1 or Division 2 (Pressure Vessels), as applicable, of the 1983 ASME Boiler and Pressure Vessel Code.	N/A
1-4.2	Unfired pressure vessels shall be designed and constructed in accordance with Section VIII, Division 1 or Division 2, of the 1983 ASME Boiler and Pressure Vessel Code.	N/A

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
1-4.3	Fired and unfired pressure vessels that do not conform to 1-4.1 or 1-4.2 may be used provided approval has been obtained from the state or other governmental jurisdiction in which they are to be used. Such pressure vessels are generally referred to as "State Special."	N/A
1.5	Exits Egress from buildings and areas covered by this code shall be in accordance with NFPA 101, "Life Safety Code."	X only one exit exists ~~for~~ this room
Chapter 2	Tank Storage The scope of this entire chapter is not included in this report. No permanent flammable liquid tanks exist within the security fence.	N/A
Chapter 3	Piping, Valves, and Fittings The scope of this entire chapter is not included in this report. No flammable liquid piping systems are installed within the Donald C. Cook Nuclear Plant.	N/A
Chapter 4	Container and Portable Tank Storage	Title
4.1	Scope	TITLE

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-1.1	This chapter shall apply to the storage of liquids, including flammable aerosols, in drums or other containers not exceeding 60 gal (227 L) individual capacity and portable tanks not exceeding 660 gal (2498 L) individual capacity and limited transfers incidental thereto. For portable tanks exceeding 660 gal (2498 L), Chapter 2 shall apply.	I
4-1.2	This chapter shall not apply to the following:	TITLE
	(a) Storage of containers in bulk plants, service stations, refineries, chemical plants, and distilleries.	I
	(b) Liquids in the fuel tanks of motor vehicles, aircraft, boats, or portable or stationary engines.	I
	(c) Beverages, when packaged in individual containers not exceeding a capacity of one gallon.	I

Code Section No.	Code Section	Walkdown Remarks
4-1.2 Cont'd	(d) Medicines, foodstuffs, cosmetics, and other consumer products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solution not being flammable when packaged in individual containers not exceeding one gallon in size.	I
	(e) The storage of liquids that have no fire point when tested by ASTM D 92-78, the Cleveland Open Cup Test Method, up to the boiling point of the liquid, or up to a temperature at which the sample being tested shows an obvious physical change.	I
	(f) The storage of distilled spirits and wines in wooden barrels or casks.	I
4-1.3	For the purpose of this chapter, unstable liquids and flammable aerosols shall be treated as Class IA liquids.	I
4-2	Design, Construction, and Capacity of Containers	TITLE

Code Section No.	Code Section	Walkdown Remarks
4-2.1	Only approved containers and portable tanks shall be used. Metal containers and portable tanks meeting the requirements of, and containing products authorized by, Chapter I, Title 49 of the "Code of Federal Regulations" (DOT Regulations), or NFPA 386, "Standard for Portable Shipping Tanks for Flammable and Combustible Liquids," shall be acceptable. Polyethylene containers meeting the requirements of, and containing products authorized by, DOT Specification 34, and polyethylene drums authorized by DOT Exemption Procedures, shall be acceptable. Plastic containers meeting the requirements of ANSI/ASTM D 3435-80, "Plastic Containers (Jerry Cans) for Petroleum Products," used for petroleum products within the scope of that specification shall be acceptable.	√ - This author did not notice any unapproved containers. All liquids were contained in their shipping containers or transferred to approved containers.
4-2.2	Each portable tank shall be provided with one or more devices installed in the top with sufficient emergency venting capacity to limit internal pressure under fire exposure conditions to 10 psig (68.9 kPa), or 30 percent of the bursting pressure of the tank, whichever is greater. The total venting capacity shall be not less than that specified in 2-2.5.4 or 2-2.5.6. At least one pressure-	N/A, no portable tanks

Code Section No.	Code Section	Walkdown Remarks
4-2.2 Cont'd	actuated vent having a minimum capacity of 6.000 cu ft (170 m^3) of free air per hour (14.7 psia (760 mm Hg) and 60°F (15.6°C) shall be used. It shall be set to open at not less than 5 psig (34.5 kPa). If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 300°F (148.9°C). When used for paints, drying oils, and similar materials where plugging of the pressure-actuated vent can occur, fusible vents or vents of the type that soften to failure at a maximum of 300°F (148.9°C) under fire exposure may be used for the entire emergency venting requirement.	
4-2.3	Containers and portable tanks for liquids shall conform to Table 4-2.3 except as provided in 4-2.3.1 or 4-2.3.2.	√, all class II or III liquids. (visual inspection)
4-2.3.1	Medicines, beverages, foodstuffs, cosmetics, and other common consumer products, when packaged according to commonly accepted practices for retail sales, shall be exempt from the requirements of 4.2.1 and 4.2.3.	N/A

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-2.3.2	DOT Type III polyethylene nonreusable containers, constructed and tested in accordance with DOT specification 2U, treated if necessary to prevent permeation, may be used for storage of Class II and Class III liquids, in all capacities not to exceed 2 1/2 gal.	N/A
4-2.3.3	Class IA and Class IB liquids may be stored in glass containers of not more than one gallon capacity if the required liquid purity (such as ACS analytical reagent grade or higher) would be affected by storage in metal containers of if the liquid would cause excessive corrosion of the metal container.	N/A
4.3	Design, Construction, and Capacity of Storage Cabinets	TITLE
4.3-1	Not more than 120 gal (454 L) of Class I, Class II, and Class IIIA liquids may be stored in a storage cabinet. Of this total, not more than 60 gal (227 L) may be of Class I and Class II liquids and not more than three (3) such cabinets may be located in a single fire area, except that, in all industrial occupancy, additional cabinets may be located in the same fire area if the additional cabinet, or group of not more than three (3) cabinets, is separated from other cabinets or group of cabinets by at least 100 ft (30 m).	See "Portable Flammable liquid Cabinet" walkdown

Code Section No.	Code Section	Walkdown Remarks
4-3.2	Storage cabinets shall be designed and constructed to limit the internal temperature at the center, 1 in. (2.5 cm) from the top to not more than 325°F (162.8°C) when subjected to a 10-minute fire test with burners simulating a room fire exposure using the standard time-temperature curve as given in ASTM E 152-81a. All joints and seams shall remain tight and the door shall remain securely closed during the fire test. The cabinet is not required to be vented for fire protection purposes; however, the following shall apply: (a) If the cabinet is vented for other reasons, the cabinet shall be vented outdoors in such a manner that will not compromise the specified performance of the cabinet, as acceptable to the authority having jurisdiction. (b) If the cabinet is not vented, the vent openings shall be sealed with properly fitted metal bung.	see "Portable Flammable Liquid Cabinets" walkdown

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-3.2.1	Metal cabinets constructed in the following manner are acceptable. The bottom, top, door, and sides of cabinet shall be at least No. 18 gage sheet steel and double walled with 1 1/2 in. (3.8 cm) air space. Joints shall be riveted, welded, or made tight by some equally effective means. The door shall be provided with a three-point latch arrangement and the door sill shall be raised at least 2 in. (5 cm) above the bottom of the cabinet to retain spilled liquid within the cabinet.	See "Portable Flammable Liquid Cabinets" walkdown
4-3.2.2	Wooden cabinets constructed in the following matter are acceptable. The bottom, sides, and top shall be constructed of exterior grade plywood at least 1 in. (2.5 cm) in thickness, which shall not break down or delaminate under fire conditions. All joints shall be rabbetted and shall be fastened in two directions with wood screws. When more than one door is used, there shall be a rabbetted overlap of not less than 1 in. (2.5 cm). Doors shall be equipped with a means of latching and hinges shall be constructed and mounted in such a manner as to not lose their holding capacity when subjected to fire exposure. A raised sill or pan capable of containing a 2 in. (5 cm) depth of liquid shall be provided at the bottom of the cabinet to retain spilled liquid within the cabinet.	See "Portable Flammable Liquid Cabinets" walkdown

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-3.2.3	Listed cabinets that have been constructed and tested in accordance with 4-3.2 shall be acceptable.	See "Portable Flammable Liquid Cabinets" walkdown
4-4	Design, Construction, and Operation of Separate Inside Storage Areas (See Section 1-2, "Definitions.) (For additional information, see Appendix C.)	TITLE
4-4.1	Inside Rooms	TITLE
4-4.1.1	Inside rooms shall be constructed to meet the selected fire-resistance rating as specified in 4-4.1.4. Such construction shall comply with the test specifications given in NFPA 251, "Standard Methods of Fire Tests of Building Construction and Materials." Except for drains, floors shall be liquidtight and the room shall be liquidtight where the walls join the floor. Where an automatic fire protection system is provided, as indicated in 4-4.1.4, the system shall be designed and installed in accordance with the appropriate NFPA standard for the type of system selected.	✓ (visual inspection) Room appears to be of sound construction

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.1.2	Openings in interior walls to adjacent rooms or buildings shall be provided with:	
	(a) Normally closed, listed 1 1/2 hr (B) fire doors for interior walls with fire-resistance rating of 2 hr or less. Where interior walls are required to have greater than 2 hr fire-resistance rating, the listed fire doors shall be compatible with the wall rating. Doors may be arranged to stay open during material handling operations if doors are designed to close automatically in a fire emergency by provision of listed closure devices. Fire doors shall be installed in accordance with NFPA 80, "Standard for Fire Doors and Windows."	✓ 3 hr fire door
	(b) Noncombustible liquidtight raised sills or ramps at least 4 in. (10 cm) in height or otherwise designed to prevent the flow of liquids to the adjoining areas. A permissible alternative to the sill or ramp is an open-grated trench, which drains to a safe location, across the width of the opening inside of room.	✓ ramps are approximately 4" in height.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.1.3	Wood at least 1 in. (2.5 cm) nominal thickness may be used for shelving, racks, dunnage, scuffboards, floor overlay, and similar installations.	✓ pallets being used
4-4.1.4	Storage in inside rooms shall comply with the following:	TITLE

Automatic Fire Protection* Provided	Fire Resistance	Maximum Floor Area	Total Allowable Quantities-- Gallons/Sq Ft/ Floor Area
YES	2 hr	500 sq ft	10
NO	2 hr	500 sq ft	4**
YES	1 hr	150 sq ft	5
NO	1 hr	150 sq ft	2

SI Units: 1 sq ft = 0.09 m^2, 1 gal - 3.8 L.
*Fire protection system shall be sprinkler, water spray, carbon dioxide, dry chemical, halon, or other approved system.
**Total allowable quantities of Class IA and 1B Liquids shall not exceed that permitted in Table 4-4.2.7 and the provisions of 4-4.2.10.

Walkdown Remarks (4-4.1.4):

(X) floor area = 800 ft

Quantity of liquids is w/in compliance of 10 gallons/ft/floor area requirement

(approximately 4,500 gal. at time of inspection)

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.1.5	Electrical wiring and equipment located in inside rooms used for Class I liquids shall be suitable for Class I, Division 2 classified locations; for Class II and Class III liquids, shall be suitable for general use. NFPA 70, "National Electrical Code," provides information on the design and installation of electrical equipment.	✓ general use electrical equipment is what is needed. The equipment installed is superior or equal to that
4-4.1.6	Every inside room shall be provided with either a gravity or a continuous mechanical exhaust ventilation system. Mechanical ventilation shall be used if Class I liquids are dispensed within the room. (a) Exhaust air shall be taken from a point near a wall on one side of the room and within 12 in. (30 cm) of the floor with one or more make-up inlets located on the opposite side of the room within 12 in. (30 cm) from the floor. The location of both the exhaust and inlet air openings shall be arranged to provide, as far as practicable, air movements across all portions of the floor to prevent accumulation of flammable vapors. Exhaust from the room shall be directly to the exterior of the building without recirculation.	

Code Section No.	Code Section	Walkdown Remarks
4-4.1.6 Cont'd	Exception: Recirculation is permitted where it is monitored continuously using a fail-safe system that is designed to automatically sound an alarm, stop recirculation, and provide full exhaust to the outside in the event that vapor-air mixtures in concentration over one-fourth of the lower flammable limit are detected. If ducts are used, they shall not be used for any other purpose and shall comply with NFPA 91, "Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying." If make-up air to a mechanical system is taken from within the building, the opening shall be equipped with a fire door or damper, as required in NFPA 91, "Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying." For gravity systems, the make-up air shall be supplied from outside the building.	

Code Section No.	Code Section	Walkdown Remarks
4-4.1.6 Cont'd	(b) Mechanical ventilation systems shall provide at least one cubic foot per minute of exhaust per square foot of floor area (1 m^3 per 3 m^2), but not less than 150 cfm (4 m^3). The mechanical ventilation system for dispensing areas shall be equipped with an air flow switch or other equally reliable method that is interlocked to sound an audible alarm upon failure of the ventilation system.	
4-4.1.7	In every inside room, an aisle at least 3 ft (0.90 m) wide shall be maintained so that no container is more than 12 ft (3.6 m) from the aisle. Containers over 30 gal (113.5 L) capacity storing Class I or Class II liquids shall not be stored more than one container high.	✓ marginal aisle space existed at time of this inspection; ✓ drums are not stacked
4-4.1.8	Where dispensing is being done in inside rooms, operations shall comply with the provisions of Chapter 5.	See Chapter 5
4-4.1.9	Basement Storage Areas. Class I liquids shall not be permitted in inside storage rooms in basement areas.	N/A (ground floor)
4-4.2	Cutoff Rooms and Attached Buildings	Title

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.2.1	Construction design of exterior walls shall provide ready accessibility for fire fighting operations through provision of access openings, windows, or lightweight non-combustible wall panels. Where Class IA or IB liquids are dispensed, or where Class IA liquids are stored in containers larger than one gallon, the exterior wall or roof construction shall be designed to include explosion-venting features, such as light-weight wall assemblies, lightweight roof assemblies, roof hatches, or windows of the explosion-venting type. NFPA 68, "Guide for Explosion Venting," provides information on this subject.	X No access for exterior fire fighting. ✓ No Class IA or IB liquids stored in this room so no explosion venting is necessary.
4-4.2.2	Where other portions of buildings or other properties are exposed, each opening in the exposing wall shall be protected with a listed 1 1/2 hr (D) fire door installed in accordance with NFPA 80, "Standard for Fire Doors and Windows," and the walls shall have a fire-resistance rating of not less than 2 hrs.	✓ door is 3-hr. seals are provided for penetratio[n] damper (? rating) is provided. ↳ visually the damper is of sound construction

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.2.3	Except as noted in 4-4.2.6, interior walls, ceiling, and floors shall have a fire-resistance rating of not less than 2 hrs where floor area of the room or building exceeds 300 sq ft (27 m^2) or a fire-resistance rating of not less than one hour for a floor area of 300 sq ft (27 m^2) or less. Such construction shall comply with the test specifications given in NFPA 251, "Standard Methods of Fire Tests of Building Construction and Materials." Walls shall be liquidtight at the floor level.	CN; this author does note that room appears to be of solid construction
4-4.2.4	Openings in interior walls to adjacent rooms or buildings shall be in accordance with 4-4.1.2(a).	✓ see 4-4.1.2(a)
4-4.2.5	Curbs, scuppers, special drains, or other suitable means shall be provided to prevent the flow of liquids under emergency conditions into adjacent building areas except where the individual container capacity is 5 gal (18.9 L) or less or if the liquids stored are only Class III liquids. The drainage system, if used, shall have sufficient capacity to carry off expected discharge of water from fire protection systems and hose streams.	✓ with the exception of 1 drum of Class II all containers have Class III liquids stored within ther A 4" ramp is installed (X) Drainage system appears to be plugged.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.2.6	Roofs of attached buildings, one story in height, may be lightweight noncombustible construction if the separating interior wall as specified in 4-4.2.3 has a minimum 3 ft (0.90-m) parapet.	N/A
4-4.2.7	Unprotected storage in cutoff rooms and attached buildings shall comply with Table 4-4.2.7. (See 4-4.2.10 for mixed storage of liquids.)	N/A
4-4.2.8	Protected storage in cutoff rooms and attached buildings shall comply with Section 4-6 as applicable. (See 4-4.2.10 for mixed storage of liquids.)	See applicable sections
4-4.2.9	Wood at least 1 in (2.5 cm) nominal thickness may be used for shelving, racks, dunnage, scuffboards, floor overlay, and similar installations.	✓ (visual inspection)
4-4.2.10	Where two or more classes of liquids are stored in a single pile or rack section, the maximum quantities and height of storage permitted in that pile or rack section shall be the smallest of the two or more separate quantities and heights. The maximum total	✓ all class III liquids.

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-4.2.10 Cont'd	quantities permitted shall be limited to a sum of proportional amounts that each class of liquid present bears to the maximum total permitted for its respective class; sum of proportional amounts not to exceed 100 percent.	
4-4.2.11	Dispensing operations of Class I or Class II liquids are not permitted in cutoff rooms or attached buildings exceeding 1000 sq ft (93 m^2) floor area. In rooms where dispensing of Class I liquids is permitted, electrical systems shall comply with 4-4.1.5, except that within 3 ft (0.90 m) of a dispensing nozzle area, the electrical system shall be suitable for Class I, Division I; ventilation shall be provided per 4-4.1.6; and operations shall comply with the provisions of Chapter 5.	✓, 800 # room only one 55 gal. drum of Class II liquid exists & no dispensing of that unit was evident.
4-4.2.12	Basement Storage Areas. Class I liquids shall not be permitted in the basement areas of cut-off rooms and attached buildings. Class II and Class IIIA liquids may be stored in basements provided that automatic sprinkler protection and other fire protection facilities are provided in accordance with Section 4-6.	N/A ground floor storage area
4.5	Indoor Storage	TITLE

NFPA 30 - 1987
FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE
CODE COMPLIANCE WALKDOWN CHECKLIST

Code Section No.	Code Section	Walkdown Remarks
4-5.1	Basic Conditions	
4-5.1.1	The storage of any liquids shall not physically obstruct a means of egress. Class I liquids in other than separate inside storage areas or warehouses shall be so placed that a fire in the liquid storage would not preclude egress from the area.	✓ Storage does not obstruct exit.
4-5.1.2	The storage of liquids in containers or portable tanks shall comply with 4-5.2 through 4-5.7, as applicable. Where separate inside storage areas are required, they shall conform to Section 4.4. Where other factors substantially increase or decrease the hazard, the authority having jurisdiction may modify the quantities specified.	See applicable sections.
4-5.1.3	Liquids used for building maintenance painting or other similar infrequent maintenance purposes may be stored temporarily in closed containers outside of storage cabinets or separate inside storage areas, if limited in amount, not to exceed a 10-day supply at anticipated rates of consumption.	N/A, this storage area is for the purpose of storing combustible liquids. Liquids removed from this area are under control of plant procedure PMI-22
4-5.1.4	Class I liquids shall not be stored in a basement, except as provided in 4-5.5.	✓ No Class I liquids stored in this ground floor room.

References

- AEPSC Calculations:

  DCC-FP-02-HS05-F, Rev. 0, 5/21/87
  DCC-FP-02-HS06-F, Rev. 0, 5/22/87
  DCC-FP-02-HS07-F, Rev. 0, 5/22/87
  DCC-FP-02-HS08-F, Rev. 0, 5/22/87
  DCC-FP-02-HS09-F, Rev. 0, 5/26/87
  DCC-FP-02-HS13-F, Rev. 0, 6/27/87
  DCC-FP-01-HS14-F, Rev. 0, 6/29/87
  DCC-FP-01-HS15-F, Rev. 0, 6/4/87
  DCC-FP-01-HS16-F, Rev. 0, 6/30/87
  DCC-FP-01-HS18-F, Rev. 0, 6/30/87
  DCC-FP-01-HS19-F, Rev. 0, 6/30/87
  DCC-FP-01-HS21-F, Rev. 0, 6/3/87
  DCC-FP-02-HS26-F, Rev. 0, 7/9/87
  DCC-FP-01-HS27-F, Rev. 0, 7/9/87
  DCC-FP-01-HS29-F, Rev. 0, 12/31/86
  DCC-FP-02-HS32-F, Rev. 0, 8/15/88

- RFC Packet No. 12-2983

AEP
AMERICAN.
ELECTRIC
POWER

Date July 18, 1988

FOR JUSTIFICATION & CLOSEOUT OF ATTACHMENT 1 CORRECTIVE ACTIONS SEE TABLE 4.1.

Subject Cook Nuclear Plant
Impell Contract C-6945
NFPA Code Compliance

FOR JUSTIFICATION & CLOSEOUT OF ATTACHMENT 2 MAINTENANCE ITEMS AND THE SELECTED ATTACHMENT 1 AND CONTROL ROOM CABLE VAULT SPRINKLER SYSTEM MAINTENANCE ITEMS IDENTIFIED BELOW, SEE 11-18-91 MEMO FROM P.H. JACQUES TO B.J. GERWE PLUS THE OTHER CLOSEOUT MEMOS NOTED FOR NFPA 12A AND 72E BY B.J. GERWE TO CODE COMPLIANCE REPORT 09-0120-0123.

From B.J. Gerwe BJ Gerwe

To P.H. Jacques - Bridgman

Attached are the corrective action (Attachment 1) and maintenance (Attachment 2) recommendations prepared by Impell under Contract C-6945. Please coordinate the maintenance items identified in both attachments.

Attachment 1 contains several actions which should have been designated as maintenance items. These maintenance items are noted below by NFPA code and code section numbers.

		JUSTIFICATION/CLOSEOUT MEMO DATE
NFPA 12A	1-9.5.6	11-14-91
NFPA 13	3-16.8	
NFPA 72D	2122/4061	
NFPA 72E	2-6.1 (For detectors 3-26 & 3-27 in FZ 33; 3-27 in FZ 34; and 2-7 in FZ 39 only. The remaining detectors have been justified.)	11-14-91

Not mentioned in either list are the two missing sprinkler heads in the Unit 2 control room cable vault. These two sprinklers are located in the same ceiling bay on the same branch line. They are approximately twelve inches from smoke detectors 12-28 and 12-30.

Please advise me when these items are completed.

BJG/gf

Attachment

cc: W.G. Smith, Jr. - Bridgman - w/o attachment
J. Sampson - Bridgman - w/o attachment
P.G. Schoepf - w/o attachment
J.A. Kobyra/J.D. Grier/B.J. Gerwe - w/o attachment
File: Impell Contract C-6945

Intra-System

ATTACHMENT 1

NFPA CODE DEVIATION/OPEN ITEM
RECOMMENDED CORRECTIVE ACTIONS

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA10 - 1984		
3-1.2 3-1.2.2	Several areas containing Class A Combustibles are not provided with extinguishers suitable for Class A hazards	The following zones which contain Class A Combustibles should be provided with extinguishers suitable for protecting these hazards.

Zone	Elev	Zone	Elev
112	573	64A-B	591-587
113	573	6N	591-587
29G	573	17A-G	591-587
22	591-587	29A-F	591-587
12	591-587	40A-B	609
18	591-587	41	609
19	591-587	42A-D	609
20	591-587	45	609
21	591-587	46A-D	609
13	591-587	47A-B	609
14	591-587	109	633
15	591-587		

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA10 - 1984		
3-2.1 3-3.3 3-3.1	Several fire zones exceeded the maximum travel distance for extinguishers.	Extinguishers located in the following zones are not within 75ft. of a Class A hazard or 50 ft of a Class B hazard. Either additional extinguishers should be provided or existing extinguishers relocated to meet the travel distance requirements.

Zone	Elev	Zone	Elev
63C	591-587	62B&C	591-587
4	591-587	64B	591-587
5	591-587	37	609
6N	591-587	44N	609
6S	591-587		

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
1-6.2 4-3.2	All extinguishers are not provided in their designated places per the fire facilities drawings.	The fire facilities drawings should be revised to show actual placement and types of extinguishers. The procedures should be enhanced to reference this fire facilities drawings for locating equipment.

NFPA CODE DEVIATION/OPEN ITEM
RECOMMENDED CORRECTIVE ACTIONS
(continued)

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA12 - 1968		
122	Locations of the pilot cabinets are such that leakage of CO_2 from the protected areas may cause the oxygen concentration to fall below acceptable limits.	Perform an engineering evaluation to address the endangerment of personnel due to leakage of CO_2 outside the protected area.
134 165 254 255	No hydraulic calculations or test data were available for review for the new halon/CO_2 nozzles in the C.R. cable vaults.	Perform hydraulic calculations for the system or an engineering evaluation to show the adequacy of the new nozzles.
1632 1634	No documentation was available to verify the hydrostatic test pressure or equivalent length of the valves used in the system.	Perform an engineering evaluation to address the acceptability of the valves used in the system.
1436	Documentation to verify that manual controls shall not require a pull of more than 40 lbs. nor movement of more than 14 inches was not available for review.	Obtain vendor data for these components to verify that the allowable limits are not exceeded.
1716	No documentation was available to verify that the liquid level gages are checked annually.	Revise procedures to annually check the liquid level gages.
NFPA12A - 1977		
1-5.4 1-7.4	The original test results for the computer rooms (zones 71 and 72) were unsatisfactory.	Perform an engineering evaluation to address the reasons for the test failures. A retest may be required.
1-8.3.6	Operation of the extended discharge cylinders protecting the C.R. cable vaults (zones 57 and 58) could not be verified in the absence of electricity.	Perform an engineering evaluation addressing the adequacy of this configuration and protection of the hazards in the absence of electricity. Incorporate results into the system design documentation.

NFPA CODE DEVIATION/OPEN ITEM
RECOMMENDED CORRECTIVE ACTIONS
(continued)

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA12A - 1977 (cont.)		
1-8.5.1	No documentation to verify that alarms for the C.R. cable vaults (zones 57 and 58) are provided in the protected area to indicate system alarm, pre-discharge, and discharge.	Refer to the NFPA 72D code compliance summary.
1-9.5.6	A system nameplate is not provided for any of the areas/systems which were evaluated.	Provide system name plates at the cylinder locations for the evaluated systems. The nameplate should contain the information specified in the code requirement. In addition, the protected hazard should be identified on the nameplates.
NFPA13 - 1971		
1141	Documentation could not be found to verify whether the flooring is watertight	The criteria contained in an 83-41 study is more applicable to D.C. Cook.
3241 3783	At the C.R. cable vault riser, the retard chamber discharges to the floor containing numerous unsealed penetrations.	Provide an engineering evaluation based on AEP's response to questions on the suppression systems regarding: ° Normal Operation ° Inadvertent Actuation ° Flooding Study These responses should address the leakage through the unsealed penetrations.
3681 3682 3683	Due to the congestion and lack of accessibility sprinklers could not be verified free of paint and ornamental finishes.	Procedures outlining the replacement of sprinkler heads with paint or ornamental finishes should be developed.

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA13 - 1983		
1-9.2	Hydraulic design data is not provided on the sprinkler drawings.	System drawings should be revised to reference design calculation numbers.
2-2.1.2.4 2-2.1.2.5	Exterior fire hose demands were not added to the hydraulic sprinkler system calculations.	Revise calculations to include the exterior hose or perform a flow test to prove that the demand can be met.
3-16.8	Various sprinklers under ducts at el. 587, 609, and 633 are not guarded.	Provide guards to prevent damage to the heads.
3-17.4.5	Non indicating valves are used.	The valves should be replaced.
4-1.1.1 4-1.1.4 4-2.4.6	Sprinklers were found obstructed in numerous locations.	° Modify the heat collection plates ° Relocate sidewall heads
4-4.13	There are no sprinklers under a 6ft. wide duct in zone 52.	Provide an engineering analysis to determine if this protection is necessary.
4-4.19	Sprinklers underneath duct work are less than 12" apart with no baffles.	Baffles should be installed or the heads relocated.
7-3.4	Water supply graph sheets are not provided.	Provide water supply graph.

NFPA14

1971	1978	1986	DEVIATION/OPEN ITEM	RECOMMENDATION
212 212a 217 531 541 551	5-3.1 5-3.2 5-4.2 5-5.2 1-11.3	2-1.3	Documentation could not be found to verify that Class I and III stand-pipes are sized for minimum flow of 500 gpm plus 250 gpm for each additional standpipe to maximum 2500 gmp for a minimum 30 minutes. Class II standpipes shall be sized for minimum flow of 100 gpm for a minimum 30 minutes.	Hydraulic calculations should be performed to verify piping is of sufficient size to supply the required water flows without excessive pressure loss.

CODE/SECTION			DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA14 (cont.)				
1971	1978	1986		
322 421	3-2.2 4-2.1 4-3.2 1-11.3	4-4.3.1	Several Class II hose stations were provided with hose lengths greater than 100'.	Hydraulic calculations should be performed to verify adequate water flows and pressures are available at the nozzles when attached to hoses exceeding 100 ft. in length. The hose stations which do not satisfy the 100ft. & 30ft. Requirements are:

Zone	Elevation	Hose Station
33	612	203
33A	612	203
34	612	207
34A	612	207
58	624	81
57	624	81
49	633	82
50	633	65
109	633	67
45	609	45
46B	609	45
46C	609	45
46D	609	45
108	633	79
41	609	58
42B	609	58
42C	609	58
42D	609	58

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
1971		
624 151	An approved indicator valve for valve no. FP 263 should be provided.	The valve actuating mechanism should be changed from a lever actuator to a gear driven actuator.
651	Piping was not properly supported as required.	Additional hangers/supports should be provided for the standpipe supply piping. Zones in which insufficient supports were noted are:

Zone	Elevation	Location
5	591-587	Supply Main

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA14 (cont.)		
1986		
8-1.2	Standpipe specifications did not specify a required flow test.	Specification DDPM110QCS should be revised to require the contractor, to flow 500 gpm from the top-most outlet of the standpipe system while maintaining a minimum residual pressure of 65psi at the standpipe outlet.
1971		
511 524	The adequacy of the water supply for the hose system cannot be verified.	Hydraulic calculations should be performed to verify the supply is sufficient for the flows required.
671	A 3-1/2 inch dial spring pressure gage is not provided at the top of each standpipe.	Hydraulic calculations should be performed to verify that a minimum flow of 500 gpm for Class III or 100 gpm for Class II standpipe services is available at a residual pressure of 65 psi at the top-most outlet from each standpipe riser.
NFPA15 - 1973		
2031 4072	Water discharge to the hazards are obstructed	Provide an engineering analysis to determine the adequacy of the current configuration.
4011	Working plans, specifications, and hydraulic calculations are not provided for the charcoal filter systems.	Provide or originate the necessary documents.
4032(b) 7000	No documents to show the adequacy of the water spray nozzles within each filter unit.	Provide an engineering analysis to show the adequacy of the nozzle arrangement.
4081	A 3/4" pipe is used.	Replace with a 1" pipe.

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA15 - 1973 (cont.)		
4082(d) 4101 4102 4103	No documents were available for the adequacy of the supports, nozzles, gage connections, or piping arrangements.	Provide an engineering analysis to show the adequacy of the components used, or produce documents establishing the adequacy of the components used.
4101 4102 4103	A pipe supplying water to filter unit 1-HV-CIPX-1 is supported by a rod welded to the pipe itself.	Perform an engineering analysis to show the adequacy of the weld configuration.
4121	There are no pressure gages installed for the water spray systems.	Install pressure gages.
5021 5031	No document were found to verify that the hose hook-up system was tested.	The system should be tested.
5023	No test results for the discharge pressure at the most remote nozzle of each system.	Provide an engineering evaluation or test each system to verify that the required pressure is available.
[illegible]11	Charcoal filter unit 12-HV-SATFU is not included in any of the procedures.	Revise procedures to include 12-HV-SATFU.
7010	No hydraulic calculations for the charcoal filter water spray system.	Originate hydraulic calculations
	A graph sheet is not included for the H_2 tank system.	Originate graph sheet. (Supply-demand curve).
NFPA72D - 1967		
2032 2212 3111	The following devices are not approved for their application ° Rochester Instruments "EF" Annunciator Panels. ° Hose System Manual Stations ° ACI Model 446002 Manual Start/Stop Stations.	An equivalency for an approved/listed device can not be provided for these devices. AEPSC will be required to provide a justification.

NFPA CODE DEVIATION/OPEN ITEM
RECOMMENDED CORRECTIVE ACTIONS
(continued)

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
FPA72D - 1967 (cont'd)		
2034 4052	The procedures do not perform surveillance tests or verify the receipt of alarm or supervisory signals at the control room from fire pump supervisory signals and hose system manual stations alarm initiating devices to confirm their operability.	The procedures should be enhanced to verify the receipt of all required signals at the control room. Each hose station device should also be activated to verify operability.
2047	The procedures do not verify the reset of signals received by the control room for sprinkler system and fire pump signals.	The surveillance test should be revised to verify the reset of each signal prior to continuing the test.
2122 4061	The alarm initiating circuit cables are exposed to potential hazards at elevations 624' and 650'.	Corrective actions should be taken to prevent damage to the circuit conductors as follows:
	a. Open junction boxes for smoke detectors on El. 624' zone 57 at detector no. 18-18 & 18-25.	a. Boxes should be properly covered.
	b. Two open junction boxes had exposed cable protruding from them, at the halon panel for zones 71 & 72 at El. 650'.	b. Cable should be inserted into the panel and the boxes properly covered.
	c. The solenoid circuit flex conduit for unit 2 computer room (zone 72) halon tank is damaged exposing the circuit conductors.	c. Replace the flex conduit, inspect conductors for abrasions, & reinstall all the conduit to prevent future damage.

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72D - 1967 (cont.)		
2154	Data was not available to confirm compliance for cables to meet maximum fault current, noninterchangeable overcurrent protection, energy limitation criteria and approved for use as a limited energy cable.	An engineering evaluation should be performed to determine compliance or obtain the data required.
2223	The power cables connected to the ACI A924 panels from power panel 1-DAB, circuit 5 & 2-DAB circuit 5, are under sized for the 35 AMP breakers provided.	An engineering evaluation should be performed to confirm that these 4-conductor cables have an equivalency of a #10 AWG cable.
2331 2251	Power supply data for the ACI panels was not released to Impell by Alison Control, Inc. Therefore confirmation of compliance of this equipment was not possible.	The data required should be provided to confirm compliance for these systems.
2341	Continuous duty rating data for the power supply transformers was not available from all the manufacturers of the alarm system.	This continuous duty rating data should be obtained if possible.

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72D - 1967 (cont.)		
2411 2422	a. The alarm initiating circuits for the "EF" panels are not electrically supervised to indicate a trouble condition at the "EF" annunciator upon a circuit fault.	The surveillance procedures should be enhanced to verify the operability of the "EF" panel alarm initiating circuits by performing functional tests of each alarm initiating device. This should be performed to provide an equivalency for electrically supervised circuits.
	b. The hose system manual stations are not connected to electrically supervised circuits.	
3431	Waterflow alarm devices are not provided for the Auxiliary Building ZMO-10 & 20 hose system supply piping.	Enhancement of the procedures recommended under code Section 2411 & 2422 should be performed to provide an equivalency for waterflow devices.
3542	Detector #3-29 in zone 44S is not accessible for testing due to sprinkler piping obstruction.	This detector should be relocated to provide adequate access for sensitivity testing.
NFPA72E - 1974		
2-6.1	Several detectors are exposed to mechanical damage on elevations 587', 609', 625' and 633'.	Protective guards should be installed or the devices should be relocated.

The devices are as follows:

Device	Zone	Elev.
Line Type Heat Det. @ 1-HV-SAT-FU Unit is exposed outside unit approximately 8".	5	587'
3-17 thru 3-18, 3-21, 3-25 thru 3-28	33	609'
7-5, 7-7 16-3 & 16-4	38	609'

CODE/SECTION	DEVIATION/OPEN ITEM		RECOMMENDATION
NFPA72E - 1974 (cont.)			
	13-7 thru 13-9	41	609'
	3-16 thru 3-21, 3-26 & 3-27	34	609'
	8-7 thru 8-9	45	609'
	20-3 & 20-4, 2-5 & 2-7	39	609'
	27-2	60	625'

NFPA72E - 1974, 1978 & 1982

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
4-3.1 4-3.2	Smoke detectors in zones 29A thru D, 32 thru 34, 44N, 49,52 thru 54, 57 and 69 are installed at the bottom of deep beams or installed greater than 12" from the ceiling. The devices are as follows:	The devices should be relocated as required.

Device	Zone	Elev.
5-29 @ bottom of beam.	32	650'
4-13 @ bottom of beam.	49	633'
4-26 installed within 4" of 18" beam.	52	633'
5-1 thru 5-3 & 5-10 thru 5-12 approx. 4' down from the ceiling.	69	650'
18-10 & 18-12 are installed within 4" of a deep beam.	57	625'

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72E - 1974 & 1978		
2-6.5 2-6.7 4-1.2	Detectors are not properly provided in all portions of a fire zone where detection has been installed.	Engineering Evaluations should be performed to confirm compliance or modifications should be performed.

These zones are the following:

Zone No.	Elevation	Deficiency
1	573	Air Movement & Det. 1-1 For Beam Construction
3	587	Throughout Zone
4	587	Deep Bay @ West End
5	587	Det. 2-25 & 2-3, For Beam Construction
6N,6M,6S	587	Air movement & inadequate det. spacing.
7	587	I.R. Det. obstructions. Beam const. @ center of zone.
8	587	I.R. Det. obstr. & air movement.
10	587	I.R. Det. obstr. & air movement.
11	587	I.R. Det. obstr.
23	587	I.R. Det. obstr. & air movement.
24	587	I.R. Det. obstr. & air movement.
25	587	I.R. Det. obstr. & air movement.
26	587	Typcial of zone 8.
27	587	Typical of zone 11.
33	612	Det. not installed @ ceiling.
34	612	Det. not installed @ ceiling.
37	609	Air movement.
38	609	Typical of zone 11.
39	609	Typical of zone ii.
44N	609	Det. 3-4, beam constr.
44S	609	Det. 3-27 & 3-28 @ bot. of beam.

CODE/SECTION	DEVIATION/OPEN ITEM		RECOMMENDATION
NFPA72E - 1974 & 1978 (cont.)			
2-6.5 2-6., 4-1.2 (Cont'd)	40A	609	Air movement & beam construction.
	40B	609	Air movement & beam construction.
	32	609	High ceilings & beam construction.
	42A-C	609	Air movement.
	43	609	Air movement.
	47A&B	609	Air movement & beam construction.
	46A-C	609	Air movement.
	41 & 45	609	Det. 13-9(41) & 8-9 & 8-7 (45) do not cover entire area. I.R. obstructions.
	56	620	Det. 18-10 & 10-12 within 4" of deep beam.
	48	625	Deep bay const. @ east end of room.
	49 & 50	633	Deep beam const. @ east end and for 8" beam const. throughout each zone.
	51	633	Deep beam const. @ northeast & south-east end of zone.
	52	633	Det. not spaced for deep & 8" beam const. @ north & south end of zone.
	55	620	Typical of zone 10.
	60	620	Typical of zone 10.
	69	650	Typical of zone 32.

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72E - 1984		
4-3.5.1.1	Detectors provided in zones40A & B, 41, 45, 47A & B,52, 55 and 60 do not adequately cover all portions of the zone within 0.7 times the listed spacing. These detectors include the following:	An engineering evaluation should be performed to determine the adequacy of the detection devices with the combustibles present.

Device	Fire Zone
12-3 & 12-4	40A
12-1 & 12-2	40B
13-9	41
8-7 & 8-9	45
7-3 & 7-4	47A
7-1 & 7-2	47B
4-20 thru 4-23 & 4-36 thru 4-38	52
15-8, 15-9 & 15-10	55
10-8, 10-9 & 10-10	60

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72E - 1974 & 1982		
4-4.1 4-4.5.2 4-5.1 4-5.1.5 9-3.3	a. Smoke detection is not properly provided in zones 7, 27, 32, 33, 34 and 69 due to high ceilings.	a. An engineering evaluation should be performed to determine the adequacy of the detection device selection and coverage for the combustibles present.
	b. Devices in zone 43 are placed too close to supply air diffusers.	b. Detectors listed should be relocated.

Device	Zone
23-4, 23-14 thru 23-19, 23-21 & 23-22	43

NFPA CODE DEVIATION/OPEN ITEM
RECOMMENDED CORRECTIVE ACTIONS
(continued)

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72E - 1974 & 1982 (Cont'd)		
4-4.2	The vestibule area (zone 53) and the toilet (zone 54) are not provided with detection at the suspended ceiling.	An engineering evaluation should be performed to determine the requirement for smoke detectors in the vestibule and toilet.
	Detectors are not properly spaced for the air movement in the zone.	Detectors should be provided as required for the air movement present in the space.

Fire Zone	Elevation
1	573
6N, 6M & 6S	587
8 & 10	596
26	587
37	625
40A - 40B	609
42A - 42C	609
43	609
47A & 47B	609
46A - 46C	609
55 & 60	625

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72E - 1974 & 1978		
4-4.6 4-3.7.2 4-3.7.3	Detectors are not properly provided in beam construction.	An engineering evaluation should be performed to determine the adequacy of the detection coverage for the combustibles present for zones 1, 3, 5, 6N, 6S, 48, 49, 50, 52, 7, 27, 32, and 69.

Device	Zone
a. Deep equipment hatch in the ceiling may delay detector response and is not considered in detector placement.	1 & 5
b. Detectors not provided in each bay as required for deep beam construction greater than 18".	3 7 & 27 32 & 69 48, 49 & 50
c. Reduced spacing is not provided in greater than 8" but less than 18".	5, 6N 6S, 49, 50 & 52

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA72E - 1974		
5-3.2 5-4.1 5-4.2 5-5.1	The field of vision for several infrared detectors were obstructed by conduit/ cable tray systems, structure and equipment. In severalcases the arrangement of the detector was not appropriate. The deficient detectors are listed as follows:	An engineering evaluation should be performed to determine the most advantageous detector arrangement for the obstructions and combustibles present.

Zone No.	Device No.	Deficiency
7	17-1	Obstruction by cable trays.
7	17-2	Misalignment for the combustibles present.
7	17-3	Obstructed by conduit.
8	18-5	Misalignment and obstructed.
8	18-1	Obstructed.
10	14-2	Obstructed.
10	14-1	Obstructed.
11	13-3	Obstructed.
25	19-3	Obstructed.
26	22-4	Misaligned and obstructed.
26	22-5	Misaligned and obstructed.

CODE/SECTION	DEVIATION/OPEN ITEM			RECOMMENDATION
NFPA72E - 1974 (Cont'd)				
5-3.2 5-4.1 5-4.2 5-5.1 (Cont'd)	27	21-3	Misaligned and obstructed.	
	27	21-2	Misaligned for combustibles present.	
	27	21-3	Obstructed by cable tray.	
	33	3-23 & 3-24	The alignment of the detectors for the platform @ elev. 646'-9" Detector is obstructed by platform.	
	34	3-23 & 3-24	Typical of zone 33.	
	38	16-3 & 16-4	Obstructed by cable tray. Misalignment due to low ceiling for 16-3.	
	39	20-3 & 20-4	Obstructed by cable tray. Misalignment due to low ceiling for 20-3.	
	41	21-3, 21-4 & 21-5	Det. 21-3 obstructed by MCC equipment. Detector 21-4 & 21-5 misaligned and obstructed.	
	42A	22-1	Misaligned.	
	42C	22-3 & 22-4	Misaligned and obstructed.	

CODE/SECTION	DEVIATION/OPEN ITEM			RECOMMENDATION
NFPA72E - 1974 (Cont'd)				
5-3.2 5-4.1 5-4.2 5-5.1 (Cont'd)	45	25-3 25-4 & 25-5	Det. 25-3 obstructed by MCC equipment. Detector 25-4 & 25-5 misaligned and obstructed.	
	55	23-3 & 23-4	Obstructed by structure; does not provide proper area coverage.	
	60	27-1, 27-2, 27-3 & 27-4	Det. 27-3 obstructed by structure. Detector 27-1, 27-2 and 27-4 misaligned & obstructed.	
5-5.2	The procedures do not confirm the changes in the alignment, physical configurations or combustible loading during surveillances.			The procedures should be revised to verify the impact of changes on the flame detectors.
NFPA72E - 1974 & 1982				
7-3.1.4 8-2.1.2	The line type heat detectors for the RCP pumps are not verified for their operability by loop resistance testing as required.			The procedures should be revised to verify the operability of the line type heat detectros as required.

ATTACHMENT 2

NFPA CODE DEVIATION/OPEN ITEM

MAINTENANCE RECOMMENDATIONS

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA 10 - 1984		
1-6.6	Three extinguishers were not properly mounted in fire Zones 33A, 38 and 43.	These extinguishers should be reinstalled properly.

Fire Zone	Device
33A	A 15 lb. CO_2 exting. at containment access portal
38	A 20 lb. ABC exting. at RCT MEZZANINE
43	A 20 lb. BC exting. in access hallway.

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
1-6.7	A 20 lb. ABC extinguisher in fire zone 61 adjacent to spray additive tank @ center of room was improperly mounted and subject to dislodgement.	The extinguisher should be reinstalled properly.
1-4.3	Five CO_2 extinguishers were not properly labled as required. These devices are located as follows:	These extinguishers should be replaced with approved devices.

Elev	Coordinates
573	WLL-WLM/WL7
587	H/12.5
587	WLK/5.5
609	WLL/4.8
612	WLR/18

NFPA CODE DEVIATION/OPEN ITEM
MAINTENANCE RECOMMENDATIONS
(continued)

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA 12 - 1986		
1439	The manual pull for fire zone 38 is not labeled.	Provide a label for the manual pull which indicates the hazard in fire zone 38.
1625	The pressure vent lines from the electro-pneumatic cabinets for the 4 main header valves and zones 55-60 15 disconnected so that excess CO_2 vents into the tank room.	Reinstall the existing copper tube vent lines onto the main vent line.
431	Access to hose reel 12-ZCH-2 is blocked.	Relocate the storage area which is currently in front of the hose reel.
NFPA 12A - 1977		
1-8.3.10	The manual pull stations (Ansul Automan Cabinets) are not labeled for the Control Room Cable Vaults (Zones 57 and 58).	Provide a label for the manual pull stations to the C.R. Cable Vaults (Zones 57 and 58).
1-9.5.5	The cylinder racking to the last line extended discharge cylinder for the Unit 2 C.R. Cable Vault (Zones 58) is loose.	Readjust the cylinder racking to firmly hold the halon cylinder.
NFPA 13 - 1971		
2822	The lower gage on the riser for the drumming area is broken	Replace the gage with one which has a maximum limit not less than twice the normal working pressure.
NFPA 13 - 1983		
3-16.2.2 3-16.3.5 3-16.9.2	A sprinkler head in zone 52 at columns 12 and WL-M is coated with red paint.	Replace the sprinkler head.
NFPA 15 - 1973		
None		

NFPA CODE DEVIATION/OPEN ITEM MAINTENANCE RECOMMENDATIONS (continued)

CODE/SECTION	DEVIATION/OPEN ITEM	RECOMMENDATION
NFPA 72D - 1967		
2042	Several detection devices and manual alarm stations are exposed to potential accidential operation	The appropriate corrective actionshould be performed as follows:
	a. Hose system manual station at El. 620' in zone 44N; two sprinkler system manual stations in zone 32 at El. 609'	a. Securely mount the device.
	b. Fire detectors are exposed to mechanical damage.	b. Reference NFPA 72E, 1974 Section 2-6.1.
	c. The valve tamper switch for valve #12-FP-37 (zone 96, El. 609') is not properly mounted.	c. Repair or Replace the device.
NFPA 72E - 1974		
7-1.1	Several detectors were noted as requiring maintenance. These devices are as follows:	The appropriate action should be taken to correct the deficiency and perform spot sensitivity testing where required to confirm operability.

Zone No.	Device No.	Deficiency
57	18-25 & 18-26	Missing locking shell.
58	12-37	Missing locking shell.

CODE/SECTION	DEVIATION/OPEN ITEM			RECOMMENDATION
NFPA 72E - 1974 (cont)				
7-1.1 (cont.)	55	24-5	Dirty lense on infrared detector.	
	60	28-5	Dirty lense on infrared detector.	
	43	23-3, 23-14 & 23-17	Detector No. 23-3 & 23-17 have dirty outer chamber grills. Detector 23-17 is missing locking shell.	
	44N	3-29,	Device can not be removed for servicing due to sprinkler piping.	
	40B	12-2	Missing locking shell.	
	42A	14-1	Dirty chamber grill.	
	29A-D	2-6 & 3-6	Dirty detector housing.	
	26	22-4	Dirty lense on infrared detector.	

AEP
AMERICAN ELECTRIC POWER

Date June 17, 1988

Subject Cook Nuclear Plant
NFPA 72D Device Approval Deficiencies

From David E. Kipley (Impell) DEK

To Bruce J. Gerwe (PH&F)

Please find attached the discussion for why the "EF" panel and manual alarm stations could not be provided with a justification of an equivalency for being U.L. listed. Based on this discussion, these deficiencies may be addressed by AEPSC.

DEK/gf

Attachment

NFPA 72D (1967 Edition) Code Sections 2032,2212 & 3111

The unapproved fire alarm devices have been compared against the applicable Underwriters Laboratory (U.L.) Test Standard to verify if these devices would meet the requirements of the applicable standard and could therefore be considered equivallent to a U.L. Listed device. Based on the evaluation performed, the devices listed did not meet the requirements of the applicable standard for the following reason(s):

Device	Deviation
Rochester "EF" Annunciator Panel	a. The alarm initiating circuits are not electrically supervised to initiate a trouble signal at the control panel should a fault condition occur on the circuit. b.NFPA 72D requires that an automatic means of recording signals be provided to record all signals recieved by the central supervising station control panel. Since this panel is not provided with this recording device, it cannot be considered equivallent for use as an NFPA 72D fire alarm signaling system.
Hose System Manual Stations and the ACI Model 446002 Manual Start/ Stop Stations	These manual stations did not meet the reqiurements of this U.L. Test Standard due to the lack of a latching feature of the alarm contacts and the activation mechanism to provide a positive indication that the device has been activated.

The U.L. Test Standards referenced include the following:

a. U.L.Standard 864 for the Rochester "EF" Panel.

b. U.L.Standard 38 for the Manual Alarm Stations.

AEP
AMERICAN ELECTRIC POWER

Date June 17, 1988

Subject COOK NUCLEAR PLANT
NFPA Code Justification Evaluations

From David E. Kipley (Impell) DEK

To J. A. Kobyra

Please find attached the subject technical evaluations for your review and approval. These evaluations were performed to provide documented justifications for the deviations identified by Impell Corporation during the review of the fire protection systems installed at the Cook Plant.

This evaluation package includes the evaluations and a cover sheet which identifies the evaluations attached by the NFPA Code and code section deviated. This cover sheet also contains the "prepared by" and "reviewed by" signature spaces. As discussed previously, the documents will require the review and approval by the fire protection staff prior to being issued.

DEK/ems

Attached

cc: P. G. Schoepf - w/o attachment
A. B. Auvil - w/attachment
J. D. Grier/B. J. Gerwe - w/attachment
File: Appendix R Audit Preparation

TECHNICAL JUSTIFICATION PACKAGE

FOR NFPA CODE DEVIATIONS IDENTIFIED BY

IMPELL TECHNICAL REPORT NO. 09-0120-0123

This package includes the justifications for deviations to NFPA Code Sections identified during the review of the fire protection systems at the D.C. Cook Nuclear Power Plant by Impell Corporation. These justifications include the following:

NFPA Code	Code Edition	Code Section	Number of Evaluations
12	1968	122	1
12	1968	134, 165, 254 and 255	1
12	1968	1436, 1632 & 1634	1
12A	1977	1-5.4 and 1-7.4	1
12A	1977	1-8.5.1	1
13	1971	1141	1
13	1971	3241 and 3783	1
13	1983	1-9.2	1
13	1983	4-1.1.1 and 4-1.1.4	4
13	1983	4-2.4.6	1
13	1983	3-17.4.5	1
13	1983	4-4.13	1
13	1983	4-4.19	1

NFPA Code	Code Edition	Code Section	Number of Evaluations
14	1971	322, 421	1
14	1978	3-2.2, 4-2.1, 4-3.2 and 1-11.3	1
14	1986	4-4.3.1	1
14	1971	511 and 524	1
15	1973	2031 and 4072	1
15	1973	4011, 4032b, 4081, 4082d, 4101, 4102, 4103, 5023 & 7000	1
15	1973	4081	1
15	1973	4101, 4102, 4103	1
15	1973	4121	1
72D	1967	2154	1
72D	1967	2223	1
72D	1967	2251 and 2331	1
72D	1967	2341	1
72E	1974	2-6.1	1
72E	1974 1978	2-6.5 and 4-4.2	1
72E	1974 1978 1982	4-3.1 and 4-3.2	2

NFPA Code	Code Edition	Code Section	Number of Evaluations
72E	1974 1978	2-6.5, 2-6.7 and 4-1.2	1
72E	1984	4-3.5.1.1	1
72E	1974	4-4.1, 4-4.5.2, 4-5.1, 4-5.1.5	1
72E	1974	4-4.6	4
72E	1978	4-3.7.2, 4-3.7.3	5
72E	1974	5-3.2, 5-4.1, 5-4.2 and 5-5.1	8
72E	1974	5-5.2	1

PREPARED BY: David E. K[illegible]

REVIEWED BY: [illegible]

NFPA 12 (1968 Edition) Code Section 122

Deviation: The pilot cabinets (EMPC) for the CO_2 systems located in the diesel ramp corridors (Fire Zones 79 and 85) and outside of Fire zone 42A and 46A, may expose personnel operating the manual mechanical actuators during a discharge, to a hazardous atmosphere by the reduction of the oxygen concentration in the area.

In addition, the vent lines at the EMPC cabinets located in the CO_2 Tank Room (Fire Zone 44N) are disconnected and vent CO_2 directly into this room.

Justification: The only time the manual actuators on the EMPC devices would be used would be during the 18-month surveillance testing or during an actual fire condition. Both the CO_2 system surveillance procedures and the fire brigade training procedures require the appropriate monitoring of oxygen levels and restriction of personnel access to areas adjacent to the space where the CO_2 system has discharged. These procedures help to minimize the potential to decrease personnel safety. Therefore, the placement of the EMPC devices are acceptable.

A review of AEPSC calculation DCCFP12C09F indicates that a minimal amount of CO_2 agent will be vented into the CO_2 Tank Room during a single fire event due to the vent lines being disconnected. Based on this calculation, however, this condition will not present a hazardous environment for operating personnel entering the CO_2 Tank Room.

References:
- Procedure 12 THP4030 STP.225 Series
- Fire Brigade Training Procedures
  a. FF-C-F106, Rev. 2
  b. FF-C-F103, Rev. 2
- AEPSC Calculation: DCCFP120C09F, Revision 0, 6/17/88

NFPA 12 (1968 Edition) Code Sections 134, 165, 254 and 255

Deviation:

Flow calculations are not available for the Unit 1 and 2 Control Room Cable Vault (Fire Zones 57 and 58) CO_2 systems to confirm that the piping system and nozzle orifices are adequate due to modifications made to incorporate a Halon 1301 system.

Justifications:

The original CO_2 system discharge nozzle configuration has been modified to accommodate the connection of a Halon 1301 system. The Halon and CO_2 systems share common branch lines within each individual fire zone. Design Packet RFC 12-2624 deleted several nozzles and replaced another five nozzles on these common branch lines with nozzles designed for use by both CO_2 and Halon 1301 systems. A review of successful pre-operational test results for the Unit 1 and 2 Control Room Cable Vaults, indicates that an additional amount of agent, approximately 2000 lbs. for Unit 1 and 1700 lbs. for Unit 2, is being discharged into the cable vaults above 2745 lbs. calculated to achieve the required concentration for each individual unit. Although the nozzle quantity has been modified slightly, the piping arrangement has remained unchanged from when the pre-operational tests were performed. Therefore, the required agent concentration will be achieved throughout the space as required. In addition, the CO_2 systems are verified for their operability every 18 months by "Puff" tests.

References:

-Procedure 12 THP4030 STP.225.010, Rev. 1, 5/14/87
-Chemetron Calculation FL-15771 Sheet 11, Rev. 0, 7/19/77
-Chemetron Drawing FL-15771 Sheet 11, Rev. E 9/28/77
-AEPSC Flow Diagram 12-5153L, Rev. 0, 8/20/87
-Pre-Operational Tests Dated 10/3/74 (Unit 1) and 11/77 (Unit 2)
-RFC 12-2624

NFPA 12 (1968 Edition) Code Section 1436, 1632, and 1634

Deviation: Documentation for the equipment listed was not available for review to confirm compliance with the referenced code sections. The data required is the following:

1436 Documentation to verify that the Electric-Mechanical Pilot Cabinet (EMPC) manual controls do not require a force of 40 lbs. with a travel distance of 14" for operation of the system.

1632 & 1634 Documentation to verify that the hydrostatic test pressures and equivalent lengths of valves installed are acceptable for use in the systems provided.

Justification: Based on the review of the Record of Conversation memo dated 6/8/88 and the Factory Mutual (FM) System Approval Guide, the following conclusions verifying compliance of these devices with the applicable code sections are:

1436 Documentation was not available from the manufacturer to confirm that the EMPC cabinets met the requirements of this code section. These cabinets however, are FM approved for use in the carbon dioxide fire suppression system installed at this plant. These cabinets have been tested by FM to verify that they will properly operate the CO_2 system in an emergency situation as required by NFPA 12. Therefore, these cabinets are acceptable for use in this system.

1632 & 1634 Based on the data retreived and documented in the Record of Conversation dated 6/8/88, the CO_2 system selector valves manufactured by Chemetron Corporation for use in their CO_2 systems meet the requirements of these code sections for the minimum hydrostatic test pressures and equivalent lengths for use in these systems. In addition, these valves have been tested and approved by FM for use in these CO_2 systems. Therefore, these valves are considered acceptable for use with the systems installed in the areas reviewed.

Based on the evaluation discussions above, these devices are considered acceptable for use in the CO_2 systems reviewed.

Reference:
- Record of Conversation dated 6/8/88 between D. E. Kipley (Impell) and S. Dometravich (Chemetron)
- Factory Mutual System Approval Guide, 1987 Edition

NFPA 12A (1977 Edition) Code Sections 1-5.4 & 1-7.4

Deviation: Documentation reviewed for the results of the concentration testing performed for the Halon 1301 fire suppression systems installed for the Unit 1&2 Computer Rooms (Fire Zones 71&72) at elevation 650' of the Auxiliary Building, indicated that the tests were unsatifactory.

Justification: Based on the review of the letter from J.D. Grier to E.C. Schimmel dicussing the results of the retesting of these systems to confirm that these systems are capable of achieving and maintaing the required concentration, are considered acceptable. As dicussed in the letter, Unit 2 Computer Room (Fire Zone 72) succesfully passed the testing performed. Unit 1 Computer Room (Fire Zone 71) did not maintain the concentration for the full ten minute period throughout the space. Based on the justification dicussion however, this system is considered acceptable.

Reference: -Letter discussing Computer Room concetration test results from J.D.Grier (AEPSC) to E.C. Schimmel (I&M), dated 5/13/88

AEP
AMERICAN ELECTRIC POWER

Date May 13, 1988

Subject COOK NUCLEAR PLANT
Units 1 and 2
P-250 Computer Room Halon System
Concentration Tests

From J. D. Grier

To E. C. Schimmel

On February 29, 1988, the Halon Concentration Test was conducted for the Unit 1 P-250 Computer Room Halon System. The results were transmitted to AEPSC via a March 2, 1988 memo from E. C. Schimmel to J. D. Grier. The Unit 2 P-250 Computer Room Halon System Concentration Test was conducted on April 12, 1988 and the results transmitted via a April 13, 1988 memo from E. C. Schimmel to J. D. Grier.

The results of both concentration tests have been reviewed and found acceptable.

Based on the following, it has been determined that even though the minimum criteria of maintaining a 5% Halon 1301 concentration for 10 minutes was not met at one of the probe locations in the Unit 1 test, both concentration tests are acceptable.

1) The results at the other probe locations surpassed the minimum criteria.

2) The requirement to maintain the halon concentration for 10 minutes is derived from the NFPA Standard 12A guidance for control of a deep-seated fire.

3) It is considered highly unlikely that a deep-seated fire could occur at the location of the probe which did not meet the criteria.

4) Most surface fires are promptly extinguished by achieving the required concentrations of Halon 1301.

5) Test results show that the concentration was maintained for greater than 5 minutes which should be sufficient to allow the embers of a surface fire and even some deep-seated fires to be extinguished.

Intra-System

I discussed the results of the halon concentration tests with M. S. Broeker (ANI). He was aware of the concentration not being maintained at the one probe for 10 minutes. Mr. Broeker's initial response was agreement with the above, and he indicated he would let me know after a further review if he did not agree.

J D Grier

J. D. Grier

JDG/ems

cc: M. S. Broeker - ANI
P. G. Schoepf (MED 88-20-1)
W. G. Smith, Jr. - Bridgman

NFPA 12A (1977 Edition) Code Section 1-8.5.1

Deviation: Documentation was not available to confirm the presence of discharge alarm signaling devices within the Unit 1 (Fire Zone 57) and Unit 2 (Fire Zone 58) Control Room Cable Vaults at elevation 625'-10" of the Auxiliary Building.

Justification: The review of the Record of Conversation memo dated 6/7/88 and drawings 12-5153L, 1&2-98982, 2-98981 and 1&2-95937 verifies that the common CO_2 and halon system discharge piping header pressure switches, interface with auxiliary alarm relays to activate alarm signaling devices (alarm bell) installed within each individual fire zone referenced above.

Therefore, the alarm signaling required for alerting operating personnel of an impending discharge of the halon 1301 fire suppression system within Fire Zones 57 and 58 has been provided and is considered acceptable.

Reference:
- Record of Conversation between D. E. Kipley (Impell) and E. Schimmel (I&M), dated 6/7/88
- AEPSC Drawings:

12-5153L-1, 2/9/87	2-98981-21, 1/5/88
1-98982-20, 10/30/87	2-98982-20, 11/5/87
1-95937-18, 4/29/86	2-95937-13, 4/29/86

NFPA 13 (1971 Edition) Code Section 1141

Deviation: Documentation was not available to verify whether the flooring was watertight as required by this code section.

Justification: An evaluation (Inadvertent Actuation Study, Information Notice 83-41) is currently being performed to identify inadequacies in the design of fire suppression systems with respect to causing damage to safety related systems. This evaluation will identify vulnerabilities to safety related electrical equipment due to sprinkler spray impingement and flooding caused by sprinkler systems. Deficiencies identified during this evaluation will be addressed by performing modifications where required to correct these items.

This evaluation is being coordinated by the Nuclear Safety and Licensing Division of American Electric Power Service Corporation.

Based on the completion of this evaluation and modifications as required, this condition will be considered acceptable.

Reference: -Inadvertent Actuation Study, Information Notice 83-41 memo dated 2/2/88 from R. S. Papps/J. Beller to J. A. Kobyra/A. B. Auvil

NFPA 13 (1971 Edition) Code Sections 3241 and 3783

Deviation: The Unit 2 Control Room Cable Vault (Fire Zone 58) automatic sprinkler riser, located at Column Lines WL-7.4 and H, on elevation 609'-0" of the Turbine Building is provided with a Viking Model B-3 retarding chamber which directly discharges water onto the Turbine Building floor which contains numerous unsealed penetrations.

Justification: The review of the manufacturer's data sheet indicates that an 1/8" orifice is provided for the drain of the retarding chamber. Upon reviewing NFPA 13, 1983 Edition, Appendix A, Section A-3-16.5 it can be determined that an 1/8" orifice at 100 psi will discharge approximately 7 GPM. Since safe shutdown cables and equipment are not located adjacent to the system riser or directly below the riser on elevation 587'-0", as verified by reviewing the Safe System Shutdown Analysis (SSSA) and the amount of water being discharged is minimal, this condition is considered acceptable.

References:
- NFPA 13, 1983 Edition
- SSSA Volume 1, Output 2
- SSSA Volume 2, Output 7
- Viking Data Sheet "Retarding Chamber Model B-3"

NFPA 13 (1983 Edition) Code Section 1-9.2

Deviation: The hydraulic design density data required on the sprinkler system as-built drawings has not been provided.

Justification: A review of the as-built sprinkler installation drawings indicates that some of these drawings do provide the design data required. Where this data is not provided on the drawings however, the drawings reference the hydraulic calculations which indicates the design density data on the front cover sheet of the calculations. Therefore, this data has been provided as required by reference on the drawings to the calculations.

Based on the review of evaluation discussion above, the drawings have provided the data as required by this code section.

Reference:

- Grinnell Hydraulic Calculations for Contract No. 1463.032-B7 & 1463.032-137
- Phoenix Contractors Inc. Hydraulic Calculations for Contract No. 79412, 79414, 80422 & 83422
- Hodgeman Manufacturing Co. Hydraulic Calculations for Contract No. 121

NFPA 13 (1983 Edition) Code Section 3-17.4.5

Deviation: Non-indicating type isolation valves are used in the alarm test bypass and the waterflow alarm pressure switch trim lines for the sprinkler system alarm valves of the sprinkler systems reviewed.

Justification: A review of the Record of Conversation Memo dated 6/7/88; indicates that a recent revision to surveillance procedure 12 OHP 4030 STP.120VV has incorporated the requirements to verify the position of these valves during the performance of the surveillance. The valve position is verified by the valve being sealed in the appropriate position.

Based on the verification of the valve position during the performance of this surveillance, an equivalency for indicating type valves can be made due to the valves being sealed in their appropriate position, thus providing a method of indication.

Reference:
- -Record of Conversation between D. E. Kipley (Impell) and D. Bruck (I&M), dated 6/7/88
- -Procedure 12 OHP 4030 STP.120VV, Revision 0, 4/14/88

NFPA 13 (1983 Edition) Code Section 4-1.1.1 and 4-1.1.4

Deviation: A sidewall sprinkler water spray pattern is partially obstructed by fire main piping which is located directly below the sprinkler. The sprinkler is located in Fire Zone 44N at column lines WL-L.1 and WL-4.9 on Elevation 609' of the Auxiliary Building.6

Justification: A walkdown of the plant the week of 4/4/88 was performed to confirm the deviation and combustible loading configurations in Fire Zone 44N. The walkdown verified that the sidewall sprinkler in question was installed such that the water spray of the sprinkler would not provide protection for the area directly below the sprinkler. The intent of the sprinkler was to provide protection in the immediate area in front of the sprinkler beneath the heavy conduit and HVAC duct congestion. The sprinkler is located along the normal path of egress out of the Auxiliary Building and is afforded mechanical damage protection by the fire main configuration. The configuration of the fire main will restrict storage of transient combustibles directly under the sprinkler, therefore, limiting the potential of a fire occurring there. A review of the data sheet for the sidewall sprinkler indicates that the water spray pattern is primarily discharged up, out, and back toward the wall. This type of trajectory of the water will aid in providing coverage for the limited area obstructed.

Currently there is some limited spray pattern obstruction due to the heat collector side shields for this sprinkler. However, additional sprinklers have been installed at the ceiling and beneath the heavy conduit and HVAC duct congestion to assist in providing adequate sprinkler protection for the area. The heat collector side shields have been identified as an obstruction and will require a modification.

Based on the evaluation discussion above, the current sprinkler installation is considered acceptable.

Reference: -Viking sidewall sprinkler Model C-4 technical data
-Phoenix Drawing No. A609N, Sheet 38, Rev. 6, 6/11/84

NFPA 13 (1983 Edition) Code Section 4-1.1.1 and 4-1.1.4

Deviation: Two (2) upright sprinkler water spray patterns are partially obstructed by an HVAC duct at column lines WL-L and WL-4.4 and WL-K.7 and WL-4.4 in Fire Zone 44N on Elevation 609' of the Auxiliary Building.

Justification: A walkdown performed the week of 4/4/88 at the plant verified that (2) sprinklers were installed at the ceiling. The sprinklers are located 1'-6" and 2" away from the side of a 6' wide duct. The HVAC duct is located approximately 3' from the wall. The water spray from these sprinklers will provide protection in the immediate area between the duct and the wall only. There were, however, (2) upright sprinklers located under the 6' wide duct which are approximately 3.5' horizontally from sprinklers in question. These sprinklers have a spray pattern which will adequately provide protection in the immediate area in addition to the limited protection provided by the obstructed sprinklers. Additional sprinklers were also installed at the ceiling on the opposite side of the duct which will provide additional protection in the immediate area.

Based on the review of the sprinkler protection configuration, adequate protection is provided in the area discussed and the sprinkler arrangement is acceptable.

Reference: -AEPSC Drawing 12-5717-8, 9/27/85

NFPA 13 (1983 Edition) Code Section 4-1.1.1 and 4-1.1.4

Deviation: An upright sprinkler water spray pattern is obstructed by a 3/4" conduit drop in Fire Zone 17E on Elevation 587' at column lines 6.9 and WL-5.9 of the Turbine Building.

Justification: A walkdown performed the week of 4/4/88 at the plant, confirmed the partial obstruction of the spray pattern by the 3/4" conduit drop for a light fixture. The conduit was measured to be 4" laterally from the sprinkler. Code Section 4-2.4.5 of NFPA 13, 1983 Edition discusses bar joist web member obstruction limitations. Based on the discussion, a 1/2" diameter web member would require the sprinkler to be spaced laterally at least 3" away and a web member not exceeding 1" in diameter shall be spaced at least 6" laterally from the sprinkler. From this data we can assume that a 3/4" diameter web member would require a lateral sprinkler spacing from the member of 4 1/2". As determined by the walkdown, the sprinkler is laterally spaced 4" from the 3/4" conduit. Therefore, the water spray obstruction will be negligible. In addition, the sprinkler spacing is such that the water spray from adjacent sprinklers will aid in providing adequate protection of area.

Based on the review of the evaluation discussion above, the configuration of the sprinklers in this fire zone is considered acceptable.

Reference: -NFPA 13, 1983 Edition.

NFPA 13 (1983 Edition) Code Section 4-1.1.1 and 4-1.1.4

Deviation: The sidewall sprinklers that are installed 10' above the finished floor in Fire Zone 52 on Elevation 633' of the Auxiliary Building at column lines WL-L.3 and WL-7.7 to WL-8, have obstructed water spray patterns due to numerous conduit and cable tray interferences. These sidewall sprinklers are located 6.75' and 9' from the southeast corner of the Unit 2 Control Room wall.

Justification: A walkdown of the plant was performed the week of 4/4/88 to confirm the combustible loading and sprinkler configurations in this area. The water spray interferences consist of MCC panel 2-AM-D which is 8' high and is located 5.5' east of the west wall of Fire Zone 52 at column line WL-L.3. Two cable trays have been stacked on top of the MCC panel to increase the interference height to 9' above the finished floor (AFF). Numerous conduits have been routed along west wall of Fire Zone 52, from 9' AFF to 11' AFF. A 4' wide HVAC duct with the bottom of the duct being 10' AFF, is located 5.25' east of the west wall in Fire Zone 52 at column line WL-L.3. The water spray interferences occur behind the MCC panel where the side wall sprinklers are located. Although NFPA 13, Section 4-4.13 does not require protection under a 4' or less wide duct, the water spray pattern interferences of the two sidewall sprinklers are such that protection may not be provided in front of the MCC panel and under the duct in that immediate area. The sidewall spray pattern will provide adequate protection behind the MCC panel where due to this panel placement, access to this area is limited. Upright automatic sprinklers are also installed at the ceiling directly over the top of the MCC panel which will provide protection for the for the MCC panel and cable trays in that immediate area. Since the MCC panel is installed immediately adjacent, the normal path of travel in the fire zone and the area immediately in front of the MCC panel is identified as being a "Clear Area", storage of transient combustible in this area should not occur. Therefore, exposure fires in front of the MCC panel from transient combustibles is highly unlikely.

Based on the review of sprinkler configuration in this area, adequate sprinkler protection will be provided for the combustibles present in this area.

Reference:
- Viking Sidewall Sprinkler Model C-4 Technical Data Sheet
- NFPA 13, 1983 Edition

NFPA 13 (1983 Edition) Code Section 4.2.4.6

Deviation: Upright sprinkler water spray patterns are partially obstructed by beam construction at two locations in Fire Zone 52 on Elevation 633' of the Auxiliary Building. The first location is at column lines WL-K.6 and WL-3.5 and the second location is at WL-K and WL-3.5.

Justification: A walkdown performed the week of 4/4/88 at the plant confirmed the sprinkler and combustible loading configurations in these areas. The upright sprinklers located at the ceiling at column lines WL-K.6 and WL-3.5 are installed within 3" of a 12" deep beam. These obstructed sprinklers are located above the HVAC unit 1-HV-AS1.

Due to the location of the sprinklers with respect to the beam, the beam will obstruct the sprinkler discharge pattern. However, to compensate for this obstruction, sprinklers were placed on the opposite side of the beam. The two branch lines are only 4 feet apart, therefore, providing adequate coverage to the area.

Obstructed upright sprinklers are also installed above HVAC unit 1-HV-AS2 near column lines WL-K abd WL-3,5. The sprinklers are located at the ceiling within 3.5" of an 18" deep beam. The water spray pattern of the sprinklers will be obstructed by the beam due to the depth of the beam and the distance of the sprinkler from the beam. Sprinklers were, however, installed on both sides of the beams and two side wall sprinklers were also located in this area approximately 10' above the finished floor. The presence of these sprinklers will provide protection required for this area.

Based on the evaluation discussion above, the configuration of the sprinklers provided are considered to be acceptable.

Reference:
- Viking sidewall sprinkler model C-4 technical data sheet.
- Phoenix Contractors Inc., hydraulics calculation for Drawing No. A633N, AS-Built 8/16/84.
- AEP Drawing 12-5719-8, 8/20/85

NFPA 13 (1983 Edition) Code Section 4-4.1.13

Deviation: Automatic sprinklers have not been installed under a 6' wide HVAC duct at column lines WL-L.5, between WL-3.5 to WL-4.5 in Fire Zone 52 on Elevation 633' of the Auxiliary Building.

Justification: A walkdown of the plant was performed the week of 4/4/88 to verify the configuration of the combustible loading and the automatic sprinklers for the area in question. The walkdown confirmed that sprinklers were not placed directly under the duct at column WL-L.5. There were, however, sidewall sprinklers installed along the west wall of Fire Zone 52 at column line WL-L.3. These sprinklers are located 9' above the finished floor (AFF), 10' on center and 13.5' east of column line WL-L. A review of Phoenix drawing No. A633N, Sheet 33 also verified the installation of a sidewall sprinkler under the 6' wide duct. This sprinkler was located approximately 13.5' north of column line WL-4 and 17.25' east of column line WL-L. The spray trajectory will be primarily under the duct. The HVAC duct bottom is located 10.5' AFF with the west side of the duct installed parallel with column line WL-L and 17.5' east of this line. The HVAC duct is installed directly over the normal path of travel which will make the storage of transient combustibles under this duct highly unlikely.

The area required to be provided with protection by the sidewall sprinklers will require a minimum water spray trajectory of 10'. The review of the Viking Model C-4 sidewall sprinkler Data Sheet indicates that the sidewall sprinklers will deliver a forward water spray trajectory of 20' based on 15 psi at the sprinkler. In addition, these sprinklers will also deliver a 16' side trajectory water spray pattern based on this pressure. The Phoenix contractor's hydraulics calculation indicates that the most remote sprinkler will be provided with 16.1 psi. Therefore, the sidewall sprinklers will provide proper protection under the 6' wide duct with the water spray pattern that will be developed for the most conservative condition.

Based on the discussion above, the area under the 6' wide duct is being properly protected and is considered to be acceptable.

Reference:

- Viking sidewall sprinkler Model C-4 technical data sheet
- Phoenix Contractors, Inc. Hydraulics calculations for drawing No. A633N, Sheet 33, as-built 8/16/84.

NFPA 13 (1983 Edition) Code Section 4-4.19

Deviation: Two (2) sidewall sprinklers installed under a 6'-0" wide HVAC duct at column lines WL-K.5 and WL-3.9 in Fire Zone 52 on Elevation 633' of the Auxiliary Building are installed 12" apart and are not provided with baffle plates.

Justification: The walkdown performed the week of 4/4/88 at the plant, verified the configuration of the sidewall sprinklers. The sprinklers are installed with the sprinkler deflectors facing away from one another so that the water spray pattern of one sprinkler will not wet the other sprinkler which cause a delayed response. Since the sprinkler configuration will not present this delayed response potential, baffles will not be required and the installation is considered acceptable.

Reference: -Viking sidewall sprinkler Model C-4 Technical Data Sheet.

NFPA 14 (1971 Edition) Code Sections 322 & 421
NFPA 14 (1978 Edition) Code Sections 3-2.2, 4-2.1, 4-3.2, & 1-11.3
NFPA 14 (1986 Edition) Code Section 4-4.3.1

Deviation: Several hose stations located within the Auxiliary Building on elevations listed below, are provided with hose lengths greater than the maximum length of 100' as required for Class II hose stations.

Zone	Elevation	Hose Station
33A	612'	203
34A	612'	207
130	633'	81
52	633'	82
52	633'	65
130	633'	67
97	609'	45
129	633'	79
90	609'	58

Justification: Based on the review of the hydrualic calculations performed by AEPSC, these hose statons are provided with adequate waterflows and pressures required to support fire fighting activities with the exception of Hose Stations No. 65 & 82. These hose stations however, are being upgraded to provide 2 1/2" diameter hose on the spare hose reels, (65A & 82A) located adjacent to the primary hose reels, in lieu of the 1 1/2" hose existing. This upgrade, performed under RFC No. 12-2983, will provide the waterflow and pressures required to support the fire fighting activities necessary. Although this hose exceeds the required diameter (1 1/2"), the justification discussion for NFPA 14, 1971 Edition, Code Section 321 that only trained personnel (fire brigade) use this equipment, will also apply to the use of 2 1/2" diameter hose.

Based on the review of the evaluation discussion above, the physical configuration of the fire hose stations for the fire fighting activities required are considered acceptable.

Reference: -RFC Packet No. 12-2983
-AEPSC Calculations:
DCCFP01HS02F, Revision 0, 2/24/88
DCCFP01HS14F, Revision 0, 2/24/88
DCCFP01HS16F, Revision 0, 2/24/88
DCCFP01HS17F, Revision 0, 2/24/88
DCCFP01HS19F, Revision 0, 2/24/88
DCCFP01HS22F, Revision 0, 2/24/88
DCCFP01HS28F, Revision 0, 2/24/88
DCCFP01HS29F, Revision 0, 2/24/88
DCCFP01HS30F, Revision 0, 2/24/88
DCCFP02HS01F, Revision 0, 2/24/88
DCCFP02HS04F, Revision 0, 2/24/88
DCCFP02HS08F, Revision 0, 2/24/88
DCCFP02HS10F, Revision 0, 2/24/88
DCCFP02HS13F, Revision 0, 2/24/88
DCCFP02HS24F, Revision 0, 2/24/88
DCCFP02HS25F, Revision 0, 2/24/88

NFPA 14 (1971 Edition) Code Sections 511 & 524

Deviation: Documentation was not available to verify the adequacy of the water supply for the hose stations.

Justification: Based on the review of the hydraulic calculations performed by AEPSC, the waterflows and pressures required for fire fighting activities are adequate with the exception of Hose Stations 65, 82, 209 & 210. These hose stations however, are being upgraded to correct this deficiency under RFC No. 12-2983, by replacing the existing 1 1/2" hose with 2 1/2". This upgrade will provide the waterflows and pressures required to support fire fighting activities in these areas.

Based on the review of the evaluation discussion above, the water supply provided for the hose stations is adequate and is considered acceptable.

Reference:

- -RFC Packet NO. 12-2983
- -AEPSC Calculations:
  - DCCFP02HS01F, Revision 0, 2/24/88
  - DCCFP01HS02F, Revision 0, 2/24/88
  - DCCFP02HS03F through DCCFP02HS13F, Revision 0, 2/24/88
  - DCCFP01HS14F through DCCFP01HS23F, Revision 0, 2/24/88
  - DCCFP02HS24F through DCCFP02HS26F, Revision 0, 2/24/88
  - DCCFP01HS27F through DCCFP01HS30F, Revision 0, 2/24/88

NFPA 15 (1973 Edition) Code Sections 2031 & 4072

Deviation: The inspection of the charcoal filter units reviewed for compliance with this code, indicated that the water spray system nozzle spray for the charcoal fitler beds are obstructed by the filter unit housing and will not discharge water onto all filters present in the unit.

Justification: A walkdown of the plant was performed the week of 4/4/88 and included the inspection of the Unit 1&2 Control Room filter units (1&2-HV-ACRF-1) located at elevation 650' of the Auxiliary Building. American Air Filter Company drawings 107D-890251H and 107D-914184E were also reviewed to confirm the configuration of the charcoal beds with respect to the sray nozzles installed.

The water spray system nozzle configuration within these units are arranged to discharge water across the entire surface of the charcoal filter beds. A review of the ANI recommendations for charcoal filter unit protection, indicates that the charcoal filter beds are the only filters within this type filter unit that are required to be protected with a water sray system. This is due to the charcoal filter beds being the primary combustible within these units and the primary source of a fire. Since the charcoal filter beds are protected as required, the water spray system configuartion is acceptable as installed.

Based on the review of the evaluation discussion above, the water spray systems installed within the charcoal filter units reviewed, are considered acceptable.

Reference:
- American Nuclear Insurers (ANI) Recommendations for Carbon Filters, dated 9/77.
- American Air Filter Company Drawings:
  107D-890251H, Revision H, 5/2/73
  107D-914184E, Revision E, 5/2/73

NFPA 15 (1973 Edition) Code Sections 4011, 4032b, 4081, 4082d, 4101, 4102, 4103, 5023, 7000, 7010

Deviation: Documentation was not available to confirm the configuration or the adequacy of the water spray systems installed within the charcoal filter units reviewed.

Justification: A walkdown of the plant was performed the week of 4/4/88 to confirm the configuration of the water spray systems installed within the charcoal filter units. The only charcoal filter units that could be inspected included the Unit 1 & 2 Control Room filter units (1-HV-ACRF-1 & 2-HV-ACRF-1). The inspection confirmed the configuration of the nozzles being properly placed to discharge water across the entire surface of the charcoal filter beds as required by the ANI recommendation criteria.

The inspection of these units also verified that piping support configurations consisting of angle iron supports attached primarily to the filter unit housing, with U-Bolt mechanical fasteners. The U-Bolt fasteners fix the spray system piping to the angle iron supports to adequately support the piping system. Although only two units were accessible during the walkdown, both units were typical of one another presenting the evidence necessary to make the general assumption that all the water spray piping systems for the charcoal filter units are typically supported in a similar fashion.

Sketches of the Control Room water spray system piping and support configurations have been prepared to provide documentation for future reference. In addition, hydraulic calculations and sketches for the water spray systems installed within the two largest charcoal filter units (1-HV-AFX-1 & 2-HV-AES-1) have been prepared by AEPSC. Based on the review of these calculations, an adequate water supply with the proper pressures available at all nozzles installed, is provided for these water spray systems. Since these water spray systems are similar in configuration to the larger systems being calculated, it can be assumed that the water spray systems installed in smaller filter units will provide the waterflow and pressures required to provide adequate discharge patterns for their nozzles.

Based on the review of the evaluation discussion above, the charcoal filter unit water spray system configuration is considered acceptable.

<u>Reference:</u>

-American Nuclear Insurers (ANI), Recommendations for Charcoal Filter Units, 9/77.

-AEPSC Calculations:
DCCFP01HS02F, Revision 0, 2/24/88
DCCFP02HS25F, Revision 0, 2/24/88

-Spraying Systems Co. "Unijet" spray nozzle model 3/8 TT9540, Catalog No. 29A, pages 22&23, 1973 Edition.

-AEPSC System Description SD-DCC-FP101, Revision 1, 2/19/87

NFPA 15 (1973 Edition) Code Section 4081

Deviation: The supply piping for the charcoal filter unit (12-HV-SATFU) for the Spray Additive Tank Room (Fire Zone 61) is a smaller diameter pipe (3/4") than the one inch minimum diameter required by this code section. This filter unit is located on the elevated platform in the northeast corner of Fire Zone 5. Fire Zone 5 is located at elevation 587' of the Auxiliary Building.

Justification: The review of Charcoal Service Corporation Drawing H8-1181, indicates that Charcoal Filter Unit 12-HV-SATFU is provided with three charcoal filter beds that are protected by a manually connected and actuated water spray system. The square foot area of the filter beds for filter unit 12-HV-SATFU are 6 square feet as documented by the referenced drawing. This drawing also indicates that four spray nozzles have been installed within this filter unit to provide suppression capabilities for the filter beds.

Based on the review of the ANI criteria for protecting charcoal beds, a density of .25 GPM/FT2 is required to provide adequate protection of the filter beds. Since each bed surface area is 6 FT2, than 1.5 GPM of water is required for each spray nozzle installed. Since only four nozzles are provided within filter unit 12-HV-SATFU, than a total of 6.0 GPM is required for the water spray system installed. A review of Automatic Sprinkler Hydraulic Data Table for Black Steel Pipe, indicates that a 3/4" black steel pipe can deliver a maximum flow of 31 GPM. Therefore, this 3/4" supply pipe will adequately provide the waterflow required to control a fire within this filter unit.

Based on the review of the evaluation discussion above, the installation configuration of the water spray system for Charcoal Filter Unit 12-HV-SATFU is considered acceptable.

Reference:

-American Nuclear Insurers (ANI) Recommendations for Carbon Filters, 9/77

-Automatic Sprinkler Hydraulic Data Friction Loss Table for Black Steel Pipe, page FT-1, 1964 Edition.

-Charcoal Service Corporation Drawing H8-1181, Revision 0, 8/1/81.

NFPA 15 (1973 Edition) Code Sections 4101, 4102 & 4103

Deviation: The inspection of charcoal filter unit 1-HV-CIPX-1 located in Fire Zone 33A at elevation 612' of the Auxiliary Building, identified an improper pipe support installation of the water spray system piping to the filter unit.

Justification: A hanger rod for the water spray piping system was welded directly to the system piping to act as a method of supporting the pipe. A walkdown of the Unit 1 & 2 Control Room filter units performed the week of 4/4/88, indicated that this pipe support configuration is not consistent for all the filter units and is considered an isolated condition.

A review of the Fire Hazards Analysis, has indicated that this filter unit is not required for safe shutdown of the plant and is considered to be Non-Safety Related equipment. Therefore, the requirement seismic supporting of the piping is not required. In addition, the Fire Hazards Analysis also indicates that the filter unit water spray system is manually operated thus preventing the potential for an uncontrolled activation of the system where the system piping may be damaged by a water hammer effect. Should an unlikely failure of the piping system occur, operating personnel will be present to manually shut the system down and take steps to provide alternate suppression capabilities (hose stations).

Based on the review of the evaluation discussion above, this pipe support configuration is adequate for this system's installation and is considered acceptable.

Reference: -Fire Hazards Analysis, Revision 2, 1/29/88

NFPA 15 (1973 Edition) Code Section 4121

Deviation: Pressure gages have not been installed for the charcoal filter units and the H2 Tube Storage Rack water spray systems within the areas reviewed.

Justification: The purpose of these gages are to provide a means by which the integrity of the system piping and system performance can be verified. A review of the Fire Protection System Description (SD-DCC-FP101) indicates that the water spray systems referenced above are open nozzle type spray systems that are either activated manually (filter unit systems) or by dry pilot sprinklers (H2 rack system).

Therefore, the requirement for Code Section 4121c for hydraulically controlled systems is no longer applicable based on the description above. The requirement for Code Section 4121b, d, & e for air pressure supervision are not applicable based on the justification discussion in NFPA 72D, 1967 Edition, Code Sections 3441, 3442 & 3443, Justification b.

The requirement (Code Section 4121a) for verifying the performance of the systems by providing a gage on the supply side of the automatic valve however, is applicable. Calculations performed by AEPSC for the charcoal filter unit water spray systems and by Grinnell for the H2 Rack water spray systems, verifies the performance of these systems by confirming that the waterflow and pressures required at nozzles are adequate for providing the proper water spray discharge patterns. Therefore, gages do not significantly enhance the fire protection capabilities of these systems and are not considered necessary.

Based on the review of the evaluation discussions above, the lack of gages installed on the charcoal filter unit and H2 Rack water spray system risers, is considered acceptable.

Reference:
- Impell Technical Report No. 09-0120-0123, Revision 0, 5/88
- AEPSC System Description: SD-DCC-FP101, Revision 1, 2/19/87
- AEPSC Calculations:
  DCCFP01HS02F, Revision 0, 2/24/88
  DCCFP02HS25F, Revision 0, 2/24/88
- Grinnell Calculation, " The H2 Bulk Storage Tanks", Revision 1, 12/18/71
- Spraying Systems Co. "Unijet" spray nozzle Model 3/8 TT9540, Catalog No. 29A, pages 22 & 23, 1973 Edition

NFPA 72D (1967 Edition) Code Section 2154

Deviation: Documentation was not available to confirm that the alarm initiating and signaling circuits and cables installed for the systems reviewed, have met the criteria required by this code section for limited energy cable.

Justification: The review of the Record of Conversation memos dated 6/8/88 and 6/9/88 in addition to the drawings referenced below, confirms that the alarm initiating and signaling circuits and cables installed for the Chemetron CO2, Pyrotronics system 3 and FIU systems and the Rochester "EF" annunciator panels, meet the requirements of this code section with the exception of the requirement that the cables be approved for the application of a limited energy cable.

A review of the cable description telex dated 3/16/88 forwarded to Impell from AEPSC, indicates the type, size and quantity of conductors for selected cables. The description of the type of insulation is also provided. The cables reviewed meet or exceed the requirements of Code Section 2155 which provides the requirements cable characteristics.

Based on the review of this documentation, an equivalency can be made that the cables reviewed, will meet the requirements of Code Section 2155 due to the attributes of the construction features of these cables.

Since the circuit characteristics for the alarm system meets the requirements of Code Section 2154 and an equivalency has been made to confirm compliance with the requirement for an "approved " cable as verified under Code Section 2155, these cables are considered to be acceptable for use in the alarm system as installed.

Reference:

-Record of Conversations

a. D.E. Kipley (Impell) and S. Dimetravich (Chemetron), dated 6/8/88.

b. D.E. Kipley (Impell) and D. Deipalmer (Rochester), dated 6/9/88.

-Telex 6142232004 page 1-5, cable descriptions and circuit characteristics, dated 3/16/88.

-AEPSC Drawings:

1-2010-58, 5/23/86	1-95936-16, 4/15/88
1-2011-49, 5/18/87	1-95937-18, 4/24/86
1-2012-38, 5/21/87	1-95939-15, 11/20/87
1-98612-14, 3/1/88	1-95928-4, 10/15/86
1-98990-3, 10/16/86	1-95981-18, 3/17/87
1-98991-13, 2/16/88	1-98992-0, 11/15/72

IMPELL CORPORATION

LOCATION AEPSC

TELECOPIER # (614) 223-2004

DATE MARCH 16, 1988

TO LIZ TAYLOR (AEP)

FROM DAVID KIFLEY (IMPELL)

NUMBER OF FOLLOWING PAGES 4

LIZ:
SORRY FOR THE DELAY, BUT I AM STILL TRYING TO GET CIRCUIT CURRENT REQUIREMENTS FOR THE CO_2 SYSTEM CIRCUITS.

300 TRI STATE INTERNATIONAL, SUITE 400 • LINCOLNSHIRE, IL 60015 • (312) 940-2000

TRANSMISSION REPORT

THIS DOCUMENT (REDUCED SAMPLE ABOVE)
WAS SENT

** COUNT **
# 5

*** SEND ***

NO	REMOTE STATION I. D.	START TIME	DURATION	#PAGES	COMMENT
1	91-6142232004	3-16-88 4:16PM	8'35"	5	
		TOTAL	0:08'35"	5	

XEROX TELECOPIER 7020

Information Requested by Dave Kipley

	Item #	DWG #	CIRCUIT VOLT & CURRENT	Description
Press Sw., Per. Sw., & Lo. Press. Sw.	314	1-2011 1-98612	125 VDC 1MA	4 Conductor #7/18 (7 wires of 18 gauge, which is approximately equal to a #10 gauge), 600V insulation SISJ or PE/PVC
AK CAB. #C 2D STALLR ES. SW.	315	1-2011 1-98612	125 VDC 1MA	7 Conductor #7/18 control cable, 600V insulation PE/PVC
	324	N/A		3 Conductor Twisted #12 Stranded copper, 600V insulation EPR/Neoprene,Okoprene,Hypalon, or CSPE
	325	N/A		3 Conductor Twisted #10 Stranded copper, 600V insulation EPR/Neoprene,Okonite/Okoprene, or EPR/Hypalon
	348	N/A		3 Conductor Twisted #2 Stranded aluminum, 600V insulation EPR/Neoprene or Okonite/Okoprene
	871	N/A		1 Conductor #12, 7 Stranded copper, 600V insulation XLP or EPR
DET.	3007	1-2011 1-98992	250 VDC 20MA	1 Conductor #12 Stranded copper, 600V insulation XLPE
12-2678 3 DET. TB	3044	1-2010 1-95981 1-95928	24 VDC 200MA	2 Conductor #16 Stranded copper, 600V Shielded PE/PVC (copper shield with a PVC jacket)
2-2618 TEM. 3 DET. BELL CKT.	3064	1-2010 1-95928	24 VDC 1.5A	2 Conductor #16 Tinned copper, 600V insulation XLPE/Hypalon or EPR/Hypalon or XLPE/CSPE
12-2694 R TO 3 DET.	3077	1-2010 1-98991 1-98990	250 VDC 20MA	4 Conductor #16 Twisted copper, 600V insulation XLPE/Hypalon, XLPE/CSPE,or CSPE/CSPE
	3110	N/A	40MA	1 Conductor 2000MCM Stranded aluminum, 5kV insulation Okoguard/Okoprene
C121543 RELAY TO HAZ #1-6	3119	1-2012 1-95936, 37, 39	250 VDC	2 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid,Vulkene/Asbestos Braid or EPR/CSPE
12-2625 EFR TO 5,3 57.	3120	1-2010 1-98991	250 VDC 20MA	4 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, or EPR/CSPE

page 2 (cont'd list from page 1)

Item #	ROW #		Description
3121	1-2011 1-98612	125 VDC 1MA.	7 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, XLPO/Hypalon, or EPR/CSPE
3122	1-2011 1-98991 1-98992	250 VDC 22MA	12 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, EPR/CSPE, or CSPE/CSPE
3123	NA		15 Conductor #12 7-Stranded copper, 600V insulation XLPE/Asbestos Braid, Vulkene/Asbestos Braid, XLPO/Hypalon, or EPR/CSPE

SIL CAB & SPARE 3X

RE TO EFR

Cable Number 17753-1 is Item #3120 already listed above.

Notes: There are various insulation types listed for certain cables. This is because there were various purchases of the cables made and depending on who we ordered the cable from usually determined the type of insulation. I can not find what these insulation descriptions are but I can give you who the purchasers were:

SISJ ....Plastic Wire Co, Collyer Co., General Cable Co., Essex Int.
PE/PVC ....Paige Electric, Collyer Co, Essex Int., General Cable Co.
EPR/Hypalon ....Anaconda, Continental
Okonite/Okoprene ......Okonite
EPR/Neoprene ....Cyprus, Essex Int.
EPR/CSPE ....Anaconda, Continental
XLP ....American Insulated Wire
EPR ....American Insulated Wire
XLPE ....Continental Wire
copper tape shield & PVC jacket ......Samuel Moore, Triangle, & G.E.
XLPE/CSPE ....BIW, Continental
XLPE/Hypalon ....Samuel Moore (Eaton), CERRO
CSPE/CSPE ....BIW, Anaconda
XLPO/Hypalon ....Rockbestos, Samuel Moore (Eaton)
Okoguard/Okoprene .....Okonite
XLPE/Asbestos Braid ...Continental
Vulkene/Asbestos Braid.....G.E.

Hopefully the manufacturers catalogues/representatives can give you some further information on the materials if you need them. If you have trouble, give me a call.

for Class 1 Signal Systems except as otherwise permitted in this Article, or other Articles, of this Standard. Flexible cords of the types described in Article 400 of the National Electrical Code shall not be used.

2150. Special Cables.

2151. Special cable approved for the purpose may be used as detailed in Paragraphs 2152, 2153, 2154, 2155, 2156.

2152. Low Voltage Applications. Cable for operation at 150 volts or less, shall be constructed as follows:

a. Conductors shall be of solid copper, not less than No. 14 AWG for single- and two-conductor cables, not less than No. 18 AWG for three- and four-conductor cables, and not less than No. 22 AWG for cables having more than four conductors.

b. The individual conductors shall have approved insulation having a nominal thickness of not less than 1/32 inch.

c. The cable conductors shall have a solid metallic sheath or a moisture-resistant and flame-retardant jacket providing equivalent protection against mechanical injury to that obtained with nonmetallic sheathed cable described in the National Electrical Code.

2153. The special cables may be installed exposed on a ceiling and on a side wall if not less than 7 feet from the floor and if adequately protected against injury. Concealed cable and cable passed through a floor or located on a side wall within 7 feet of the floor shall be installed in conduit or other approved raceway, unless solid metallic sheath is provided. Cable shall be adequately supported and terminated in approved fittings.

2154. Limited Energy Applications.

Approved cable meeting the requirements of Paragraphs 2155 and 2156 may be used in circuits having energy limiting characteristics as follows:

a. Circuit voltages not to exceed those shown in Column 1 of Table 1.

b. Maximum fault currents designed into the circuit not to exceed those shown in Column 2 of Table 1.

c. Noninterchangeable overcurrent protection not to exceed that shown in Column 3 of Table 1.

d. Energy limitations not to exceed those shown in Column 4 of Table 1.

Table 1

1 Voltage Range	2 Maximum fault current AC or DC	3 Noninterchangeable overcurrent protection	4 Energy Limitation AC	DC
200-250	0.1 a	—	—	—
151-199	0.15 a	—	—	—
61-150	1.00 a	1.00 a	—	—
31-60	—	1.6 a	100 va (See Note)	
0-30	—	3.2 a	100 va (See Note)	

Note: Where batteries are used a resistor shall be in the circuit to limit the fault current to that obtained from a 100 va approved transformer of the same voltage output. Rectifiers and generators shall have built-in energy limiting characteristics equivalent to those of a 100 va approved signaling transformer.

2155. Conductors of cable for use with limited energy circuits shall be:

a. Solid copper, bunched-tinned (bonded) stranded copper, or copper alloys of equivalent tensile strength

b. Not smaller than

1. 16 gauge single conductor copper
2. 19 gauge multi-conductor copper

c. Covered by approved insulation having a 0.012 inch nominal 0.010 inch minimum thickness for both the outside jacket and the conductors. A single conductor cable shall have a jacket not less than 0.035 inch nominal 0.030 inch minimum thickness. Two or more conductors may be in flat parallel construction with 0.023 inch nominal integral insulation jacket, minimum 0.020 inch and with 0.031 inch minimum web.

d. The insulating compound shall have a temperature rating not less than 105°C and the jacket compound shall have a high degree of abrasion resistance.

2156. Limited energy cable described in Paragraphs 2154 and 2155 may be installed as follows:

a. Exposed on surface of ceiling and sidewalls or "fished" in concealed spaces. Cable shall be adequately sup-

NFPA 72D (1967 Edition) Code Section 2223

Deviation: Documentation reviewed indicated that the power cables connected to the Alison Control panels A924 from power panels 1&2-DAB, circuit 5, are under sized for the 35 AMP breakers provided.

Justification: Based on the review of the letter from E.A. Taylor to B.J. Gerwe, indicates that these cables are adequate for the currents involved and are equivalent to the No. 10 AWG. wire required. Therefore, these cables are considered acceptable.

Reference: -Letter discussing the results of the evaluation performed for NFPA 72D Code Section 2223 from E.A. Taylor (AEPSC) to B.J. Gerwe (AEPSC), dated 4/26/88.

AEP
AMERICAN ELECTRIC POWER

Date April 26, 1988

Subject NFPA Code Compliance
Impell Corp. Recommendations

PIPING, HVAC

APR 27 1988

FIRE PROTECTION

From E. A. Taylor

To B. J. Gerwe

This memo is in response to your request for information dated 2/25/88. We have reviewed the recommendation on Code Section 2223 dealing with the comparison of a #7/18 AWG cable vs. a #10 AWG cable. The recommendation was to replace the #7/18 AWG with a #10 AWG.

An engineering evaluation was performed comparing a #7/18 to a #10 cable. A #7/18 AWG wire is larger than a #10 AWG and therefore the recommendation for upgrade to a #10 AWG is illogical.

The other item requiring investigation, Code Section 2154 on energy limitations, is awaiting further clarification from Impell.

Elizabeth Taylor

Elizabeth Taylor

EAT/jj/84.53

Approved R C Carruth
R. C. Carruth

cc: T. O. Argenta/S. H. Horowitz
L. F. Caso/J. V. Ruparel
D. N. Turnberg/J. R. Anderson
S. Z. Parsons/J. J. Kutys, Jr.
FILE: Cables

NFPA 72D (1967 Edition) Code Sections 2251 and 2331

Deviation: Documentation was not available to verify the adequacy of the Alison Control Incorporated alarm system power supplies for control panel models A700-9, A909, A924, 6007, and 7035 with the requirements of this code section.

Justification: Alison Control Incorporated released the power supply data required to confirm compliance with this code section as documented by the Record of Conversation memo dated March 17, 1988 between B. J. Gerwe (AEPSC) and F. Kimack (ACI).

These control panels, however, are not approved by an independent testing laboratory for use as an alarm signaling system which includes the power supplies for these panels. An equivalency evaluation of these panels was performed during the Code Compliance review for NFPA 72D, 1967 Edition under Code Section 2032 to confirm that these control panels comply with the functional requirements of a UL listed alarm signaling system.

Based on the review of the memo, the evaluation performed for the referenced code section, this equipment is considered acceptable for their application.

Reference:
- NFPA Code Compliance Evaluation, Impell Report No. 09-0120-0123, Revision 0, 5/88
- Record of Conversation Memo between B. J. Gerwe (AEPSC) and F. Kimack (Alison), dated 3/17/88

NFPA 72D (1967 Edition) Code Section 2341

Deviation: Documentation was not available for review to confirm that the power supply transformers for the Pyrotronics, Alison Control and Rochester Alarm system panels are properly protected for a rating not greater than the continuous duty rating of the transformer.

Justification: The continuous duty rating data required for confirming compliance of the alarm system power supplies was available from the manufacturers referenced with the exception of Alison Control panel A909 and Pyrotronics for the System 3 and FIU panels as documented in Record of Conversations dated 3/17/88 and 6/13/88. This was due to the fact that these units are no longer being manufactured and the data is no longer readily accessible.

The Pyrotronics units have however, been tested for use as an alarm signaling system in accordance with the Underwriters Laboratory (U.L.) testing criteria and have been listed by U.L. as such. The testing of these panels included verifying the operability of these panels under adverse conditions and were found to be acceptable by U.L. Therefore, an equivalency can be made in lieu of the lack of data available for these panels based on the acceptance by U.L. for the use of these panels as alarm signaling systems.

The power supply data for the Alison Control Panel A909 is not available and cannot be retrieved. In addition, these panels have not been approved or listed for use in these systems. These panels are however, verified in these surveillance testing for their operability and have been operable since approximately 1974. In addition, these panels are connected to a DC volt power source that is regulated and is unlikely to produce surges in the power thus potentially damaging the panel power supply unit. Based on the discussion above, a justification can be provided that the A909 panel's power supply is adequately protected as indicated by the length of service of these panels.

A review of the Record of Conversations dated 3/17/88 and 6/9/88 and the drawings referenced below indicates that the remaining Alison Control Panels and Rochester "EF" alarm panels are adequately protected as required by this code section.

<u>Reference:</u> -Record of Conversations

a. B. J. Gerwe (AEPSC) and F. Kimack (Alison), dated 3/17/88

b. D. E. Kipley (Impell) and D. Deipalmer (Rochester), dated 6/9/88

c. D. E. Kipley (Impell) and F. Kanerath (Pyrotronics), dated 6/13/88

-AEPSC Drawings:

1-98979-3, 4/2/87	2-98979-2, 1/9/87
771478, Revision D, 6/27/79	
1-98611-4, 5/14/87	2-98611-1, 10/87
1-98977-5, 1/7/85	2-98977-4, 8/21/78

NFPA 72E (1974 Edition) Code Section 2-6.1

Deviation: Several fire detectors are subject to mechanical damage due to the devices being installed less than 7' above the finished floor of the applicable fire zone of the Auxiliary Building. The device locations are as follows:

Fire Zone	Fire Zone Elevation	Device
5	587'	The line type heat detector for filter unit 1-HV-SATFU is mounted on the top of the unit and is exposed to mechanical damage outside the unit approximately 8".
33	609'	Smoke detectors 3-18, 3-21 below platform 639'-4", and 3-25, 3-28 below platform 646'-9". The infra-red detector 3-17 at platform 631'. These devices are typically installed less than 7' above the platform floor.
34	609'	Smoke detectors 3-16 below platform 631', 3-18 through 3-21 below platform 639'-4" and 3-25, 3-26 and 3-28 below platform 646'-9". The infra-red detector 3-17 at platform 631'. These devices are typically installed less than 7' above the platform floor.
38	609'	Smoke detectors 7-5 and 7-7 are located in the mezzanine area of this zone. Infra-red detectors 16-3 and 16-4 are also located in the mezzanine. These devices are typically installed less than 7' above the floor of the mezzanine.
39	609'	Smoke detectors 2-5 is located in the mezzanine area of this zone. The infra-red detectors 20-3 and 20-4 are also located at the mezzanine. Typically these devices are installed less than 7' above the floor.
41 & 45	609'	Smoke detectors 13-7 through 13-9 (Fire Zone 41) and 8-7 through 8-9 (Fire Zone 45) are located in the underfloor of these zones and are installed less than 4' above the floor.
60	625'	The infra-red detector 27-2 is located on a column installed less than 7' above the floor.

Justification: The location of these devices are such that they are installed in portions of a fire zone which are normally not accessible due to physical or controlled limitations. The bases for justifications are as follows:

Fire Zone	Justification
5	The filter unit is located at the southeast corner of the platform which is located in the northeast corner of Fire Zone 5 at elevation 596'. This filter unit is located such that it is not in the normal path of travel on the platform. The heat detector is mounted on top of the filter unit and may be exposed to damage by tools used for maintenance. The construction of the heat detector is of a stainless steel outer jacket surrounding a specially formulated ceramic core with an internal conductor. Therefore, this detector is made of durable construction and is not susceptible to mechanical damage. In addition, the device has been installed for approximately nine years and the walkdown confirmed that the detector did not show signs of damage.
33 & 34	The smoke and infra-red detectors listed are typically located in areas where valves, piping or within pockets of platform structural members will provide protection for the detectors located out of the normal path of travel in the immediate area.
38 & 39	The infra-red and smoke detectors listed are typically installed over cable tray routing, out of the normal path of travel in these areas. The cable trays will provide barriers to prevent mechanical damage by operators walking in the path ways.

41, 45 & 60	The smoke and infra-red detectors are protected by controlled access to these areas, thus limiting the potential for damaging the devices. In addition, these devices are typically not installed in the area or the normal path of travel in these zones.

In general, operators typically would not occupy these areas thus limiting the potential for mechanical damage even further.

Based on the evaluation discussions above, the protection of the detectors listed will not be required and are considered acceptable as installed.

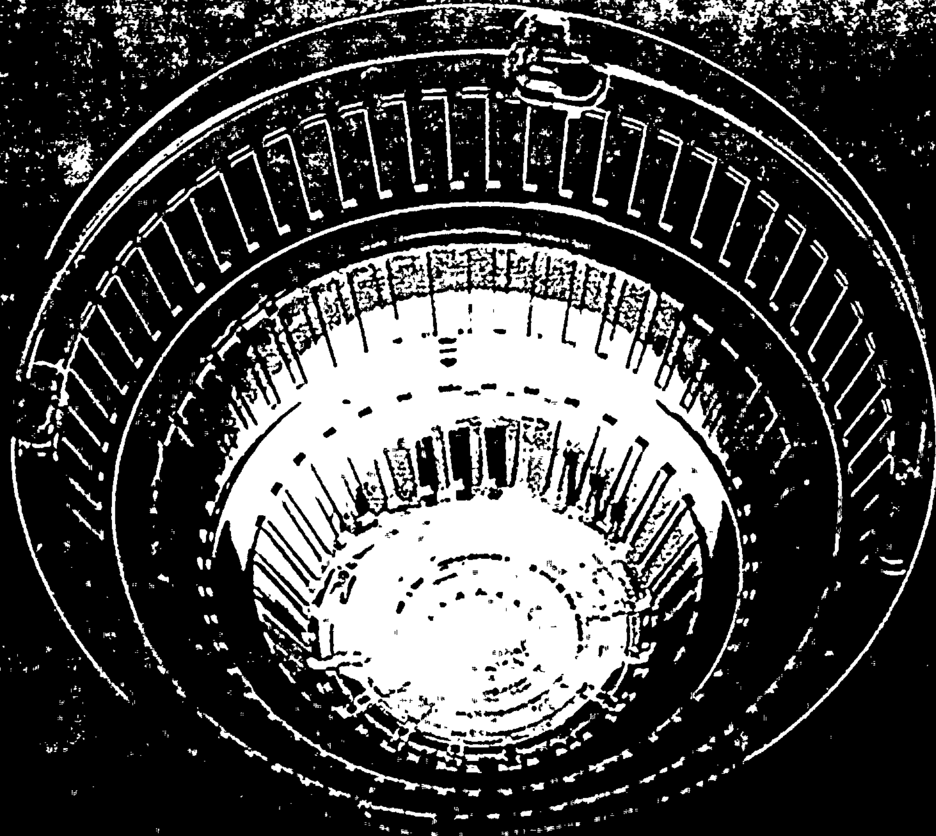
Reference:

-NFPA 72E Code Compliance Walkdown Checklists 0120-108-008N through 0120-108-008S and 0120-108-008W

-Alison Control Inc. Data Sheet for 9090 Series Detector, dated 3/6/75

FIRE DETECTORS REQUIRING GUARDS

Fire Zone	Fire Zone Elevation	Device
33	609'	Smoke detector 3-26 and 3-27 are located under a platform at elevation 646'-9" at 6.5' above the platform elevation 639'-4" floor. These devices are located in the normal access path to this platform and are exposed to damage.
34	609'	Smoke detector 3-27 is arranged as discussed for Fire Zone 33.
39	609'	Smoke detector 2-7 located at the reactor cable tunnel penetration mezzanine is installed 5.75' above the mezzanine floor and located in the normal path of travel on this mezzanine.



DETECTOR PROTECTOR

A damaged smoke detector could make an entire fire alarm system inoperable and negate the early warning purpose for which it was intended. To maintain critical creditability, it may be necessary to provide a physical guard to stop damage by accident or vandalism. STI's Detector Protector does exactly that. Features include:

- Factory Mutual approved.
- Aesthetically appealing.
- Clear ⅛" thick polycarbonate construction allows indicator L.E.D. visibility.
- Easy installation and easy removal for servicing smoke detector.

Will fit over virtually all smoke detectors, flush- and surface-mounted (with riser).
Insect repellant may be placed inside guard.
May be painted to match decor.
Dimensions: 4" deep x 9" diameter.
Has 216 slots totaling 18.5 sq. inches of open area.
There will be some smoke restriction, therefore consideration must be given to coverage, etc.

The smoke detector guard should only be installed in areas where smoke detector damage has, or is likely, to occur.

STI

SAFETY TECHNOLOGY INTERNATIONAL, INC.

Corporate Headquarters:
P.O. Box 621, Waterford, Michigan
48095 United States of America
Phone: (313) 623-9898

NFPA 72E (1974 Edition) Code Section 4-3.1
NFPA 72E (1978 and 1982 Edition) Code Section 4-3.2

Deviation: Automatic ionization smoke detectors in the fire zones listed have not been installed properly for the beam construction present at the ceiling for the following fire zones:

Fire Zone	Device No.	Zone Elevation	Description
32	5-29	650'-0"	Device installed at bottom of 6'-0"deep beam.
49	4-13	633'-0"	Device installed at bottom of 12" deep beam.
	4-16	633'-0"	Device installed at bottom of 12'-0" deep beam.
52	4-26	633'-0"	Device located within 4" of an 18" deep beam.
57	18-10 & 18-12	625'-10"	Devices installed within 4" of 18" deep beams.

Justification: A walkdown performed the week of 4/4/88 confirmed the configuration of the ionization detectors with respect to the combustibles present in each individual fire zone.

Fire Zone 32

Automatic smoke detection and dry pilot preaction sprinkler systems have been installed throughout Fire Zone 32. Smoke detector 5-29 however, has been installed at the bottom of a 6'-0" deep beam. The preaction sprinkler system's dry pilot sprinklers have been properly installed throughout this fire zone. The dry pilot sprinklers act as heat detection devices, as defined by NFPA 13, 1983 Edition, Code Section 5-3.4 and are provided to actuate the preaction sprinkler system in this fire zone. The dry pilot sprinklers will, upon actuation, transmit a waterflow signal (via the preaction valve operating) to the Control Room to alert the operators of the fire condition in this fire zone.

Therefore, an equivalency can be made for the dry pilot sprinklers to act as heat detectors and will to provide detection in the area of smoke detector 5-29 in lieu of that device.

Fire Zone 49

The review of drawings 1-1444 & 1-1437 and the walkdown data collected, indicated that the primary purpose of these detectors 4-13 & 4-16 were installed to provide specific protection of cable trays and other combustibles located at a lower elevation in the area of these detectors.

Detector 4-16 has been installed at elevation 639'-6" due to HVAC duct work congestion. Should a fire occur in the area of this detector, products of combustion from the fire will stratify under the HVAC ducting and the bottom of the beam thus providing adequate area for smoke to collect to activate detector 4-16.

Detector 4-13 has been installed on the bottom of a 12" deep beam directly over charcoal filter units 1-HV-AES-1&2. A review of the Fire Hazards Analysis indicates that the primary insitu combustible in this fire zone is the charcoal beds of the filter units. Therefore, the primary purpose of detector 4-13 is to provide specific hazard protection as discussed under Code Section 4-3.1.1 of NFPA 72E, 1982 Edition.

Fire Zones 52 and 57

The walkdown verified that ionization detectors 4-26 (Fire Zone 52) and 18-10 & 18-12 (Fire Zone 57) are installed 6" from the side the respective beam as confirmed by measurement. Therefore, these detector installations are considered acceptable as NFPA 72E requires that detectors not be installed less than 4" to a wall.

Fire Zones 32, 49, 52, and 57

Based on the review of the discussions above, the placement of these detectors with respect to the combustibles present, the detector arrangements are considered acceptable.

Reference:

-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawings; 1-1437-78, 8/3/87
1-1444-49, 7/30/87
1-1449-11, 6/8/82

NFPA 72E (1974 Edition) Code Section 4-4.2
NFPA 72E (1978 Edition) Code Section 2-6.5

Deviation:

Smoke detectors are not properly spaced for the air movement present in the Valve Gallery (Fire Zone 37) at elevation 617' of the Auxiliary Building.

Justification:

Ionization smoke detectors have been installed in the demineralizer central hallway portion of this fire zone. The individual cubicles for the demineralizer and ion exchangers, however, are not provided with detectors. Impell Calculation No. 0120-108-009 has verified that the spacing for the air movement through this fire zone will require four smoke detectors in lieu of the three smoke detectors installed.

A review of the Fire Hazards Analysis for Fire Zone 37 has identified that the combustible loading in this zone is negligible.

The maximum allowable combustible loading and equivalent fire severity for Fire Zone 37 are 13,000 BTU/sq. ft. and 10 minutes (the actual combustible loading and equivalent fire severity existing at this time are zero BTU/sq. ft. and zero minutes).

The walls, floors, and ceilings to adjacent fire areas and fire zones are constructed of reinforced concrete in excess of a three-hour rating. Although, there are unrated penetrations through the barriers, a fire occurring in this space would be required to take a circuitous path in order to impact redundant safe shutdown components and the barriers will limit the spread of fire.

The smoke detectors are located in the portion of the fire zone that is normally accessible. All other portions have limited accessibility due to these areas being high radiation areas. The access to the fire zone is controlled due to ALARA concerns.

A review of calculation No. 0120-108-009 indicates that the requirement for the fourth smoke detector in the fire zone based on the air movement and the spacing requirements is not that significant. In addition, the placement of detectors provided are such that they are in the return air path through the fire zone.

Based on the negligible combustible loading, construction features and smoke detectors provided in this fire zone, the configuration of these smoke detectors is considered acceptable.

<u>References:</u>

-Impell Calculation No. 0120-108-009, Revision 0, 2/24/88
-Fire Hazards Analysis, Revision 2, 1/29/88

NFPA 72E (1974 and 1978 Edition) Code Sections 2-6.5, 2-6.7, and 4-1.2

Deviation: Smoke detectors 3-27 and 3-28 have been installed on the bottom of 12" beams and may not provide proper fire detection in accordance with NFPA 72E for Fire Zone 44S of the Auxiliary Building at elevation 609'-0".

Justification: A walkdown of the plant was performed the week of 4/4/88 to determine what combustible loading and safety related components are present for the areas in question. The ionization smoke detectors 3-27 and 3-28 have been installed directly over specific hazards as verified during the walkdown. Detector 3-27 has been installed over Panel No. CMO-410 which is part of the green train. Detector 3-28 is located over the opening to the Laundry Room. These devices have been installed over these specific areas to provide a rapid response to a fire developing in these immediate areas.

In addition, an automatic dry pilot sprinkler system has also been provided at the ceiling over the cable trays and conduit which are installed throughout the area around detectors 3-27 and 3-28 in Fire Zone 44S. The pilot sprinklers are provided to actuate the sprinkler system and will serve the purpose of a heat detector, as defined by NFPA 13, 1983 edition, Code Section 5-3.4. Upon actuation, the pilot sprinklers, a waterflow alarm signal will be transmitted (via the preaction valve operating) to the Unit 1 Control Room. Therefore, the requirement for additional smoke detection in this immediate area is unnecessary.

Based on the review of the combustible loading, automatic sprinkler and smoke detection configurations in the immediate area of the existing smoke detection arrangement for this area is considered acceptable.

References:

-NFPA 13, 1983 Edition
-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawing 2-1434-84, 12/30/87

NFPA 72E (1974 Edition) Code Sections 5-4.1, 5-4.2
NFPA 72E (1982 Edition) Code Section 4-3.2

Deviation: Smoke and flame detection is not properly provided above the platform at Elevation 646'-9" in Fire Zone 33 (Unit 1) and 34 (Unit 2) of the Auxiliary Building.

Justification: A walkdown of the plant was performed the week of 4/4/88 to determine the adequacy of the fire detection system for the combustible loading present on this platform. The walkdown identified that the fixed combustibles present primarily included a flamable liquids cabinet which contains limited quantities of lubricating fluids, electrical motors. In Fire Zone 34, terminal boxes with cable terminations were also present. Transient combustibles were not present at either unit for these elevations.

The configuration of the fire detectors in Fire Zones 33 and 34 is a combination of smoke and infrared devices properly spaced throughout multiple platform elevations. This is consistant for all the platform levels except for the platform at 646'-9" elevation. Infrared detectors have been installed at the east wall of each fire zone approximately 1' below the platform elevation. The platform extends out from the containment wall approximately 11.5' with the leading edge of platform approximately 8.33' from the east wall. The roof above the 646'-9" platform is located at Elevation 682'-6" and is honeycombed with a series of deep beams. Due to the height of the ceiling above the 646'-9" platform, the elevated ambient temperatures normally above the platform, and lack of effectiveness to detect a fire from placement of detectors on the beams, infrared detectors were chosen to provide the required detection coverage.

A review of RFC Packets 01-2679 and 02-2694 has confirmed that the cone of vision of the AFA Minerva infrared detectors will be partially obstructed by the platform structure. At the farthest point of the platform from the detector, the blind spot is no more than 3' above the platform. Fixed combustibles are limited with the primary concerns being a stop valve motor, lube oil leak or terminal cabinet fire on the platform. All component configurations on the platform are such that a fire propagating from these components will be detected by the infrared device due to the equipment height and position on the platform. The flammable liquids cabinet is typically placed in the front half portion of the platform. However, if placed anywhere on the platform it would be visible to an infrared detector should a fire start inside the cabinet and propagate out.

Should transient combustibles be stored on the 646'-9" platform. A fire propagating from these combustibles would be detected by the infrared detectors. This would occur either by an open flame that would develop or by flaming embers falling through the 1" x 4" open grating of the platform onto the 639'-4" platform below. Ionization smoke detectors are installed on the 639'-4" platform and would also assist in detecting a fire from embers dropping on to the Platform from above.

Based on the review of the combustibles present and their configuration, the current arrangement of infrared detection in these fire zones is adequate and will provide proper detection inlieu of providing smoke detection at the ceiling.

Reference: -RFC 01-2679 and RFC 02-2694
-AEPSC Drawing No. 12-3842-7, Rev. 2, 11/8/85

NFPA 72E (1978 Edition) Code Sections 4-3.7.2 and 4-3.7.3
NFPA 72E (1984 Edition) Code Section 4-3.5.1.1

Deviation: Smoke detection is not properly installed in Fire Zone 52 on Elevation 633' of the Auxiliary Building for deep beam construction. Also, detection is not provided to cover all portions of the fire zone within 0.7 times the listed spacing of the device.

Justification: A walkdown of this fire zone performed the week of 4/4/88 verified the arrangement of fire protection features with respect to combustible loading present in the zone. The primary combustibles present are the auxiliary subpanels, other miscellaneous electrical cabinets and cable trays at column lines WL-3.9 in Unit 1 and WL-8.1 in Unit 2. Cable trays and MCC panels are also provided from column lines WL-3.9 through WL-8.1 at WL-L.5 in both Units 1 and 2. A dry pilot sprinkler system is also provided throughout the fire zone to provide fire detection and suppression capabilities. Although the smoke detectors are not placed throughout the fire zone to provide smoke detection for all portions of the zone, the smoke detectors are placed over the portions of the zone which contain the primary combustibles (subpanels, cable trays, etc.). The placement of the smoke detectors meets the intent of NFPA 72E, 1984 edition, Code Section 4.3.1.1 which states that smoke detection can be installed closer to a specific hazard to readily intercept smoke. Combustible loading in other portions of the fire zone is not as significant due primarily to (4) large supply and (4) large exhaust HVAC units which cover a majority of the floor area at column lines WL-K through WL-M and WL-3.5 and WL-8.5.

In addition, dry pilot sprinklers are installed throughout the fire zone. An equivalency can be made for the pilot sprinklers as heat detectors as defined in NFPA 13 Code Section 5.3.4, 1983 Edition. The dry pilot sprinklers, upon the fusing of an element, will transmit a waterflow alarm signal (via the preaction valve operating) to the Control Room to alert operating personnel to the fire condition. Since pilot sprinklers are provided throughout the fire zone, the relocation or addition of smoke detection is not necessary.

Based on the review of the combustible loading and fire protection features present, this condition is acceptable.

Reference:

- NFPA 13, 1984 Edition
- NFPA 72E, 1984 Edition
- Fire Hazards Analysis, Revision 2, 1/29/88
- Safe Shutdown Capability Assessment Figure 3-5

NFPA 72E (1978 Edition) Code Section 4.3.7.3

Deviation: Smoke detectors are not provided in a deep beam bay area at the east end of the new fuel room, Fire Zone 48) as required.

Justification: The review of the Fire Hazards Analysis for D. C. Cook Nuclear Plant indicates that the combustible loading in the room is negligible and that there are no fixed transient combustibles (trash cans, etc.) located in the room. The detectors installed in the room are properly provided over the new fuel area. The portion of the room where the deep bay occurred does not contain any fixed or transient combustibles in the area. In addition, the security access level for entering the room, severely restricts all normal access to this space.

Reference:
- -Fire Hazard Analysis, Rev. 2, 1/29/88
- -Impell Calculation No. 0120-108-008, Rev. 0, 5/14/88

NFPA 72E (1974 Edition) Code Sections 4-4.1, 4-4.5.2, 4-5.1, 4-5.1.5
NFPA 72E (1978 Edition) Code Section 4-3.7.3

Deviation: Ionization smoke detectors are not properly provided for the high ceilings and deep beam construction present in the Unit 1 (Fire Zone 7) and Unit 2 (Fire Zone 27) Quadrant 1 Cable Tunnels, located at elevation 596'-4" of the Auxiliary Building.

Justification: A walkdown of the plant was performed the week of 4/4/88 to confirm the configuration of the ionization smoke detectors with respect to the combustibles present in the applicable fire zones. Automatic ionization and infrared flame detectors are provided throughout Fire Zones 7 & 27. A review of the Fire Hazards Analysis for these fire zones, indicates that the primary insitu combustibles located in these fire zones are system cables. Therefore, the fire detectors should be installed to provide protection of the system cables in these fire zones.

Fire Zone 7

The system cables are installed in cable trays which are located along the containment wall (north wall) and the east wall at a maximum elevation of 603'-9" above the floor of the space. Cable trays are also located along the south wall at a maximum elevation of 628'-9" above the floor of the space. The smoke detectors have been evaluated to confirm that the detectors have been properly provided in the following discussions:

a. A smoke detector has not been provided for the deep beam bay area at column lines WL-4.5 AND WL-R. The combustibles in this immediate area consist of system cables. A review of HVAC Drawing 1-5688 indicates that fan unit 1-HV-ET-1 discharges air out into this area from Fire Zone 8 toward the south wall of Fire Zone 7. Should a fire occur in a cable tray along the Containment wall (north wall), the smoke will primarily be forced toward the south wall of this fire zone due the air movement produced by the fan unit and into the deep bay containing detector 6-3. In addition to the ionization detectors provided, infrared detectors, once relocated, will provide adequate protection of the cable trays in this immediate area. Therefore, an additional detector for this deep bay area is not required.

b. The area of Fire Zone 7 between column lines WL-R to WL-P and WL-4.5 to WL-4.8 has a high ceiling of approximately 35' above the floor of this fire zone. Ionization detectors 6-3 & 6-4 are installed at the ceiling within the immediate area of the fire zone. A review of NFPA 72E, 1984 Edition, Appendix C, Section C-4-2.1.1 indicates the criteria for spacing smoke detectors in high ceiling areas. Assuming that a postulated fire in this area is one that develops slowly, then the maximum spacing for these detectors can be determined by reviewing Figure C-4-2.1.1C. Based on the ceiling height being 35', the smoke detectors will respond to fire that develops at a rate of 500 BTU/sec. and can be spaced a maximum of 784 ft^2/device (spaced 28ft. on center). A review of Impell Calculation No. 0120-108-009 has indicated that the spacing of detectors in this fire zone is 240 ft^2/device. Therefore, the spacing of smoke detectors in this fire zone is well within the maximum spacing allowed and will provide adequate protection for the high ceiling area.

Fire Zone 27

The fire zone physical configuration and detector placement are essentially the same for Fire Zone 27 as they were for Fire Zone 7 as discussed above. Fire Zone 27 however has been rotated 180 degrees from the southeastern quadrant of the Unit 1 Containment Building to the northeastern quadrant of the Unit 2 Containment Building. The evaluation discussions for Fire Zone 7 also apply to Fire Zone 27 with the exception that the smoke detector numbers for this fire zone are, 1-1 through 1-4.

Fire Zone 7&27

Based on the review of the evaluation discussions above, the configuration of the ionization smoke detectors provided with respect to the combustibles and the structural features present, are considered acceptable.

Reference:

-NFPA 72E, 1984 Edition
-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawings;
1-5688-10, 2/1/88 2-5688-8, 2/1/88
1-1422-57,12/30/87 2-1413-50,4/8/88
2-1424-52, 4/29/88 2-1415-91,4/15/88
-Impell Calculation No. 0120-108-009, Revision 0, 2/24/88

NFPA 72E (1974 Edition) Code Section 4-4.6
NFPA 72E (1978 Edition) Code Sections 4-3.7.2 and 4-3.7.3

<u>Deviation:</u> Smoke detection has not been installed in deep bay equipment hatch areas to provide proper fire detection in accordance with NFPA 72E for the following fire zones of the Auxiliary Building.

Fire Zone No.	Evaluation	Location
1	573'	WL-K and WL-6.3
5	587'	WL-P and WL-6.3
44N	609'	WL-N and WL-6.3

<u>Justification:</u> A walkdown of the plant was performed the week of 4/4/88 to determine what combustible loading and safety related components are present for the areas in question. Based on a review of the data collected, the Safe Shutdown System Analysis (SSSA) and the Fire Hazards Analysis, it was determined that the fixed or transient combustible loading located in the immediate area of cable trays with Essential Safety System (ESS) cables installed adjacent to the equipment hatch is minimal. Further review also determined that should these cables be exposed to a fire condition, that their failure would not prevent safe shutdown of the plant.

<u>Fire Zone 1</u>

The fixed combustibles in Fire Zone 1 on Elevation 573' in the area of this equipment was limited. A radiation monitor was installed directly under two essential safety system cable trays at the entrance to Fire Zones 1E and 1F. Temporary transient combustible storage in the immediate area of the hatch are typically not significant in quantity and would be located in the immediate area of a smoke detector. Based on the transient combustibles present during the walkdown, they would not present a significant fire exposure to the cable trays in the area.

Should a fire occur in the cable trays or from combustibles located below, a delay in the response to the fire by the smoke detector located on the north side of the hatch will occur due to the existence of the hatch, the smoke will eventually activate one or both of the two smoke detectors in the immediate area of the hatch and will alert the Control Room operators to the fire condition. As discussed earlier, the loss of these cables to fire would not impact the safe shutdown of the plant.

Fire Zone 5

An automatic sprinkler system has been installed primarily under the cable trays and around most of the equipment hatch areas in Fire Zone 5 on Elevation 587'. The sprinklers are installed approximately 15' above the finished floor (AFF) which are located beneath the cable tray conduit and piping obstructions. The sprinklers were installed to provide protection for the cable trays from exposure fires below the trays. The dry pilot sprinklers act as heat detection devices, as defined by NFPA 13, 1983 edition, Code Section 5-3.4, and are provided to actuate the sprinkler system. The dry pilot sprinklers will also transmit water flow alarm signals to the Unit 1 Control Room to alert operating personnel of the fire condition once they are fused.

Therefore, an equivalency can be made for the dry pilot sprinklers to act as heat detectors which are provided in lieu of smoke detectors.

Where temporary transient combustible equipment storage may be located under the equipment hatches, those transients are typically not significant in quantity. The location of these transient combustibles would typically be in the immediate area of smoke detection and sprinklers. Therefore, the combustibles would not present any significant fire exposure to the cable trays present.

Fire Zone 44N

An automatic dry pilot sprinkler system has also been provided at the ceiling over the cable trays and conduit which are installed adjacent to the equipment hatch in Fire Zone 44N on Elevation 609'. The dry pilot sprinklers are installed throughout area of the

equipment hatch. The pilot sprinklers are provided to actuate the sprinkler system and will serve the purpose of a heat detector, as defined by NFPA 13, 1983 edition, Code Section 5-3.4. Upon actuation, the pilot sprinklers will transmit a water flow alarm signal to the Unit 1 Control Room, therefore, making the requirement for additional smoke detection in this immediate area unnecessary. The configuration of transient combustibles is similar for this area as it was for Fire Zone 5 above and will not present significant fire exposure to the cable trays present.

Based on the review of the combustible loading, automatic sprinkler and smoke detection configurations in the immediate area of each equipment hatch, the existing smoke detection arrangement for the areas discussed is considered acceptable.

<u>References:</u>

-NFPA 13, 1983 Edition
-Fire Hazards Analysis, Revision 2, 1/29/88
-Safe Shutdown Capability Assessment Figures 3-1, 3-2, and 3-3
-Safe Shutdown System Analysis

NFPA 72E (1974 Edition) Code Section 4-4.6
NFPA 72E (1978 Edition) Code Section 4-3.7.2 and 4-3.7.3

Deviation: Ionization smoke detectors installed at the ceiling of the Unit 1 (Fire Zone 49) and Unit 2 (Fire Zone 50) HVAC Vestibule areas at elevation 633'-0" of the Auxiliary Building, are not properly provided for the deep beam construction present in these fire zones.

Justification: A walkdown of the plant was performed the week of 4/4/88 to confirm the configuration of the smoke detectors with respect to the combustibles present in these fire zones. A review of the Fire Hazards Analysis has identified the primary insitu combustible in these fire zones to be the charcoal located inside the filter units within these fire zones. The filter units however, are provided with individual heat detection systems installed within each filter unit and will provide alarm signaling to the respective Control Room to alert operators of a fire condition in one of these units. These units are also provided with a manually actuated fixed water spray suppression system to control a fire which may occur in these filter units. Therefore, the primary insitu combustible located in these fire zones can be said to be the system cables installed in trays. Smoke detection should therefore be primarily provided to protected these system cables.

Fire Zone 49

Automatic ionization smoke detection has been installed throughout this fire zone. The construction of the ceiling in this fire zone is primarily 8" to 12" deep beam type construction with the exception of 18" and 36" deep beams located at the east end of this fire zone. Based on the review of drawing 1-1444 and 1-1446 and the walkdown data collected it was verified that smoke detectors were installed in each deep bay area formed by deep beams as required by the Code Section 4-3.7.3.

The verification for the requirement for reduced spacing of smoke detectors (Code Sections 4-3.7.2 and 4-4.6) for areas with beam construction of 8" to 18" was confirmed to be in compliance with the code based on the review of drawing 1-1444 and 1-1446, the walkdown data collected and Impell Calculation No. 0120-108-009. The review of this data confirmed that smoke detectors have been provided over the primary insitu combustibles of concern (cables), at reduced spacings within these bays as required by the code sections referenced above.

Fire Zone 50

Automatic ionization smoke detectors are provided throughout this fire zone. As discussed earlier, charcoal filter units area also provided in this fire zone and are provided with heat detection and fire suppression systems. In addition, Fire Zone 107 is located within it's own enclosure at the northeast corner of this fire zone. Fire Zone 107 is provided with a heat detector which will provide alarm signaling to the Control Room to alert operators of a fire condition in this area.

The ceiling mounted smoke detectors have been installed to provide protection of insitu combustibles with respect to the beam construction present in this fire zone, as required by Code Sections 4-3.7.2, 4-3.7.3, and 4-4.6 with the exception of the following:

a. An 18" deep bay area at the northeast corner of this fire zone has not been provided with a smoke detector. The review of drawing 2-1444 and the walkdown data collected verified that this corner of the fire zone is primarily occupied by the enclosure for Fire Zone 107 which is provided with a fire detector. The floor area not occupied by Fire Zone 107 in the area of this deep bay, is limited. Therefore, transient combustibles are unlikely to be stored there. The insitu combustibles located in this immediate area are made up of local power panels. These panels contain negligible combustibles and will not present a fire exposure to components in this immediate area. System cables are installed in conduit in this area and are not considered to be an exposure problem.

b. Smoke detection has also not been installed at the center west portion of this fire zone between two 18" deep beams which form a bay. The presence of transient combustibles observed during the walkdown in this immediate area was negligible and the insitu combustibles were limited to the system cables located in cable trays 2AU-C18 and 2-AU-C19. These cable trays do traverse the area between the two 18" deep beams located in this immediate area.

The cables that have been installed in these cable trays have been subjected to fire resistive testing in accordance with IPCEA S-19-81, paragraph 6.19.6, and have successfully passed. In addition, these cables are also constructed of the same materials used in the Unit 2 containment system cables which also underwent fire resistive testing in accordance with IEEE Standard 383 and successfully passed that testing. Therefore, an equivalency can be made for the cables installed outside the Unit 2 containment are afforded the same fire resistive characteristics as the cables that passed the IEEE testing.

Based on this data, the potential for an exposure fire from the cable trays to components located in this immediate area is limited. Therefore, the primary fire concern would be a floor based exposure fire. Since insitu combustibles at the floor level are negligible in this immediate area, it must be assumed that this fire must originate from transient combustibles stored in this area. Should an exposure fire occur in these transient combustibles, products of combustion will accumulate in this bay area and travel toward the back of the fire zone (east) toward detectors 4-30 and 4-31.

This is due to the return air movement for this fire zone which is brought through the 3000 CFM return air diffuser located near column line WL-N and the north wall of the fire zone. Smoke detectors 4-30 and 4-31 are located directly in line with the return air diffuser and a fire that is postulated to have started at the west end of this fire zone. Smoke detectors 4-30 or 4-31 will eventually respond to the fire condition, thus signaling an alarm condition to the Control Room and alerting the operators to the fire condition in this area.

Fire Zones 49 and 50

Based on the review of the evaluation discussions above, the configuration of the smoke detectors with respect to ceiling beam construction and combustibles present, are considered to be acceptable.

Reference:

- Fire Hazards Analysis, Revision 2, 1/29/88
- AEPSC Drawings:
  - 1-1437-78, 8/3/87
  - 2-1444-49, 7/30/87
  - 1-1444-56
  - 2-1445-66, 12/8/87
  - 12-5719-9, 4/26/88
- AEPSC response to the NRC 53 questions;
  Letter from J. Phillinghast (AEPSC) to E. G. Case (NRC), dated 9/30/77. Question No. 49.
- Impell Calculation No. 0120-108-009, Revision 0, 2/24/88

NFPA 72E (1974 Edition) Code Section 4-4.6

Deviation: Smoke detectors in Fire Zone 3 on Elevation 587' of the Auxiliary Building are installed at the bottom of 3' deep beams which are 7.5' and 10' on center.

Justification: A walkdown of the area was performed on 4/4/88 to determine if the arrangement of the smoke detectors installed was based on the location of the combustibles present in the room. The walkdown verified that the smoke detection devices were placed over the area of the greatest activity within the room where exposed combustibles are present.

Fire Zone 3 is used for the preparation of contaminated waste. The zone is divided into two areas. These areas include a drum storage area having very high radiation levels and a work area containing baling equipment with lower radiation levels. Access into Fire Zone 3 is controlled due the very high radiation levels present within general portions of the zone. Smoke detectors were installed over the baling equipment at column WL-T and WL-6.4 and over the bagging area at WL-5.2 and WL-6. In addition to the smoke detectors, an automatic dry pilot sprinkler system is also provided throughout the area where operating personnel would normally be performing any required duties. Should the dry pilot sprinkler system actuate, a waterflow alarm signal would be transmitted (via the preaction valve operating) to the Unit 1 Control Room to alert oeprating personnel of the fire condition in that zone. NFPA 13, 1983 Edition, Code Section 5-3.4 defines the use of the dry pilot sprinklers in this application as heat detectors. Therefore, an equivalency can be made for the dry pilot sprinklers to act as heat detectors and have been provided in lieu of smoke detectors.

NFPA 72E, 1984 edition, Code Section 4-3.1.1 also indicates that where smoke detectors are installed to readily intercept the smoke of a specific hazard, that the detectors may be installed closer to the hazard. The intent of these smoke detectors are to provide detection over the areas where operating personnel and exposed combustibles would be present and the dry pilot sprinklers provide detection for the remaining portion of the accessible portions of the fire zone.

Based on the review of the fire protection features installed, the normally high radiation levels in the room and the limited access to the area, the detection arrangement in Fire Zone 3 is considered acceptable.

Reference:
- -NFPA 13, 1983 Edition
- -NFPA 72E, 1984 Edition
- -Fire Hazard Analysis, Revision 2, 1/29/88
- -Safe Shutdown Capability Assessment Figure 3-2

NFPA 72E (1974 Edition) Code Section 4-4.6.

Deviation: Smoke detection is not properly provided for 12" deep beam construction at column lines WL-S and WL-6.3 in Fire Zone 5 on Elevation 587'of the Auxiliary Building.

Justification: A walkdown was performed the week of 4/4/88 to determine the adequacy of the fire protection features with respect to the combustibles present. The present fire detection system includes the installation of an ionization smoke detector at column lines WL-S and WL-5.5 above the 1-HV-SATFU charcoal filter unit. A dry pilot sprinkler system is also installed under the conduit congestion throughout the area at column line WL-S in Fire Zone 5.

Transient combustibles potentially may be stored under safe shutdown cable trays. The cable trays, however, are protected with an automatic dry pilot sprinkler system which will alleviate the exposure potential of a fire from these transient combustibles.

The dry pilot sprinklers provided to actuate the sprinkler system, also provide an equivalency for heat detectors as defined by NFPA 13, 1983 Edition, Section 5-3.4. Upon the activation of a pilot sprinkler element, a waterflow alarm signal will be transmitted to the Unit 1 Control Room to alert operating personnel of a fire condition.

Based on the provision of the dry pilot automatic sprinklers and smoke detectors installed in the immediate area, additional detection will not be required and the existing detection configuration is considered acceptable.

Reference:
- Fire Hazards Analysis, Revision 2, 1/29/88
- Safe Shutdown Capability Assessment Figure 3.2
- NFPA 13, 1983 Edition

NFPA 72E (1974 Edition) Code Sections 5-3.2, 5-4.1, 5-4.2, 5-5.1

Deficiency: The field of vision for the infrared flame detectors listed are obstructed by cable trays and MCC panels installed in the respective fire zones. The detectors and fire zones evaluated are located within the Auxiliary Building and include the following:

Fire Zone	Device No.	Fire Zone Elevation	Fire Zone Description
41	21-3, 21-4 & 21-5	609'-0"	Unit 1 Engineered Safety System, MCC Room and Underfloor
45	25-3, 25-4 & 25-4	609'-0"	Unit 2 Engineered Safety System, MCC Room and Underfloor
42A	22-1	609'-0"	Unit 1 E.P.S. Transformer Room

Justification: A walkdown of the plant performed the week of 4/4/88 confirmed the configuration of the infrared flame detectors with respect to the combustibles present in the applicable fire zone. A review of the Fire Hazards Analysis has identified the primary combustibles located within the fire zones referenced, as being system cables. The primary equipment installed in Fire zones 41 and 45 include essential motor control center (MCC) and transformers; and Fire Zone 42A contains switchgear panels and transformers. Therefore, the infrared detectors should provide protection for the cables and components within their respective fire zone.

Fire Zone 41

Automatic ionization and infrared flame detectors are provided throughout this fire zone. Infrared detectors 21-1 & 21-2 are located at the ceiling of the northeast and northwest portion of the fire zone. These devices are pointing down with their sensing element at an elevation of 623'-4" (13.83') above the main floor (at elev. 609'-0") of the space being protected. In addition, infrared detector 21-2 also provides protection for a portion of the MCC floor area which is located at elevation 613'-0". The maximum height of the cable trays above the floor in these areas is 622'-3". A review of the Pyrotronics Application Bulletin B-188, indicates that these detectors have a capability of providing an area coverage of three times the height of the device

from the floor of the protected space. Therefore, detectors 21-1 will provide an area coverage for the main floor of 1353 $ft.^2$. Detector 21-2 will provide an area coverage of 378 $ft.^2$ for the MCC floor area and 677 $ft.^2$ for the main floor space. Therefore, these detectors will provide adequate protection of the equipment and system cables located at the northeast and northwest portions of the fire zone.

Detector 21-3 is located on the south wall near the southeast corner of this fire zone. This detector is located at an elevation of 623'-6" (10.5') above the MCC floor area and is pointing out, looking across the MCC floor area. As discussed in Pyrotronics Bulletin B-188, this detector will provide an optimum field of vision of 43' with 170 degree angle cone. This detector will be capable of detecting a fire propagating from the top of the trays or the MCC panels located in this area.

Detectors 21-4 and 21-5 area located in the underfloor space of the MCC floor area. Detector 21-4 is located on the south wall near the southwest corner at an elevation of 612'-0" (3') above the floor and detector 21-5 is located on the east wall near the northeast corner, also at an elevation of 612'-0". The maximum height of the cable trays installed in the underfloor area are at an elevation of 610'-9" (1.75'). As discussed earlier, detectors arranged in the horizontal position, have an optimum field of vision of 43'. Therefore, these detectors will be capable of.providing adequate for the system cables present in this portion of the fire zone.

Fire Zone 45

The infrared detection, cable tray and MCC equipment configurations are essentially typical of that for Fire Zone 41 discussed above. The primary difference between Fire Zones 41 and 45 is the positioning of detector 25-2 (detector 21-2 for Fire Zone 41). Detector 25-2 is located on the east wall, 14' north of the south wall at an elevation of 620'-2" (11.16') above the floor area of the protected space. This detector is pointing out toward the west wall of this fire zone. The minimal amount cable trays located in this immediate area are located at a maximum elevation of 620'-5" (11.47'). Based on the discussion for Fire Zone 41, the detectors installed in Fire Zone 45 will provide adequate protection for this fire zone.

Fire Zone 42A

Automatic ionization and infrared flame detectors are provided throughout the fire zone. Infrared detector 22-1 is located on the east wall near the northeast corner, at an elevation of 623'-3" (13.75') above the floor area protected. Detector 22-2 is located on the south wall near the southwest corner, at an elevation of 612'-0" (11.5') above the floor of the protected space. Both of these detectors are directed out toward the middle of the fire zone to provide protection of the entire space. The maximum height of the cable trays located in the area of detector 22-1 is at an elevation of 622'-8" (13.17') above the floor.

The maximum height of the cable trays in the area of detector 22-2 is at an elevation of 618'-2" (8.66') above the floor. A review of the Pyrotronics Application Bulletin B-188, the detectors installed in their horizontal position will provide an optimum field of vision of 43' with a a 170 degree angle cone. Therefore, these detectors will provide adequate protection of the system cables and the transformer equipment present in this fire zone.

Fire Zones 41, 42A, and 45

Based on the review of the evaluation discussions above, the configuration of the infrared detectors with respect to the combustibles present in these fire zones, are considered acceptable.

Reference:

-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawings:

1-1427-78,1/26/88	2-1427-51, 12/21/87
1-1430-49	2-1430-48
1-1432-48, 1/26/88	2-1432-49, 8/3/87
1-1433-21, 1/23/87	2-1433-21, 1/23/87
1-1435-78	2-1435-62
1-1436-65	2-1436-48, 12/21/87

-Pyrotronics Application Bulletin B-188, 9/74

NFPA 72E (1974) Code Sections 5-3.2, 5-4.1, 5-4.2, & 5-5.1

Deviation: The field of vision for infrared Detector No. 17-3 located in the Unit 2 Quadrant 3S Cable Tunnel (Fire Zone 23) at elevation 596'-0" of the Auxiliary Building, is obstructed by cable trays installed at the east end of the fire zone.

Justification: A walkdown performed the week of 4/4/88 verified the arrangement of the automatic fire detectors with respect to the combustibles present in the zone. A review of the Fire Hazards Analysis identified the primary combustibles in this fire zone to be system cables located in multiple cable trays and motor control center (MCC 2-CT-B5 and 2-CT-C5). The cable trays are located at elevations from 5' to 11' above the finished floor (AFF) and primarily run along the north, south, and east walls of the fire zone. The MCC unit is located approximately 17'-0" west of the east wall of the fire zone.

Automatic ionization and infrared fire detection devices have been installed throughout this fire zone. Infrared detectors 17-1 and 17-2 are installed at the ceiling pointing down. A review of the Pyrotronics Application Bulletin B-188, indicates that these detectors have a capability of providing an area coverage of three times the height of the device from the floor of the protected space. The detector sensing element height for detectors No. 17-1 and 17-2 are located approximately 13' AFF. Therefore, these detectors can provide an area coverage of 1195 $ft.^2$. These detectors will provide adequate protection for the center and west end of this fire zone.

Infrared Detector No. 17-3 is located on the east wall approximately 13' AFF, pointing toward the west wall of the fire zone. The Pyrotronics Bulletin indicates that this detector is capable of providing an optimum field of vision of 43' with a 170 degree angle cone due to the horizontal positioning of the device. The purpose of this detector is to provide protection of the MCC unit and the cable trays that run parallel with the east wall of this zone. Although the east face of the MCC unit is not entirely visible to detector 17-3 due to the obstruction of the field of vision for this detector by the cable trays which run in front. This device will be capable of detecting a fire propagating from the upper two thirds of the MCC unit or from any of the cable trays located in front of this device. This is due to the height of the detector above the cable trays and the distance of the detector from the MCC unit.

Based on the review of this evaluation and the infrared detector configuration with respect the cable tray and MCC equipment in this fire zone, this arrangement is considered acceptable.

<u>Reference:</u>

-AEPSC Drawing 2-1418-93
-Pyrotronics Application Bulletin No. B-188, 9/74
-Fire Hazards Analysis, Revision 2, 1/29/88

NFPA 72E (1974 Edition) Code Sections 5-3.2, 5-4.1, 5-4.2, 5-5.1

Deviation: The field of vision for infrared flame detector 19-3 located in the Unit 2 Quadrant 3S Cable Tunnel (Fire Zone 24), at elevation 596' of the Auxiliary Building, is obstructed by expanded metal type cable trays in this zone.

Justification: A walkdown of the plant performed the week of 4/4/88 confirmed the configuration of the infrared detectors with respect to the combustibles present in the applicable area. The review of the Fire Hazards Analysis has confirmed that the primary combustible present in this fire zone are the system cables. Therefore, the detectors should be arranged to provide protection of the system cables in this fire zone.

Automatic ionization and infrared flame detectors are installed throughout the fire zone. The infrared flame detectors installed in this fire zone are located at the ceiling above the maximum height of the cable trays which is 606'-3" (10') above the floor and are pointing down. The elevation above the finished floor (AFF) to the infrared detector's sensing element is 609'-4" (13'). A review of the Pyrotronics Application Bulletin B-188 indicates that these detectors can provide an area coverage of three times the height of the device from the floor of the protected space. Detectors 19-1, 19-2, and 19-3 will each provide an area coverage of 1195 $ft.^2$. Therefore, a clear view of the primary combustibles (system cables) in this fire zone are provided by these detectors. In addition, these detectors will also provide limited floor area protection due to the configuration of the detectors and the cable trays. This however, is not the primary concern due to the lack of insitu or transient combustibles under the cable trays in this fire zone.

Based on the evaluation discussion above, the configuration of the flame detectors in this fire zone are considered acceptable.

Reference:
-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawings; 2-1416-47, 8/11/87
2-1418-93
-Pyrotronics Application Bulletin B-188, 9/74

NFPA 72E (1974 Edition) Code Sections 5-3.2, 5-4.1, 5-4.2, 5-5.1

Deviation: The field of vision for infrared flame detector 18-13 located in the Unit 1 Quadrant 4 Cable Tunnel (Fire Zone 8), detectors 14-1 and 14-2 located in the Unit 1 Quadrant 3M Cable Tunnel (Fire Zone 10) and detector 22-4 located in the Unit 2 Quadrant 4 Cable Tunnel (Fire Zone 26), at elevation 596' of the Auxiliary Building, are obstructed by cable trays installed in these zones.

Justification: A walkdown of the plant performed the week of 4/4/88 confirmed the configuration of the infrared detectors with respect to the combustibles present in the applicable area. The review of the Fire Hazards Analysis has confirmed that the primary combustible present in these fire zones are the system cables. Therefore, the detectors should be arranged to provide protection of the system cables in these fire zones.

Automatic ionization and infrared flame detectors are installed throughout each fire zone. The infrared flame detectors installed in these fires zone are located at the ceiling above the maximum height of the cable trays which is 607'-6" (11.25") and are pointing down. The elevation above the finished floor (AFF) to each infrared detector's sensing element is 609'-4" (13'). A review of the Pyrotronics Application Bulletin B-188, indicates that these detectors can provide an area coverage of three times the height of the device from the floor of the protected space. Detectors 18-1 (Fire Zone 8), 14-1 and 14-2 (Fire Zone 10) and 22-4 (Fire Zone 26) will each provide an area coverage of 1195 $ft.^2$. Therefore, a clear view of the primary combustibles (system cables) in these fire zones are provided by these detectors. In addition, these detectors will also provide limited floor area protection due to the configuration of the detectors with respect to the cable trays. This however, is not primary concern due to the lack of insitu or transient combustibles under the cable trays in these fire zones.

Based on the evaluation discussion above, the configuration of the flame detectors in these fire zones are considered acceptable.

Reference:
-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawings; 2-1416-47, 8/11/87
2-1418-93
-Pyrotronics Application Bulletin B-188, 9/74

NFPA 72E (1974) Code Sections 5-3.2, 5-4.1, 5-4.2, & 5-5.1

Deviation: The field of vision for infrared detector No. 13-3 located in the Unit 1 Quadrant 3S Cable Tunnel (Fire Zone 11) at elevation 596'-0" of the Auxiliary Building, is obstructed by cable trays installed at the east end of the fire zone.

Justification: A walkdown performed the week of 4/4/88 verified the arrangement of the automatic fire detectors with respect to the combustibles present in the zone. A review of the Fire Hazards Analysis identified the primary combustibles in this fire zone to be system cables located in multiple cable trays and a motor control center (MCC 1-CT-D5 and 1-CT-C5). The cable trays are located at elevations from 5' to 11' above the finished floor (AFF) and primarily run along the north, south, and east walls of the fire zone. The MCC unit is located approximately 17'-0" west of the east wall of the fire zone.

Automatic ionization and infrared fire detection devices have been installed throughout this fire zone. Infrared detectors 17-1 and 17-2 are installed at the ceiling pointing down. A review of the Pyrotronics Application Bulletin B-188, indicates that these detectors have a capability of providing an area coverage of three times the height of the device from the floor of the protected space. The lense height for detectors No. 17-1 and 17-2 are located approximately 13' AFF. Therefore, these detectors can provide an area coverage of 1195 $ft.^2$. These detectors will provide adequate protection for the center and west end of this fire zone.

Infrared detector No. 13-3 is located on the east wall approximately 13' AFF, pointing toward the west wall of the fire zone. The Pyrotronics Applications Bulletin indicates that this detector is capable of providing an optimum field of vision of 43' with a 170 degree angle cone due to the positioning of the device. Although the east face of the MCC unit is not entirely visible to Detector No. 13-3 due to the obstruction of the field of vision for this detector by th cable trays which run in front. This device will be capable of detecting a fire propagating from the upper two thirds of the MCC unit or from any of the cable trays located in front of this device. This is due to the height of the detector above the cable trays and the distance of the detector from the MCC unit.

Based on the review of this evaluation and the infrared detector configuration with respect the cable tray and MCC equipment in this fire zone, this arrangement is considered acceptable.

Reference: -AEP Drawing 1-1418-94
-Pyrotronics' Application Bulletin No. B-188, 9/74
-Fire Hazards Analysis, Revision 2, 1/29/88

NFPA 72E (1974 Edition) Code Sections 5-3.2, 5-4.1, 5-4.2, 5-5.1

Deficiency: The field of vision for infrared detectors 16-3 and 16-4 (Fire Zone 38) and 20-3 and 20-4 (Fire Zone 39) are located in the Unit 1 (Fire Zone 38) and Unit 2 (Fire Zone 39) Quadrant 2 Penetration Cable Tunnel Mezzanine at elevation 625' of the Auxiliary Building are obstructed by cable trays installed in this area.

Justification: A walkdown of the plant was performed the week of 4/4/88 to confirm the configuration of the infrared detector placement with respect to the combustibles present in the applicable area. A review of the Fire Hazards Analysis has confirmed that the primary combustible present in these fire zones are system cables. Therefore, the infrared detectors should provide protection for the system cables.

Automatic ionization and infrared flame detectors are provided throughout the respective fire zone. The infrared detectors in this portion of the fire zones are located at the ceiling over the top of the cable trays with the detector sensing element at an elevation of 630'-6" (5.5') above the finished floor (AFF). The maximum height of the cable trays are an elevation of 629'-9" (4.75') AFF. Infrared detectors 16-3 (Fire Zone 38) and 20-3 (Fire Zone 39) are installed pointing down over the cable trays at the west end of the respective fire zones. A review of the Pyrotronics Application Bulletin B-188 indicates that these detectors have a capability of providing an area coverage of three times the height of the device above the floor of the protected space. therefore, these detectors will provide an area coverage of 214 $ft.^2$. These detectors will provide adequate protection of the west end of their respective fire zones.

Detectors 16-4 (Fire Zone 38) and 20-4 (Fire Zone 39) are located on the east wall of their respective fire zone, approximately 5.5' AFF pointing west into the mezzanine portion of each respective fire zone. These detectors will be capable of providing protection for the remaining portions of the mezzanine area not protected by detectors 16-3 and 20-3. This is due to detectors 16-4 and 20-4 being installed in the horizontal position with an optimum field of vision being 43' with a 170 degree angle cone.

In addition, the exposure of the cable trays from fire from insitu and transient combustibles located under the trays are unlikely due to the cable trays typically being installed approximately 1'-0" AFF.

Based on the review of this evaluation and the configuration of the infrared flame detectors installed in these fire zones with respect to the configuration of the primary combustibles present, the arrangement s are considered acceptable.

<u>Reference:</u>

-Fire Hazards Analysis, Revision 2, 1/29/88
-AEPSC Drawings; Fire Zone 38: 1-1437-79, 4/8/88
1-1444-49, 7/30/87
Fire Zone 39: 2-1437-87, 4/8/88
2-1444-56
-Pyrotronics Application Bulletin B-188, 9/74

NFPA 72E (1974 Edition) Code Sections 5-3.2, 5-4.1, 5-4.2, 5-5.1

Deviation: The field of vision of infrared flame detector 18-3 is located at the east end of Quadrant 3M Cable Tunnel (Fire Zone 24), elevation 596' of the Auxiliary Building, is obstructed by cable trays installed at multiple levels above the floor directly in front of this detector in this zone.

Justification: A walkdown of the plant was performed the week of 4/4/88 to confirm the configuration of the infrared detector positioning with respect to components obstructing the field of vision of this device. The results of this walkdown were documented and applied to an engineering evaluation performed to confirm compliance. The evaluation identified the actual location of this detector on the applicable conduit and cable tray plan drawings which verified the actual field of vision obstruction.

Based on the review of the Pyrotronics Applications Bulletin for this detector and the position of the detector with respect to the cable tray obstructions present, detector 18-3 will provide adequate protection of the system cable trays and the front face of MCC panel by a fire propagating over the top of the trays or MCC panel thus exposing the infrared light source to the detector. Therefore, the present positioning of infrared detector 18-3 is acceptable.

Reference: -AEPSC Drawings 2-1418-93
2-1416-47, 8/11/87
-Pyrotronics Application Bulletin B-188, 9/74

NFPA 72E (1974 Edition) Code Edition 5-5.2

Deviation: The surveillance procedures required for verifying the operability of the flame detectors installed in the plant, do not confirm if obstructions have occured to prevent the proper operation of the detector since the last surveillance was performed.

Justification: The review of procedure PMI-5040 has confirmed that upon completion of the installation of components, conduit or structural members required by an RFC design package, the plant Fire Protection Coordinator is required to review the installation of the equipment or structure to determine the impact on the fire protection features within the plant. Upon the review of the installation, the Fire Protection Coordinator will confirm that the installation is acceptable or indicate where corrective action is required to upgrade the fire protection features to compensate for adverse conditions.

Based on the review of the evaluation discussion above, the upgrading of surveillance procedures will not be required and are therefore considered to be acceptable.

Reference: -AEPSC Procedure No. PMI-5040, Revision 10, 10/22/87

AEP
AMERICAN
ELECTRIC
POWER

Date July 7, 1988

Subject COOK NUCLEAR PLANT
Documentation Revisions Required
For NFPA Code Compliance

From B. J. Gerwe BJG

To P. H. Jacques - Bridgman

Please find attached a copy of the Matrix developed to identify the procedures required to be revised to provide compliance with the applicable NFPA Code.

This Matrix indicates the procedure to be revised, the surveillance requirement to be incorporated, and the NFPA Code and section which requires this revision. These recommended procedural changes were previously discussed by Mr. D. Kipley of Impell with plant personnel during his April trip to the plant.

Should you have any questions, please do not hesitate to contact me.

BJG/ems

Attachment

cc: P. G. Schoepf
W. G. Smith, Jr. - Bridgman
J. R. Sampson - Bridgman
J. A. Kobyra/J. D. Grier/B. J. Gerwe
File: NFPA Code Compliance C-6945

Intra-System

Procedures which require revision to incorporate surveillance testing issues which have been identified as being required by NFPA Code Sections are detailed below.

NFPA Code	Edition	Code Section	Procedure To Be Revised	Requirement
10	1984	4-3.2	12-QHP 2270 Fire.001	The procedures should be enhanced to reference the fire facilities drawings for locating equipment.
12	1968	1716	12-OHP 4030 STP.120	Revise procedure to annually check the liquid level gages.
13	1971	3681 3682 3683	12-MHP 4030 STP.020	Guidelines outlining the replacement of sprinkler heads with paint or ornamental finishes should be incorporated.
13	1983	7-3.4	12-OHP 4030 STP.120	Provide a water supply graph to confirm acceptance during testing.
15	1973	5011 5021 5031	12-MHP 4030 STP.020	The system should be tested. Nozzle operability should be confirmed for filter unit 12-HV-SATFU.
15	1973	7010	12-OHP 4030 STP.120	Provide a water supply graph to confirm acceptance during testing.

NFPA Code	Edition	Code Section	Procedure To Be Revised	Requirement
72D	1967	2034 4052	a. 12-QHP 4030 STP.003	a. Revise procedure to confirm operability of all hose system manual actuation station devices and circuits.
			b. 12-OHP-4030 STP.120	b. Revise procedure to confirm operability of all sprinkler system waterflow and low air supervisory alarm initiating devices and circuits.
			c. 12-THP 4030 STP.223	c. Revise procedure to confirm the operability of all high demand and diesel driven fire pump supervisory devices and circuits.
72D	1967	2047	12-QHP 4030 STP.003, 12-OHP 4030 STP.120, 12-THP 4030 STP.223	Revise the procedures to verify the reset of signals received by the control room for hose system manual stations, sprinkler system waterflow and supervisory signals and fire pump alarm and supervisory signals.
72D	1967	2411 & 2422 3431	Ref. Section 2047	Based on the procedure enhancements required under sections 2034. 4052, and 2047, a justification can be provided.
72E	1974 & 1982	7-3.1.4 8-2.1.2	12-THP 4030 STP.239	The procedures should be revised to verify the operability of the line type heat detectors as required.

Miscellaneous Support Data

for

ABB Impell NFPA Code Compliance Report

No. 09-0120-0123

Date: 3/17/88

Time: —

TELEPHONE CONVERSATION RECORD

Subject: Power Supply Data for Alison Control Alarm Systems installed at D. C. Cook Nuclear Power Plant

From: B. J. Gerwe (AEPSC)

To: Fred Kimack (Alison)
(201) 575-7100

Summary of Conversation:

Power supply data was requested for the following systems:

A700-9	A909
A924	6007
7035	

A conservative estimate of the maximum power load was given for each power supply by Mr. Kimack as follows:

Panel No.	Power Load Description
A909	Because of its age, Alison didn't want to guess
7035	Standby 4.25 Vac Alarm 58.25 Vac
6007	Standby 500 Vac Alarm 720 Vac
A700-9	Standby 300 Vac Alarm 864 Vac
A924	Standby 150 Watts dc Alarm 350 Watts dc

DEK/ems

cc: D. E. Kipley

[illegible]

IMPELL CORPORATION

Memorandum

File: N/A

Copy:

To: BRUCE LAGROS (AEP)

From: DAVID KIPLEY (IMPELL)

Date: MARCH 16, 1989

Subject: METHODOLOGY FOR DETERMINING THE QUANTITY OF CO_2 AGENT IN THE SELECTOR VALVE VENT PIPING.

BASED ON THE TELEPHONE CONVERSATION BETWEEN KAREN HOLTZICK OF CARDOX AND DAVID KIPLEY OF IMPELL ON 5/24/88 WE CAN ASSUME THE FOLLOWING:

- THE AGENT CHARACTERISTICS ARE 2°F AT 300PSI, THE SPECIFIC DENSITY OF THE AGENT IS 0.28 LB/FT³

THE FORMULA FOR DETERMINING THE QUANTITY OF CO_2 IS THE FOLLOWING:

$$\left[\text{VOLUME OF PIPE } (FT^3)\right] \times \left[0.28 \left(\frac{LB}{FT^3}\right)\right] = \text{LBS OF } CO_2$$

Date: May 24, 1988

Time: 11:25 AM EST

TELEPHONE CONVERSATION RECORD

Subject: Methodology for Determining the Quantity of CO_2 Agent in the Selector Valve Vent Piping

From: David E. Kipely (Impell) DEK

To: Karen Holtzich (Chemetron)
(312) 534-1000

Summary of Conversation:

I requested the method for calculating CO_2 agent in the selector valve vent piping.

Ms. Holtzich indicated the following:

- o Assuming the agent characteristics are 2°F at 300 psi, the specific density of the agent is 0.28.

- o To determine the quantity of CO_2 agent in the pipe, the following formula can be used;

Volume of Pipe x specific Density of CO_2 Agent = lbs. of CO_2 ~~per WBIG cubic Foot of Pipe~~

ORIGINAL FORMULA WAS FOUND TO BE INCORRECT. FORMULA CORRECTED IN 3-16-89 MEMO FROM D. KIPLEY (IMPELL) TO B.J. GERWE (AEP). FORMULA GIVEN ABOVE HAS BEEN CORRECTED.

BJG 3-17-89

cc: B. J. Gerwe

Date: May 24, 1988

Time: 11:25 AM EST

TELEPHONE CONVERSATION RECORD

Subject: Methodology for Determining the Quantity of CO_2 Agent in the Selector Valve Vent Piping

From: David E. Kipely (Impell) DEK

To: Karen Holtzich (Chemetron)
(312) 534-1000

Summary of Conversation:

I requested the method for calculating CO_2 agent in the selector valve vent piping.

Ms. Holtzich indicated the following:

- Assuming the agent characteristics are $2^{o}F$ at 300 psi, the specific density of the agent is 0.28.
- To determine the quantity of CO_2 agent in the pipe, the following formula can be used;

Volume or Pipe	specific Density of CO_2 Agent	=	lbs. of CO_2 per WBIC Foot of Pipe

cc: B. J. Gerwe

SUPERSEDED BY 3-17-89
MARK-UP BJH

Date: 6/7/88

Time: 2:05 PM EST

TELEPHONE CONVERSATION RECORD

Subject: Audible signals for predischarge signaling of halon discharge in the Unit 1 and 2 Control Room Cable Vaults

From: David E. Kipley (Impell) DEK

To: Earl Schimmel (I&M)
Cook Nuclear
Extension 1574

Summary of Conversation:

I requested information on whether predischarge signaling has been provided for the halon systems within the subject locations.

Earl indicated that the audible signaling for the CO_2 and halon 1301 systems for these areas, is activated by the operation of common manifold pressure switches located near the hazard. These pressure switches include the following:

Unit 1:	ZPS - 600	Unit 2:	ZPS - 606
	ZPA - 602		ZPA - 604

Earl also indicated that the drawings which will verify this will include:

12-5153L and 12-5154A

See Attachment "A" for drawing and device references.

DEK/ems

cc: B. J. Gerwe

SCD
3/8/88
(STEVE C. DUBOIS)

UNIT 1&2 CO_2 SYS. PRESS. SWITCHES LOCATED IN THE AUX BLDG. CONTROL ROOM CABLE VAULT. (FOR VENTILATION INTERLOCKS) & HALON ALARM BELL

I&C TAG NO.	ELEC. TAG. NO.	ELEC COIL NO. ENERG. BY PRESS. SW.
2-ZPA-604	63 A CVC	23 x 3 CVC ALARM BELL CKT. CONTACT [illegible]
2-ZPS-606	63 B CVC	23 x 2 CVC
1-ZPA-602	63 A CVC	23 x 3 CVC ALARM BELL CKT. CONTACT [illegible]
ZPS-600	63 B CVC	23 x 2 CVC

REF. DWGS.

12-5153 L-1, [illegible]/81
2-98981-21, 1/5/88 23x2CVC
1-98582-30, 10/30/87 23x3CVC ALARM BELL [illegible]

[illegible] ALARM BELL [illegible] 23x3CVC
[illegible] 63BCVC [illegible]
-9[illegible]37-13, 4/29/86 63ACVC [illegible]

NOTE: ADD COMMENTS. By D.E. RIPLEY 6/7/88

Date: 6/9/88

Time: 1:25 PM EST

TELEPHONE CONVERSATION RECORD

Subject: Power Supply Data for Rochester Power Supply Model AN-159

From: David E. Kipley (Impell) DEK

To: Dino Deipalmer (Rochester)
(716) 238-4917

Summary of Conversation:

I requested data information on the power supply data for power supply Model AN-159. Mr. Deipalmer indicated the following:

The AN-159 power supply outputs are:

Volts DC	Min. Current	Max. Current
-28	1 amp	5.6 amp
+12	50 MA	500 MA
-12	50 MA	500 MA
+125	-	200 MA

In addition, I requested power data for the "EF" panel detection cards (Model AN-080). Mr. Deipalmer indicated that the detection circuits operate on 125 VDC at 1 MA.

DEK/ems

cc: B. J. Gerwe

Date: 6/13/88

Time: 3:30 PM EST

TELEPHONE CONVERSATION RECORD

Subject: Continuous duty data for Pyrotronics System 3 and FIU unit's power supply transformers

From: David E. Kipley (Impell) DEK

To: Frank Kanerath (Pyrotronics)
(201) 267-1300

Summary of Conversation:

I requested information on the continuous duty data for the transformers of the System 3 (PS-30) and FIU unit's power supplies.

Mr. Kanerath indicated that since these units are no longer being manufacturered, this data is not available.

DEK/ems

cc: B. J. Gerwe

TELEPHONE CONVERSATION RECORD

Subject: Data required to confirm compliance with NFPA 12 for EMPC cabinet manual actuator, selector valves, and typical circuit current output from CO_2 system relay cabinets.

From: David E. Kipley (Impell) DEK

To: Steve Dimetravich (Chemetron)
(312) 534-1000

Summary of Conversation:

I requested data on the following equipment:

a. Maximum circuit current output from the CO_2 system relay cabinets

b. The hydrostatic pressures and equivalent lengths for the CO_2 selector valves

c. Maximum pull pressure and travel distance of EMPC cabinet manual actuator

Mr. Dimetravich indicated the following:

a. The largest power consuming component connected to the relay cabinets are the EMPC solenoids. These devices are all 10 watt solenoids.

<u>Note:</u> The current consumption is the following: $\text{Amp} = \frac{\text{Watts}}{\text{Volts}}$

.040 Amps = 10/250 VDC

b. Selector valve data

1. All valves are hydrostatically tested at 1800 psi

2. Equivalent lengths of selector valves are the following:

Valve Pipe (Inches) Size	Equivalent Length (Feet)
1 1/2	72
2	67
3	99
4	61
6	185

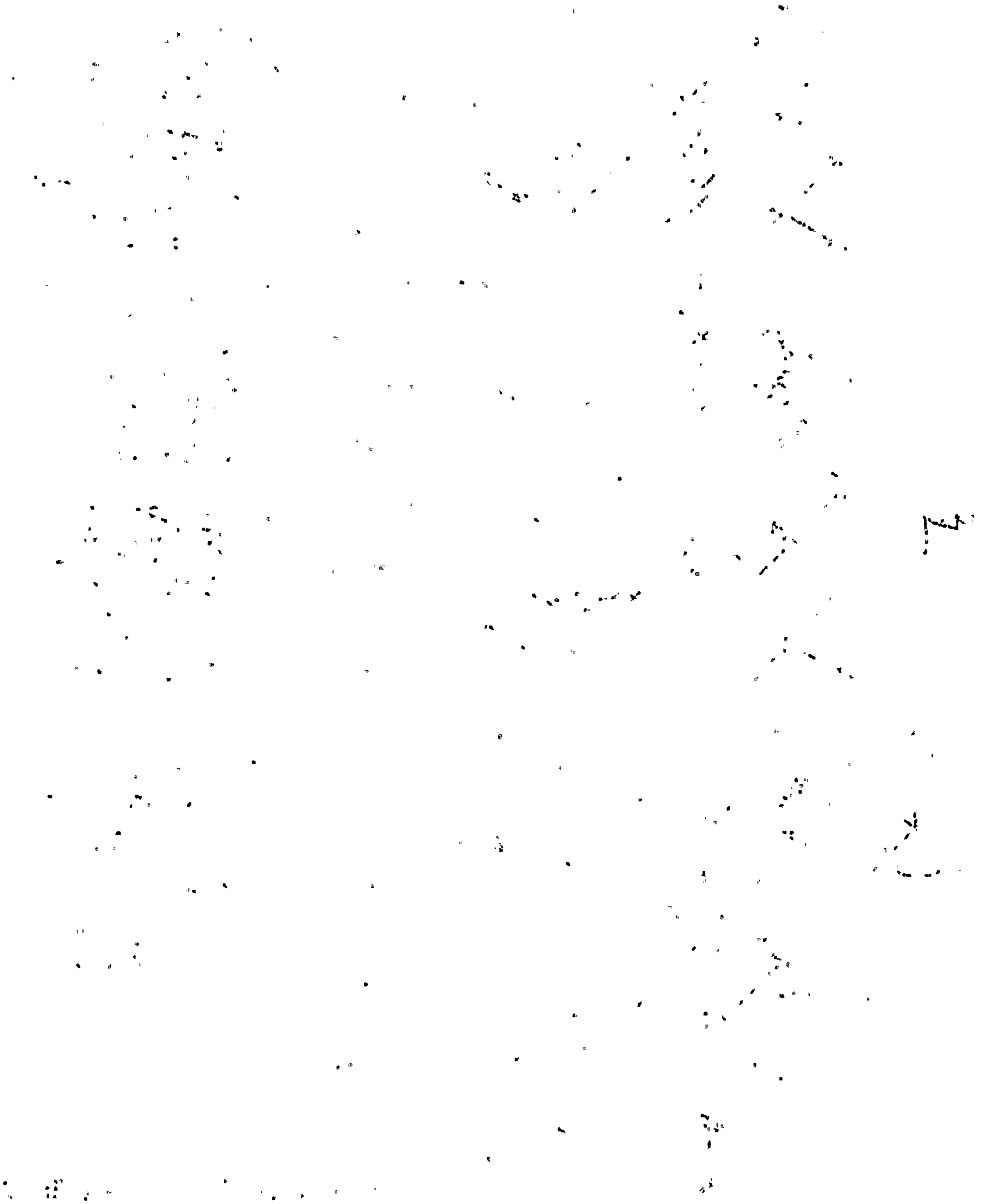
c. Data is not available for this request for the manual actuators of the EMPC cabinets.

DEK/ems

cc: B. J. Gerwe

[illegible]

[illegible]



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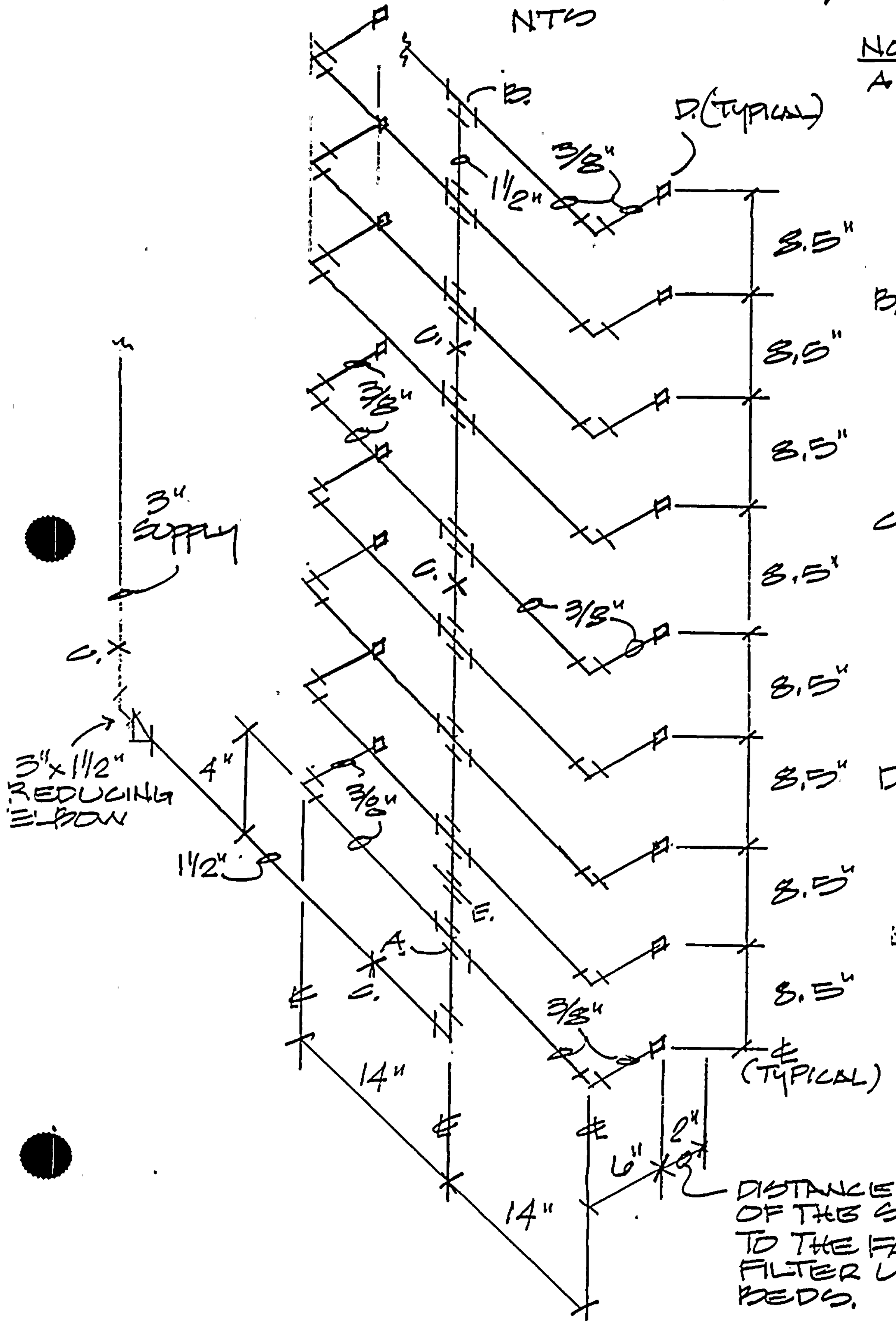
7223(9-83)
FORM GE-8 (C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 1 OF 2
DATE 1/14/88 BY DeWitt CK.
COMPANY G.O.
PLANT D.C. COOK NUCLEAR

SUBJECT ISOMETRIC SKETCH OF SPRAY SYSTEM FOR CHARCOAL FILTER UNITS 1 & 2 - HV-ACRF-1
NTS



NOTES

A. 1 1/2" x 1 1/2" CROSS TEE. 1 1/2" x 3/8" REDUCING BUSHINGS (2) IN CROSS TEE FOR 3/8" BRANCHES TO NOSSLES.

B. 1 1/2" x 1 1/2" x 1 1/2" TEE, 1 1/2" x 3/8" REDUCING BUSHING (2) IN TEE FOR 3/8" BRANCHES TO NOSSLES.

C. "U" BOLT ATTACHED TO ANGLE IRON FOR SPRAY SYSTEM SUPPORT. SEE SHEET 2 OF 2 FOR DETAIL.

D. SPRAY NOSSLE THREADED INTO COUPLING AT END OF 3/8" BRANCH LINE.

E. 1 1/2" UNION COUPLING

DISTANCE FROM THE END OF THE SPRAY NOSSLE TO THE FACE OF THE FILTER UNIT CHARCOAL BEDS.

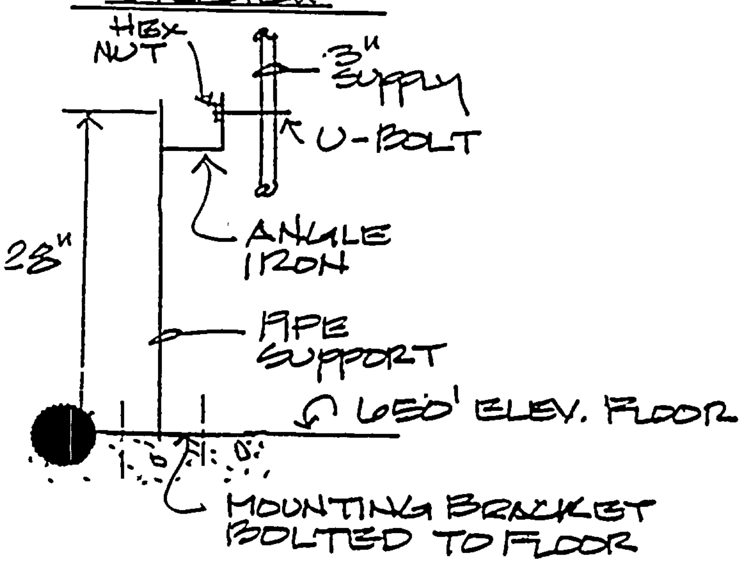
7223(9-83)
FORM GE-8 (C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

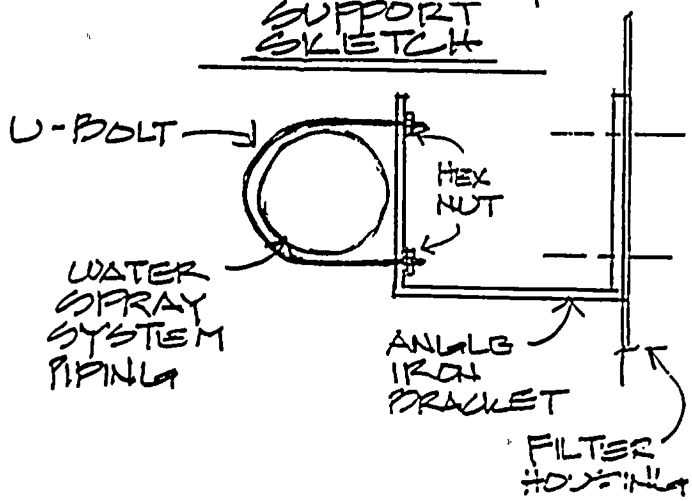
SHEET 2 OF 2
DATE 6/14/88 BY D.E. WILEY CK.
COMPANY G.O.
PLANT D.C. COOK NUCLEAR

SUBJECT SKETCH OF FILTER UNIT SPRAY SYSTEM (CONT'D)

3" SUPPLY SUPPORT SKETCH



1 1/2" SUPPLY SUPPORT SKETCH



CIMCO QC Con't

Surveillance Activities

Inprocess Work Activities	13
Safety	13
Material Control	9
Document Review	0
TOTAL	35

One Condition Report was generated during these surveillance activities.

NDE Group

Radiography of CCW piping is complete for the Annulus and Blowdown Flash Tank area.

The inaccessible snubber inspection was completed. All snubbers are acceptable.

Ultrasonic examination was performed on the Unit 1 East/West MSR for verification of thickness measurements.

Visual and nondestructive examinations are being performed as required to support various Maintenance and Construction activities.

Reviewed Job Orders 017823, 017822, and 700135 travelers for ASME repair/replacement NDE requirements. These reviews are being performed to establish NDE requirements prior to the start of work.

FIRE PROTECTION COORDINATOR

Mr. Al Barker, AEPSC Site QA, exited with the Fire Protection Coordinator on Friday, June 10, 1988, pertaining to QA Surveillance QA-88-18. Only one deviation was identified during this surveillance. This item was corrected during the surveillance and no follow-up response is required.

BJY Fire Protection personnel placed signs on the Training Simulator Room doors to match those of the Unit 2 Control Room. Halon fire extinguishers will be purchased and placed in the Simulator Room.

BJY Fire Protection personnel worked on installation of sprinkler head guards on low hanging sprinkler heads throughout the Auxiliary Building. This activity will be completed upon receipt of additional sprinkler head guards.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

DATE 4/13/88

MEMO TO: PAUL JACQUES
COOK PLANT

PAUL:
ENCLOSED YOU WILL FIND THE DESCRIPTIONS OF THE AREAS WHERE SPRINKLER GUARDS SHOULD BE INSTALLED. ANY QUESTIONS PLEASE LET ME KNOW.

FROM DAVID KIFLEY

7155(7-83)IAP50
OM-14 (AD-16)

AREAS REQUIRING SPRINKLER GUARDS

FIRE ZONE	ELEV.	SKETCH	DESCRIPTION
6M	587'	A	PENDANT AUTO. SPRINKLER NOT PROTECTED @ 7.5' AFF.
6S	587'	B	UPRIGHT SPRINKLER AND PILOT @ 7' AFF.
6S	587'	C	PENDANT SPRINKLER AND PILOT NOT PROTECTED AT 8' AFF
5	587'	D	PENDANT PILOT & UPRIGHT SPRINKLER NOT PROTECTED AT 9' AFF
5	587'	E	UPRIGHT SPRINKLER NOT PROTECTED @ 7' AFF
5	587'	F	PENDANT SPRINKLER NOT PROTECTED @ 7.5' AFF
5	587'	G	PENDANT SPRINKLER DAMAGED AND GUARD MISSING @ 7' AFF. PENDANT PILOT NOT PROTECTED @ 7' AFF.
44S & 44N	609'	H	UPRIGHT SPRINKLERS NOT PROTECTED @ 7' AFF
S	609'	I	WATER SPRAY NOZZLE FOR CCW PUMPS EXPOSED TO MECH. DAMAGE AT 5' AFF.

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[illegible]

[illegible]

[illegible]

AREAS REQUIRING SPRINKLER GUARDS.

FIRE ZONE	ELEV.	SKETCH	DESCRIPTION
4N MEZ.	620'	J	UPRIGHT SPRINKLERS NOT PROTECTED @ NORTH WEST CORNER OF AREA @ 4' 6" AFF.
52	633'	K	UPRIGHT AND PENDANT SPRINKLERS AND PILOT NOT PROTECTED @ MEZZENINE OF STAIRWAY @ 5' AFF.
52	633'	L.	UPRIGHT SPRINKLERS UNDER DUCT @ 5.5' AFF.
52	633'	M	UPRIGHT SPRINKLER UNDER DUCT NOT PROTECTED @ 5.5' AFF