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- V Supplement One - Hydraulic Verification Study (see Vol. 11 of FPPDP)
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- VI Suppression Effects Analysis (see Vol. 12 of FPPDP)
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- 2. Evaluations

I

**INTERIM MEASURES/EXEMPTION
REQUESTS**

INTERIM MEASURES/EXEMPTION REQUESTS

1.0

INTRODUCTION

CECo management requested that a detailed, independent outside review of this entire fire protection program be conducted for the station. The study was to compare the criteria of Appendix R, with particular attention given to the latest NRC staff positions as presented in Generic Letter 83-33, with the previous Appendix R analysis.

The Appendix R reevaluation included the detailed review of the fire protection program and safe shutdown analyses for the station. The fire protection program was reviewed and evaluated not only against Appendix R requirements but also included previous station commitments made in the Fire Hazards Analysis, Station Technical Specifications, NFPA Fire Codes, Fire Protection Safety Evaluation Report, and Responses to Supplementary Guidance.

As a result of the reevaluation and Generic Letter 83-33, it was determined that additional formal exemption requests were necessary. Technical justifications are included in this report for the exemption requests identified during the reevaluation.

The following is a summary of the Dresden 2&3 Exemption Requests following the reevaluation.

On August 10, 1984, Commonwealth Edison Company requested Appendix R exemptions for both Unit 2&3 Reactor Buildings, the Turbine Building, and the Cribhouse. These exemptions fell into two categories:

1. The lack of complete three hour fire barriers.
2. The lack of fire detection and suppression throughout the fire areas.

Most of this original material was updated on September 18, 1985 when Commonwealth Edison submitted Revision 1 to the August 10, 1984 submittal. The September 18, 1985 submittal also included the following material to be used as appendixes:

1. Schematic Diagrams of Alternate Safe Shutdown Path Availability and Shutdown Path Piping Systems (Appendix A).
2. Fire Protection Diagrams (Appendix B).
3. Instrumentation and Alternate Inboard Isolation Condenser Valve Cabling Diagrams (Appendix C).

On October 16, 1985, Commonwealth Edison submitted new exemption requests for the following items:

1. Fire area TB-V, which contains the Main Control Room and Auxiliary Electric Equipment Room (Section 8).
2. 4kV Bus Duct penetrations and Standby Gas Treatment System piping penetrations (Section 9).
3. Structural Steel (Section 10).
4. Cold Shutdown Methods (Subsection 2.3).
5. Structural Steel Beam Exposure Evaluation (Subsection 2.4).
6. Justification for lack of complete fire barriers around fire Zone 1.3.1 and 1.4.1 (Subsections 4.8 and 4.9 respectively).
7. Justification for separation between mechanical components of redundant Cold Shutdown Systems (Subsection 4.10).

New material entitled "Methodology for Evaluation of Fire Resistance of Structural Steel," Revision 3 dated January 23, 1985 was also included to be used as Appendix D.

Technical Exemption Requests for the station were updated by letter dated May 30, 1986. This revision:

1. Deleted subsections 3.8.4.1 and 4.10.4.1, which discussed separation of valves within a fire zone.
2. Added new subsections 7.2 and 7.3, which justified additional fuse pulling and/or replacement to comply with the intent of IEIN 85-09 and to address common power source concerns.
3. Changed Table 9.2-1 to indicate what fire zones are involved and add one additional standby Gas Treatment System penetration.

Various exemptions were also withdrawn through this submittal. The following exemption request sections were withdrawn from their previous submittals.

<u>Section</u>	<u>Submittal</u>
3.2	Sept 1985
3.3	Sept 1985
3.8	Oct 1985
4.2	Sept 1985
4.8	Oct 1985
4.9	Oct 1985
4.10	Oct 1985
5.2	Sept 1985
9.1	Oct 1985
9.2	Oct 1985
10.1	Oct 1985

However, since there exists no definite criteria for establishing independence of an alternate safe shutdown system from the area, room or zone under consideration, it was requested that NRR review the submittals with regard to the independence of alternate safe shutdown systems. See J. R. Wojnaiowski (CECo-NLA) letter of May 30, 1986 to H. R. Denton (NRC-NRR).

On June 5, 1986, Commonwealth Edison submitted a new exemption request for the Drywell Expansion Gap (Section 11). Reference material consisting of Penetration Assembly Drawings and Steel Containment Temperature Profiles were also included to be used as Appendix E.

In September of 1987 Revision 3 to the August 10, 1984 Exemption Requests was submitted. This revision added a new subsection 7.4, which justified the pulling of fuses to preclude spurious operation of Reactor Relief Valves.

2.0 LICENSING DOCUMENTATION REFERENCES

- A. February 2, 1983 Safety Evaluation of Exemptions to 10CFR50 Appendix R Section III.G (available in FPPDP Vol. 1, Tab III-2).
- B. Safe Shutdown Report, June 1985 (available in FPPDP Vol. 3, Book 1).

3.0 INTERIM MEASURES/EXEMPTION REQUESTS DOCUMENTATION LISTING

3.1.0 Tab I - Executive Summary.

- a. The Executive Summary provides the background information leading to the reevaluation of the station fire protection and safe shutdown systems. The summary also outlines the steps performed in the reevaluation to arrive at the conclusion.

3.2.0 Tab II - Interim Compensatory Measures.

3.2.1 Tab 1 - Interim Measures

- a. Interim measures are required to show safe shutdown can be achieved until the modifications which do not meet the requirements of 10CFR50.48 are completed. This section identifies modifications that have been or will be performed and any interim compensatory measures associated with the modifications.

3.2.2 Tab 2 - Offsite Power Reliability

Request that the NRC accept the position that a loss of offsite power in conjunction with a catastrophic fire which affects multiple safe shutdown equipment will not occur.

Request that the NRC accept the position that a loss of offsite power in conjunction with a catastrophic fire which affects multiple safe shutdown equipment will not occur.

- 3.3.0 Tab III - Appendix R Exemption Requests and Analysis
 - a. Table of Contents for Appendix R Exemption Requests and Analysis for information contained in Tabs 1 through 11.
- 3.3.1 Tab 1 - Introduction to Exemption Requests.
 - a. Identifies and lists by building the exemptions for Dresden Station.
- 3.3.2 Tab 2 - Appendix R Shutdown Paths.
 - a. Identifies the ten different safe shutdown paths and the fire zones in which cables or equipment are located. For a fire in any fire zone, at least one path will remain free of fire damage, ensuring that hot and cold shutdown can be achieved and maintained for a fire.
- 3.3.3 Tab 3 - Unit 2 Reactor Building Appendix R Exemption Requests.
 - a. Request for exemption from the requirements of Sections III.G.2, III.G.3 and III.L of Appendix R. Provides zone descriptions for the reactor building.
- 3.3.4 Tab 4 - Unit 3 Reactor Building Appendix R Exemption Requests.
 - a. Request for exemption from the requirements of Sections III.G.2, III.G.3 and III.L of Appendix R. Provides zone descriptions for the reactor building.
- 3.3.5 Tab 5 - Turbine Building Appendix R Exemption Request.
 - a. Request for exemption from the requirements of Sections III.G.3 and III.L of Appendix R. Provides zone descriptions for the turbine building.
- 3.3.6 Tab 6 - Crib House Exemption Request.
 - a. Request for exemption from the requirements of Sections III.G.2 of Appendix R. Provides zone descriptions for the crib house.
- 3.3.7 Tab 7 - Appendix R Exemption Request for Hot Shutdown Repairs.
 - a. Request for exemption from the requirements of Section III.G.1 of Appendix R that one train of systems needed for hot shutdown be free of fire damage.
- 3.3.8 Tab 8 - Fire Area TB-V (Main Control Room and Auxiliary Electric Equipment Room) Appendix R Exemption Requests.
 - a. Request for exemption from the requirements of Section III.G.3 of Appendix R. Provides a description of the detection for the fire zone.

- 3.3.9 Tab 9 - Appendix R Exemption Request for 4KV Bus Duct Penetrations and Standard Gas Treatment System Piping Penetrations.
- a. Request exemption from the requirements of Sections III.G.3 and III.L of Appendix R.
- 3.3.10 Tab 10 - Structural Steel Exemption Request
- a. Request for exemption from the requirements of Section III.G.3 and III.L of Appendix R.
- 3.3.11 Tab 11 - Appendix R Drywell Expansion Gap Exemption Request.
- a. Exemption requested from the requirements of Section III.G.3 of Appendix R to 10CFR50 that the drywell expansion gap be provided with fire detection and fixed fire suppression.
- 3.3.12 Tab A - Drawings A-1 through A-11.
- a. Drawings provide reactor and turbine building safe shutdown paths and equipment and piping for operation of safe shutdown systems.
- 3.3.13 Tab B - Drawings B-1 through B-24.
- a. Drawings indicate fire zones, barriers, fire suppression (gaseous and water) and detector locations, 1-hour fire barrier cable protection and curbs in the crib house.
- 3.3.14 Tab C - Drawings C-1 through C-3.
- a. 3 Figures titled: Instrument Routings, Mechanical Penetrations in Ceiling of Shutdown Cooling Pump Room, and Inboard Isolation Condenser Valves Alternate Power and Control Feed Routing.
- 3.3.15 Tab D - Methodology for Evaluation of Fire Resistance of Structural Steel.
- a. Professional Loss Control, Inc. "Methodology for Evaluation of Fire Resistance of Structural Steel", January 23, 1985.
- Structural steel members which form a part of or support fire barriers should be capable of withstanding the fire exposure presented by all combustibles contained in that fire area. Structural steel need not be protected if it can withstand this fire exposure. The evaluation consists of 2 parts. First, the fire exposure is determined. Then, the response of the structural steel member is assessed.

3.3.16 Tab E - Drawings E-1 through E-3.

a. 3 Figures titled:

1. Typical Electrical Penetration Assembly Canister
2. Typical Mechanical Penetration Assemblies
3. Steel Containment Temperature Profiles

3.40 Tab IV - Appendix R Exemption Requests and Analysis Transmittal Letters

- a. Transmittal letters for the original Appendix R Exemption Requests, additional Exemption Requests, and the subsequent Revisions to the existing Exemption Requests.

4.0 SUPPORTING DOCUMENTATION

"Fire Protection Evaluation Report," July 1985 (available in FPPDP Vol. 6, Tab VII).

August 1984

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ENCLOSURE I

EXECUTIVE SUMMARY

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1.0 DRESDEN FIRE PROTECTION PROGRAM

1.1 BACKGROUND

As part of the continuing NRC evaluation following the fire at the Browns Ferry Nuclear Station in March 1975, Commonwealth Edison Company (CECo) has outlined its fire protection program and features at Dresden Power Station in a number of documents submitted to the NRC between 1976 and the present.

The document entitled, "Information Relevant to Fire Protection Systems and Programs-Parts 1-3, April 1977," provided CECo's response to the NRC initial request for a comparison of the fire protection provisions of Dresden Station with the guidelines of Appendix A to BTP 9.5-1. This was CECo's first Fire Hazards Analysis of Dresden Station and resulted in a number of fire protection modifications.

CECo also responded to NRC guidelines regarding nuclear power plant fire protection programs issued in the following documents:

1. Supplementary Guidance on Information Needed for Fire Protection Evaluation, September 30, 1976,
2. Sample Technical Specifications, May 12, 1977, and
3. Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance, June 14, 1977.

Following the review of these CECo submittals and a plant inspection, the NRC staff docketed a Fire Protection Safety Evaluation Report (FPSER) for Dresden Units 2 and 3 in March 1978. A staff letter of February 12, 1981, confirmed that all FPSER items were considered closed with the one exception being "Safe Shutdown Capability."

Implementation of these guidelines resulted in additional fire protection measures being incorporated to enhance the existing fire protection program and satisfy the NRC defense-in-depth philosophy. Many studies and much discussion were also associated with the subsequent NRC fire protection guidelines and requirements.

1.2 APPENDIX R

The fire protection rule, Appendix R of 10 CFR 50, was issued on February 19, 1981, for Dresden Units 2 and 3. At that time the shutdown analyses and subsequent related correspondence for Dresden Station was well underway and being reviewed by

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the NRC staff. CECo continued to provide the NRC staff with all necessary information for their review of the station's safe shutdown capability.

On July 1, 1982, CECo submitted the final response and position in Generic Letter 81-12 questions, Safe Shutdown Capability, Associated Circuits, and a listing of the exact shutdown methods and necessary safe shutdown modifications for Dresden Station. Submitted with this enclosure was Dresden Station's Fire Protection Associated Circuits Analysis and Modifications Report. The cable discrepancy report was revised and resubmitted August 16, 1982, as a supplement to the Modifications Report.

Enclosure E of the August 16, 1982 submittal included the first formal exemption request from the requirement of Appendix R Section III.G.3.b for fixed fire suppression. This request was made for 13 fire zones having electrical equipment critical to the power distribution necessary for normal and emergency operation of safety-related equipment for Units 2 and 3 at Dresden. A formal exemption was granted from the requirements of Section III.G.3 on February 2, 1983.

By cover letter dated January 19, 1983, the NRC staff stated that they had completed the review of Dresden 2 and 3 alternate shutdown capability which is used to achieve safe shutdown in the event of a fire. This capability was evaluated against the requirements of Sections III.G and III.L of Appendix R to 10 CFR 50. Based on this review, the NRC staff concluded that Dresden 2 and 3 was in compliance with Appendix R Items III.G.3 and III.L regarding safe shutdown in the event of a fire. A Safety Evaluation Report (SER) was written on this Appendix R review. The conclusion of this evaluation states:

"We (the NRC staff) have reviewed the licensee's proposed alternate shutdown capability for certain designated areas in Dresden Units 2 and 3 in accordance with Appendix R criteria. Based on that review, we conclude that the performance goals for accomplishing safe shutdown in the event of a fire, i.e., reactivity control, inventory control, decay heat removal, pressure control, process monitoring, and support functions are met by the proposed alternate in these areas. Therefore, we conclude that the requirements of Appendix R Sections III.G.3 and III.L are satisfied in the areas identified in Section 2.2 of this Safety Evaluation."

On the basis of these conclusions, CECo management was confident that the intent of Appendix R has been satisfied and continued working to implement the identified modifications in accordance with 10 CFR 50.48 (c)(4).

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On October 19, 1983, Generic Letter 83-33, which reemphasized NRC positions on certain requirements of Appendix R, was transmitted to Dresden 2 and 3. As a result, CEC management decided to perform a reevaluation of the previous analysis to verify that misinterpretations did not exist.

2.0 REEVALUATION OF CECO APPENDIX R POSITION

2.1 PURPOSE

CECo management requested that a detailed, independent outside review of its entire fire protection program be conducted at Dresden. The study was to compare the criteria of Appendix R, with particular attention given to the latest NRC staff positions as presented in Generic Letter 83-33, with the previous Appendix R analysis.

2.2 REEVALUATION TEAM

In October 1983, CECo contracted the services of Professional Loss Control, Inc. (PLC) to conduct an in-depth reevaluation at Dresden Station. PLC was selected to perform this review because of their extensive involvement in all aspects of nuclear power plant fire protection. CECo also contracted the architectural engineering firm, Sargent and Lundy (S&L), to provide the technical support necessary for evaluation of mechanical, electrical, and nuclear systems at the station.

The overall reevaluation team consisted of Mr. Michael E. Mowrer, P.E., Vice President, (PLC); Mr. Christopher A. Ksobiech, Fire Protection Engineer, (PLC); Mr. John W. Dingler, P.E., Group Supervisor Nuclear Licensing Section, (S&L); Mr. John M. Nosko, P.E., Mechanical Project Engineer, (S&L); and Mr. Clayton E. Ruth, P.E., Electrical Engineer, (S&L). Mr. Wayne D. Pierce, Dresden Station Technical Staff Engineer; Mr. Raymond Christenson, Senior Reactor Operator at Dresden Station; Mr. Ronald E. Roebert, Staff Assistant, and Mr. William H. Koester, Station Nuclear Design Engineer, Station Nuclear Engineering Department; and Mr. Bob Rybak, Nuclear Licensing Administrator for Dresden Station provided the plant specific information, guidance, and support from Commonwealth Edison Company.

Mr. Mowrer acted as the project leader for this reevaluation team. He is Vice President of PLC and a Senior Fire Protection Engineer with over 15 years of experience as a fire protection engineer. Mr. Mowrer is a full member of the Society of Fire Protection Engineers (SFPE), a qualified lead auditor per ANSI N45.2.23, and exceeds the NRC qualifications for a fire protection engineer. He has been involved in nuclear power plant fire protection since 1976 providing services to more than 27 plants in the U.S. and is familiar with all of the fire protection criteria and guidelines established by the NRC.

Mr. Dingler provided nuclear systems information in the analysis. He is familiar with the Dresden Station and is experienced with the Appendix R safe shutdown analyses.

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Mr. Nosko provided the mechanical system information for the study. In his position as Mechanical Project Engineer he is thoroughly acquainted with the mechanical systems at the plant and proposed Appendix R modifications.

Mr. Ruth provided the technical input on electrical systems for the detailed analysis. He also coordinated the preparation and review of the cable charts and maps used so extensively during the reevaluation.

Mr. Ksobiech is a graduate Fire Protection Engineer. He provided additional technical fire protection input to the project for PLC.

(Detailed resumes for the project team are presented at the end of this enclosure.)

2.3 METHODOLOGY OF REEVALUATION

The Appendix R reevaluation included the detailed review of the fire protection program and safe shutdown analyses for Dresden Station Units 2 and 3. The fire protection program was reviewed and evaluated not only against Appendix R requirements but also included previous station commitments made in the:

- Fire Hazards Analysis
- Responses to Supplementary Guidance, June 20, 1977, Nuclear Plant Fire Protection Responsibilities, Administrative Controls and Quality Assurance
- Fire Protection Safety Evaluation Report (FPSEER)
- Station Technical Specifications
- NFPA Fire Codes (Design, installation and maintenance of fire protection systems)
- Related Correspondence with the NRC.

The adequacy of previous safe shutdown analyses (discussed previously) and related correspondence was verified and revalidated. These CECO responses were reviewed to the latest NRC staff positions and the criteria of Appendix R. Special attention was given to the issues addressed in Generic Letter 83-33.

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The reevaluation began with the gathering and/or review of existing necessary data. This data included information on plant fire protection features, combustible loadings, hot and cold shutdown equipment and associated cables. The adequacy of definitions used in the initial analysis was verified as part of the reevaluation. This was done to ensure that items such as associated circuits and spurious valve operations were thoroughly addressed in accordance with NRC direction issued subsequent to the original Dresden analysis.

The station's fire protection systems, both passive and active, are being evaluated for compliance with previous commitments, such as the nationally recognized (NFPA) fire codes. This review included such features as fixed fire suppression, detection, manual hose stations, portable extinguishers, fire barriers, fire dampers, fire doors, and penetration seals. This review provided the basis for identifying the fire protection features available in the plant. This study also included a walkdown of all fire zones to determine the basis for the establishment of the zone (i.e., surrounding barriers, separation, etc.) and to ensure that the fire areas were consistent with NRC definitions.

The fixed combustible loading of each fire zone was recalculated. The calculations were conservative but did not include lubricating grease or negligible oil capacities related to minor equipment. Special note was taken of concentrations of combustibles, their type, and their location in each fire zone with respect to safe shutdown equipment, fire barriers, and openings in barriers.

A clear shutdown path was identified for each fire zone which would not affect the ability of the plant to be safely shut down under any worst reasonable fire scenario. Cable maps were developed for all hot and cold shutdown equipment showing associated cable routing through fire zones. These cable maps were studied to determine the level of separation between available shutdown paths. Fire protection drawings were compiled to illustrate available fire protection features. Previously identified modifications were reviewed to ensure that they adequately addressed Appendix R concerns. Each shutdown path was carefully reviewed to ensure that all necessary manual actions were identified, required instrumentation was available, and that the related time line for manual actions was realistic. Plant personnel verified that sufficient manpower was available to accomplish all necessary actions in addition to the required fire brigade activities.

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A careful review was conducted against the guidance of Appendix R Sections III.G and III.L and Generic Letter 83-33. This review revalidated the Associated Circuits Analysis of June 1982 and expanded the analysis to demonstrate that a fire in one fire zone would not adversely affect the ability to shut down the plant even with alternate shutdown equipment located in an adjacent fire zone.

Documentation of the modifications and justification of Appendix R exemptions identified in this review are contained in Enclosures II and III, respectively, of this submittal. A revised Appendix R report is in preparation which will update and replace the Associated Circuits Analysis of June 1982. This report will document in detail the methodology and results of the reanalysis including hot shutdown, cold shutdown, potential adverse spurious operation of valves, emergency lighting study, and the structural steel analysis. Documentation of the NFPA code study and the previous commitment review will be available for review.

The few unprotected plant areas which contain unprotected structural steel are now being analyzed in detail to determine if additional fire protection is needed. Results of this study will be submitted upon completion. Additionally, the results of the cold shutdown review, emergency lighting study, and potential spurious valve operation review will be submitted when completed.

It should be noted that the major concerns regarding spurious operation of valves were identified in the Associated Circuits Analysis of June 1982. Procedures and/or modifications were developed to address the identified concerns.

CECo personnel also recognized the need to consider compensatory measures when 10 CFR 50.48(C)(4) could not be satisfied. Those proposed modifications which will not be completed according to the 10 CFR 50.48 schedule have been considered to determine the impact of a fire in the area before completion of the modification. Discussions are included as Enclosure II.

2.4 CONCLUSIONS

A detailed, independent reevaluation of the entire Dresden fire protection program was undertaken by a well qualified project team at the request of CECO management. The results of that study verified the validity of the basic approach and results from the previous Appendix R analysis. The Dresden associated circuit analysis was updated to include all NRC concerns. Previously proposed modifications were found to be appropriate.

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As a result of Generic Letter 83-33, it was found that additional fire detection was warranted primarily in the reactor buildings. This additional fire detection will assist the plant operators in deciding which alternate shutdown path remains unaffected. Modifications were also proposed to more clearly demonstrate equivalence to the fire area concept where strict Appendix R compliance could not be achieved.

As a result of the reevaluation and Generic Letter 83-33, it was determined that additional formal exemption requests were necessary. Technical justifications are included in this report for the exemption requests identified during the reevaluation.

PLC *Professional Loss Control, Inc.*

MICHAEL E. MOWRER, P.E.
VICE PRESIDENT

EDUCATION

B.S. Fire Protection Engineering, Illinois Institute of Technology, 1969
Seminar on Quality Assurance Audit Techniques
Management Courses and Seminars

PROFESSIONAL AFFILIATIONS

Registered Professional Engineer, California
Society of Fire Protection Engineers, Member
National Fire Protection Association, Member of Technical Committee

PROFESSIONAL EXPERIENCE

Mr. Mowrer has more than fifteen (15) years of fire protection engineering experience with hazardous industry. He is currently involved in a variety of projects relating to heavy industry, including power plant audits, engineering evaluations, establishment and review of fire detection and suppression system design criteria, fire hazards analyses, development of detailed pre-fire plans for fire brigade use, project management, fire system design, and fire brigade leadership training programs to satisfy OSHA and NRC requirements. He has developed and presented numerous seminars on fire protection for nuclear and fossil power plants, hazardous industry, and fire emergency planning. He is an ANSI N45.2.23 qualified lead auditor.

Previously Mr. Mowrer was Assistant Manager for a large fire protection consulting firm. As such he was responsible for the supervision of fire protection engineers providing services for the hazardous paint and coatings industry. These services included both fire protection system review and chemical process analysis. Additional responsibilities included conducting surveys of municipal fire defense facilities, determining life-safety needs for highrise buildings, evaluation of compliance with OSHA regulations, and review of building construction to determine divergence from national consensus standards.

Before joining the consulting firm, Mr. Mowrer's responsibilities included HPR inspections of high risk sprinklered properties to determine the need for special hazard detection or suppression equipment to improve life safety and property protection. He was also involved in the evaluation of the level of public fire protection provided for a number of communities. Mr. Mowrer has experience as a volunteer fire fighter.

AREAS OF SPECIALIZATION

Project Management
Fire Protection for Electrical Power Generating Facilities (nuclear & fossil fuel)
Design and Evaluation of Fire Detection and Suppression Systems
Evaluation of Compliance with Consensus Standards, Codes, and Regulations
Quality Assurance Audits for Nuclear Plants
Fire Hazard Evaluation and Protection of Heavy Industry
Pre-Fire Planning
Development, Presentation, and Evaluation of Fire Training Programs

SECURITY CLEARANCE

DOE "Q" Clearance

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4/84

MICHAEL E. MOWRER, P.E.
VICE PRESIDENT

Professional Loss Control, Inc.

MAJOR PROJECT EXPERIENCE

1. Fire Protection System Evaluation and Design for Power Plants:

Commonwealth Edison Co.	- Dresden, Units 2 & 3, & Quad Cities, Units 1 & 2
Georgia Power Co.	- E. I. Hatch, Units 1 & 2
Jersey Central Power & Light	- Oyster Creek Nuclear Generating Station
Carolina Power & Light	- Brunswick Steam Plant, Units 1 & 2
Electricity Supply Commission of the Republic of South Africa	- nine plants
Ohio Edison	- ten plants
Washington Public Power Supply System	- Unit 1
Springfield City Utilities	- Southwest Power Plant
New Brunswick Electric Power Commission	- Pt. Lepreau, Unit 1
Long Island Lighting Company	- Shoreham Nuclear Power Station
Santee Cooper	- six plants
Indiana & Michigan Electric Co.	- D.C. Cook, Units 1 & 2

2. Audits of Nuclear Power Plants:

Florida Power Corporation	Crystal River, Unit 3
Power Authority of the State of New York (PASNY)	Indian Point, Unit 3
Power Authority of the State of New York (PASNY)	J.A. FitzPatrick Plant
Alabama Power Company	J.M. Farley, Unit 1
Georgia Power Company	E.I. Hatch, Units 1 & 2
Tennessee Valley Authority	Browns Ferry, Units 1, 2, & 3
Toledo Edison	Davis-Besse Nuclear Station
Consolidated Edison	Indian Point, Unit 2
Kansas Gas and Electric	Wolf Creek
Louisiana Power and Light	Waterford 3

3. Inspections of Heavy Industry (Representative Sample):

Valspar Corporation	Rockford, Illinois
FMC Corporation	Portland, Oregon
O'Brien Paint	South Bend, Indiana and San Francisco, California
Conchemco, Inc.	Kansas City, Missouri
American Aerosols	Holland, Michigan
St. Louis Car Co.	St. Louis, Missouri
Guardsman Chemical	Grand Rapids, Michigan
Standard T. Chemical	Chicago, Illinois
Sherman Williams Co.	Cleveland, Ohio
Mallinckrodt Chemical	St. Louis, Missouri
Pratt & Lambert, Inc.	Kansas City, Missouri

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4. Major Municipal Fire Protection Studies:

Kansas City, Missouri
Lockport, New York
Hoffman Estates, Illinois
New Castle, Pennsylvania
Altoona, Pennsylvania
Columbia, Missouri

5. OSHA Surveys:

Goddard Space Center, Maryland
Fort Buchanan (U.S. Army), Puerto Rico
Fort Meade (U.S. Army), Maryland
New Cumberland Depot (U.S. Army), Pennsylvania
Naval Rework Facilities (6 locations), U.S.A.
General Accounting Office, Washington, D.C.
Columbus Depot (U.S. Army), Ohio
Santee Cooper, South Carolina (6 plants)

6. Fire Protection Engineering Training Seminars:

U.S. NRC, Fire Protection for Nuclear Power Plants
Southern California Edison, Fire Protection for Power Plants
Wisconsin Electric Power, Fire Protection for Power Plants
Professional Loss Control, Fire Protection for Power Plants
Rochester Gas & Electric, Fire Brigade Leadership
Professional Loss Control, Industrial Fire Brigade Leadership
Power Authority of the State of New York, Fire Brigade Leadership
Long Island Lighting Company, Fire Protection Technology
Verlan Limited, Fire Protection for Coatings Manufacturers
New Brunswick Electric Power Commission, Fire Brigade Leadership
Niagara Mohawk Power Corp., Fire Brigade Leadership
Portland General Electric, Fire Protection for Power Plants

7. Pre-Fire Emergency Planning

Zimmer Nuclear Power Station
Oyster Creek Nuclear Generating Station
Crystal River, Unit 3
Callaway Plant
Susquehanna Steam Electric Station
Wolf Creek Generating Station
Shoreham Nuclear Power Station
Point Beach Nuclear Plant

8. Fire Hazards Analysis

Georgia Power Company, E.I. Hatch, Units 1 & 2
Washington Public Power Supply System, Unit 1
Carolina Power & Light, Brunswick Steam Electric Plant, Units 1 & 2
Carolina Power & Light, H.B. Robinson, Unit 2
Northern States Power Company, Monticello Nuclear Generating Station
Commonwealth Edison Company, Dresden Nuclear Power Station, Units 2 & 3
Commonwealth Edison Company, Quad Cities Nuclear Power Station, Units 1 & 2

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PAPERS AND PRESENTATIONS

1. "Fire Emergency Planning," M.E. Mowrer, presented at the WATtec Engineering Conference, Knoxville, Tennessee; February 1980.
2. "Emergency Preparedness," M.E. Mowrer, presented at AIChE Winter National Meeting in Atlanta, Georgia; on March 14, 1984.
3. "Fire Detection Design Considerations for Nuclear Power Plants," M.E. Mowrer, presented at the Second Annual Fire Engineering Conference at Manhattan College, Riverdale, New York; June 4, 1984.

PLC *Professional Loss Control, Inc.*

CHRISTOPHER A. KSOBIECH
FIRE PROTECTION ENGINEER, E.I.T.

EDUCATION

B.S. Fire Protection Engineering, Illinois Institute of Technology, 1980
Graduate Student, Engineering Science & Mechanics Department, Univ. of Tennessee

PROFESSIONAL AFFILIATIONS

Society of Fire Protection Engineers, Associate Member
National Fire Protection Association, Member
Engineer-in-Training, #061-016246, Illinois
Salamander, Honorary Fire Protection Engineering Society
National Society of Professional Engineers

PROFESSIONAL EXPERIENCE

Mr. Ksobiech has more than four years' experience in fire protection engineering. Since joining Professional Loss Control Mr. Ksobiech has been involved with the fire protection methodology pertaining to the nuclear power industry. He has performed a number of studies to evaluate the effectiveness of fire detection and suppression systems, calculated heat transfer exposure to equipment and structural elements with state-of-the-art computer fire modeling techniques, coordinated product testing of materials to obtain listings by a nationally recognized testing laboratory, and conducted audits of nuclear facilities.

He has provided on-site support for a major overseas utility for 1-1/2 years, developing their fire protection program from both a corporate and station level. This included establishing fire protection guidelines, procedures, and standards, evaluation of existing facilities and training of corporate and field personnel. Mr. Ksobiech was also involved in the development, review, and acceptance of the utility's fire protection philosophies and systems involved in their on-going construction program.

Prior to joining PLC, Mr. Ksobiech worked as a Fire Protection Engineer for a large chemical and nuclear production facility where he conducted detailed audits of the process and support facilities to confirm compliance with NFPA, OSHA, and other standards. His responsibilities included review of engineering specifications and safety analysis reports, establishing design criteria, and approving the installation of new fire suppression systems. He served as Department Representative on the plant Quality Assurance and Environmental, Safety, and Health committees.

AREAS OF SPECIALIZATION

HPR Type Inspections and Audits
Fire Hazard Analyses
Fire Detection & Suppression System Design and Evaluation
Evaluation of Compliance with Federal & OSHA Standards, NFPA, & Building Codes
Product Testing
Fire Behavior Modeling
Computer Assisted Hydraulic Analysis
Fire Protection Program and Procedure Development
Evaluation of Nuclear Power Plant Fire Protection programs for compliance with NRC (Appendix R) requirements.

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7/84

Title	Group Supervisor, Nuclear Licensing Section Nuclear Safeguards and Licensing Division
Education	Kansas State University - B.S. Nuclear Engineering - 1971 University of Illinois - M.S. Nuclear Engineering - 1976
Registration	Professional Engineer - Illinois
Responsibilities	<p>Mr. Dingler is responsible for review and coordination of nuclear licensing activities within Sargent & Lundy's scope of work for several projects. He acts as liaison with regulatory bodies, clients, vendors, and other Sargent & Lundy divisions. He analyzes and reviews designs of nuclear power plants to ensure conformance with the code of federal regulations and other design requirements. He also assembles the information necessary for a safety analysis report.</p>
Experience	<p>Mr. Dingler has had experience in supporting the licensing effort of several nuclear-powered steam-electric generating stations. He has performed studies and developed modifications for five operating nuclear reactors, and provided technical and licensing support for four reactors undergoing review for an operating license. He has coordinated the Marble Hill Standard Review Plan Conformance Review. Mr. Dingler has coordinated the preparation and amendment of the Final Safety Analysis Report for 985 MW capacity BWR and provided support for hearings before the Advisory Committee for Reactor Safety and the Atomic Safety and Licensing Board. He has conducted the fire protection alternate safe shutdown analysis for four operating plants and three plants under operating license review. He has assisted client personnel in performing various onsite licensing studies. Additionally, Mr. Dingler has performed radiological safety calculations in S&L's Shielding and Radiological Safety Section.</p> <p>Prior to joining S&L in 1976, Mr. Dingler was a munitions maintenance officer in the U.S. Air Force for three years. He was responsible for all aspects of maintenance, storage, and safety, of nuclear and conventional weapons.</p>
Membership	American Nuclear Society

Nuclear Power Plant Projects

<u>Station - Unit</u>	<u>Rated Gross MW</u>	<u>Operating Date(s)</u>	<u>Client</u>	<u>Assignment</u>	<u>Assignment Date(s)</u>
Byron 1,2/ Braidwood 1,2	1175 (each)	1984/1985/ 1985/1986	Commonwealth Edison Company	Performed and reviewed shielding calculations	1983 to present
La Salle 1,2	1122 (each)	1982/1984	Commonwealth Edison Company	Analyzed the effects of a fire on the ability to safe shutdown per Appendix R	1982 to present/ 1979 to 1986
Marble Hill 1,2	1175 (each)	1988/1990	Public Service Indiana	Coordinated Standard Review Plan Conformance Review. Onsite assistance in licensing studies	1982 to 1983
Clinton 1,2	985 (each)	1986/Cancelled	Illinois Power Company	Supported licensing effort directed toward obtaining operating license	1979 to 1983
Marble Hill 3&4	1175 (each)	Cancelled	Public Service Indiana	Supported licensing effort toward obtaining a construction permit. Review design criteria for incorporation of regulatory requirements	1978 to 1980
Dresden 1-3	1900 (total)	1960/1971/1971	Commonwealth Edison Company	Provided licensing sup- port of operating re- actors addressing safety issues especially the Dresden I ECCS modifica- tion and fire protection	1976 to 1979
Quad Cities 1,2	850 (each)	1972	Commonwealth Edison Company	Provided licensing support of operating reactors addressing safety issues	1976 to 1979

Title	Mechanical Project Engineer
Education	DePaul University - M.B.A. - 1979 University of Illinois, Champaign-Urbana - B.S.M.E. - 1975
Registration	Professional Engineer - Illinois
Responsibilities	<p>As a mechanical project engineer, Mr. Nosko coordinates the efforts of the engineering and support specialists within the mechanical disciplines. He directly oversees and directs the work of the mechanical engineers assigned to his projects. The mechanical project engineer is responsible for the conformance of mechanical project work to applicable Sargent & Lundy standards and procedures. This includes performing preliminary design studies to determine general plant layout and sizing, specifying equipment, analysis of economic factors, preparing flow diagrams, and sizing of piping including analysis of flexibility and support systems. He maintains client contact and incorporates operating philosophies within design parameters, interfaces with suppliers in selecting equipment, materials, and labor packages, evaluates proposals, and recommends purchases.</p>
Experience	<p>Mr. Nosko has experience in the mechanical design, engineering and analysis of nuclear- and fossil-fueled steam-electric generating stations. This includes preparing design criteria and process flow diagrams; preparing and evaluating piping, equipment and construction specifications; and directing support personnel in project activities. He has worked on several plant betterment projects with responsibility for project scope of work and schedule development, monitoring, and directing project progress. He was also the engineer responsible for coordinating and controlling efforts of all design and drafting personnel involved with analysis and design of piping supports on a nuclear power plant consisting of two 1122-MW units.</p> <p>Mr. Nosko previously worked as an engineering analyst in Sargent & Lundy's Mechanical Analytical Division. In this capacity, he conducted detailed mechanical engineering design studies on various power plant systems and equipment. He joined Sargent & Lundy in 1975.</p> <p>Before joining Sargent & Lundy, Mr. Nosko worked briefly for another architect/engineer as a field service engineer.</p>

Power Plant Design Projects

<u>Station - Unit</u>	<u>Fuel</u>	<u>Rated Gross MW</u>	<u>Operating Date(s)</u>	<u>Client</u>	<u>Assignment</u>	<u>Assignment Date(s)</u>
La Salle 1,2	Nuclear	1122 (each)	1982/1984	Commonwealth Edison Company	Mechanical Project Engineer/Mechanical Engineer	10-80 to 1-83
Edgewater 5	Coal	380	1985	Wisconsin Power & Light Company	Mechanical Engineer	7-79 to 10-80
Carroll County 1,2	Nuclear	1175 (each)	Deferred	Commonwealth Edison Company	Mechanical Engineer	10-77 to 7-79
Marble Hill 1,2	Nuclear	1175 (each)	Suspended	Public Service Indiana	Mechanical Engineer	9-76 to 10-77

Power Plant Betterment Projects

<u>Station - Unit</u>	<u>Fuel</u>	<u>Rated Gross MW</u>	<u>Client</u>	<u>Assignment</u>	<u>Assignment Date(s)</u>
Dresden 2,3	Nuclear	850 (each)	Commonwealth Edison Company	Mechanical Project Engineer	1-83 to present
Quad Cities 1,2	Nuclear	850 (each)	Commonwealth Edison Company	Mechanical Project Engineer	1-83 to present
E.W. Brown 1-3	Coal	701 (total)	Kentucky Utilities Company	Mechanical Engineer (flue gas monitoring equipment backfit)	1-80 to 1-81
Ghent 1,2	Coal	511 (each)	Kentucky Utilities Company	Mechanical Engineer (flue gas monitoring equipment backfit)	1-80 to 1-81
Green River 3	Coal	66	Kentucky Utilities Company	Mechanical Engineer (flue gas monitoring equipment backfit)	1-80 to 1-81
Tyrone 3	Coal	66	Kentucky Utilities Company	Mechanical Engineer (flue gas monitoring equipment backfit)	1-80 to 1-81
Edgewater 3,4	Coal	399 (total)	Wisconsin Power & Light Company	Mechanical Engineer (ductwork and common chimney backfit)	7-79 to 10-80

Title	Electrical Engineer
Education	Purdue University - B.S.E. - 1973
Registrations	Professional Engineer: Illinois Indiana
Responsibilities	Mr. Ruth currently is responsible for participating in the design of electrical circuitry to support power plant betterment projects at operating nuclear generating stations.
Experience	Mr. Ruth has done the engineering design of the electrical controls and power distribution systems for both nuclear- and fossil-fueled generating stations. His nuclear assignments have included the design and specification of electrical controls and the coordination of field design and construction with office engineering and design activities, including the resolution of a wide variety of electrical construction problems. He also has engineered the design of HVAC controls and distribution systems, cathodic protection systems, and coal conveyor controls and distributions systems for several fossil-fired stations. Mr. Ruth joined Sargent & Lundy in 1974.
Memberships	Institute of Electrical and Electronics Engineers Power Engineering Society

Power Plant Design Projects

<u>Station - Unit</u>	<u>Fuel</u>	<u>Rated Gross MW</u>	<u>Operating Date(s)</u>	<u>Client</u>	<u>Assignment</u>	<u>Assignment Date(s)</u>
Marble Hill 1,2	Nuclear	1175 (each)	Suspended	Public Service Indiana	Office and field coordination, remote multiplexing system design, and resolution of field problems	4-82 to 1-84
Baton Rouge Cogeneration Plant (4 units)	Coal, Oil, Slurry Coal & Pyrolysis Char	370 (each)	Deferred	Exxon Company, U.S.A.	Coal handling system controls and distri- bution	9-81 to 4-82
Dolet Hills 1	Lignite	707	1986	Southwestern Electric Power Company/Central Louisiana Electric Company, Inc.	HVAC controls and distribution design and specifications	6-80 to 4-82
Henry W. Pirkey 1	Lignite	707	1985	Southwestern Electric Power Company	HVAC controls and distribution design and specifications	7-79 to 4-82
Edgewater 5	Coal	380	1985	Wisconsin Power and Light Company	HVAC controls and distribution design and specifications	1-79 to 12-81
Schahfer 17,18	Coal & Oil	393 (each)	1983/1986	Northern Indiana Public Service Company	HVAC controls and distribution design and specifications	5-79 to 9-81
Pleasant Prairie 2	Coal	570	1985	Wisconsin Electric Power Company	HVAC controls and distribution design and specifications	7-79 to 10-80
Weston 3	Coal	321	1981	Wisconsin Public Service Corp.	HVAC controls and distribution design and specifications	7-77 to 10-80
Ghent 3,4	Coal	511 (each)	1981/1984	Kentucky Utilities Company	HVAC controls and distribution design and specifications	7-77 to 10-80
Lawton Tire 1,2	Coal & Oil	N.A.	1979	The Goodyear Tire & Rubber Co.	Coal handling system and HVAC system controls and distri- bution design and specifications	10-77 to 3-79
East Bend 2	Coal	648	1981	The Cincinnati Gas & Electric Company	Moto control centers, batteries, and pre- cipitators	5-76 to 2-77

Power Plant Design Projects, Continued

<u>Station - Unit</u>	<u>Fuel</u>	<u>Rated Gross MW</u>	<u>Operating Date(s)</u>	<u>Client</u>	<u>Assignment</u>	<u>Assignment Date(s)</u>
Gibson 3,4	Coal	618 (each)	1978/1979	Public Service Indiana	Specifications for transformers, bus duct, motor control center, batteries, uninterruptible power supplies, electro- static precipitators, control cable, power cable, and cable tray	7-74 to 5-76

Power Plant Betterment Projects

<u>Station - Unit</u>	<u>Fuel</u>	<u>Rated Gross MW</u>	<u>Client</u>	<u>Assignment</u>	<u>Assignment Date(s)</u>
Zion 1,2	Nuclear	1085 (each)	Commonwealth Edison Company	Modification of main steam isolation valves control circuitry to adapt to new environ- mentally qualified hydraulic prevent resetting of valves during safety injection	1-80 to 2-80
Powerton 5	Coal	828	Commonwealth Edison Company	Design and specification of HVAC controls and distribution equipment for FGDs addition	3-77 to 7-78
Beckjord 1-6	Coal	1171 (total)	The Cincinnati Gas & Electric Company	Procurement and design coordination for cathodic protection	9-76 to 3-77
Dicks Creek	Coal	N.A.	The Cincinnati Gas & Electric Company	Procurement and design coordination for cathodic protection	9-76 to 3-77

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August 1984

DRESDEN 2&3

ENCLOSURE II

INTERIM COMPENSATORY MEASURES

DRESDEN 2&3

DRESDEN UNITS 2&3

INTERIM COMPENSATORY MEASURES

The scheduler requirements for Appendix R modifications are outlined in 10 CFR 50.48. The NRC has requested that nuclear stations petitioning for relief from the scheduler requirements of 10 CFR 50.48 show, through interim measures, that safe shutdown can be achieved. These interim measures should be implemented until the modifications, which do not meet the requirements of 10 CFR 50.48, are completed. In the B. Rybak letter to H. R. Denton dated May 18, 1984, Dresden Station petitioned for relief from the scheduler requirements of 10 CFR 50.48 for the modifications in the 1982 Dresden Units 2&3 Associated Circuits Analysis.

Table 1 provides a list of the previously identified modifications and their current completion schedule. This schedule supercedes the one transmitted in the B. Rybak letter to H. R. Denton. The only difference between the schedules is due to changes in the scheduled refueling outages for both units. The reanalysis to ensure conformance with Appendix R has identified several modifications in addition to those identified in the 1982 Associated Circuits Analysis (see Table 2). A schedule has not been completed for these additional modifications but they will be completed before the Fall 1986 outage for Dresden Unit 2. The only exception to this is the sealing of penetrations in fire barriers. This task will be completed by October 15, 1984.

Table 2 lists the interim measures or justifications for continued operation for all modification, additional and previously identified, which will not be completed within the 10 CFR 50.48 schedule. In view of the fact that a schedule has not been developed for the additional modifications, interim measures or justifications for continued operation have been proposed for all of these modifications. The interim measures will ensure that safe shutdown can be achieved for both units in the event of a fire. The proposed interim measures will only be implemented until the corresponding modifications are completed. In addition, Dresden Station has a safe shutdown procedure to ensure the ability to safely shut down both units in the event of a fire in the control room or auxiliary electric equipment room.

The F-Drawings for Dresden Units 2&3 have been included with this submittal. These are general arrangement drawings which show safe shutdown equipment and power and control cables, fire zone boundaries, and existing detection and suppression systems.

Dresden Station Units 2&3 has been separated into four major fire areas to facilitate the Appendix R reverification. This includes the Unit 2 and Unit 3 Reactor Buildings, the Turbine Building, and the Crib House. General area descriptions of these areas are included in Enclosure III, Sections 3.1, 4.1, 5.1, and 6.1,

respectively. These descriptions represent the plant configuration after completion of all Appendix R modifications. A description of the safe shutdown methods employed at Dresden Station is in Enclosure III, Section 2.0.

The interim measures or justifications for continued operation outlined in Table 2 are based, for the most part, on the following:

- The majority of fire zones containing safe shutdown equipment have relatively low fire loadings and the combustibles are uniformly distributed.
- Major combustible concentrations have been protected with automatic suppression systems.
- Electrical penetrations are sealed at the barriers separating zones.
- Fire stops are provided between electrical divisions to impede the spread of a fire within fire zones.
- Local fire detection has been provided over major electrical equipment (i.e., 4-kV switchgear and 480-V MCC's).
- Products of combustibles will not affect the ability to safely shut down the plant.

As noted in Enclosure I of the Dresden 2&3 exemption request transmittal, an emergency lighting evaluation is underway at Dresden Station. This evaluation will identify additional emergency lighting necessary to perform safe shutdown functions. In the interim, until completion of this evaluation and until the additional emergency lights have been installed, portable battery operated lights will be available to the operators.

The interim measures or justifications for continued operation described herein will ensure that Dresden Station can be safely shut down in the event of a fire in any fire zone. The interim measures will only be implemented until the additional and previously identified modifications are completed.

Appendix R Fire Protection ModificationsDresden Station Unit 2Original Modifications

<u>Modification</u>	<u>NRC Commitment</u>	<u>Remarks</u>
Alternate Feed to Inboard Iso. Condenser Valves	Next Refueling Outage	On Schedule
Access to Outboard Iso. Condenser Valves	Unit 2 - Fall '86 Outage	Complete
Auxiliary Cooling Water Supply to the CRD Pumps	Unit 2 - Fall '84 Outage	Complete
Local Reactor Pressure Indication	Unit 2 - Fall '84 Outage	Complete

Table 1 (Cont'd)

Appendix R Fire Protection ModificationsDresden Station Unit 2New Modifications

<u>Modification</u>	<u>Completion Date</u>	<u>Remarks</u>
Fire Dampers	Next refueling Outage	
Installation of Fire Doors	9-01-85	Complete
Alternate Feeds to Reactor Pressure and Level Transmitters	Next refueling Outage*	Outage related activity. May involve procurement of safety related instrumentation.
Access to Cold Shutdown Motor Operated Valves	9-1-86	Involves installation of galleries in high radiation areas.
HPCI Room Curbs	6-1-86	Complete
Alternate Access to Iso. Condenser Pipe Pipe Chase	Unit 2-Fall '84 Outage	Complete

Appendix R Fire Protection ModificationsDresden Station Unit 3Original Modifications

<u>Modification</u>	<u>NRC Commitment</u>	<u>Remarks</u>
Alternate Feed to Inboard Iso. Condenser Valves	Unit 3 - Fall '85 Outage	Complete
Access to Outboard Iso. Condenser Valves	Unit 3 - Fall '85 Outage	Complete
Auxiliary Cooling Water Supply to the CRD Pumps	Unit 3 - Fall '85 Outage	Complete
Local Control and Isolation of DG 3 Fuel Oil Transfer Pump	Fall '83 Outage	Complete
Local Reactor Pressure Indication	Unit 3 - Fall '83 Outage	Complete

Table 1 (Cont'd)

Appendix R Fire Protection ModificationsDresden Station Unit 3New Modifications

<u>Modification</u>	<u>Completion Date</u>	<u>Remarks</u>
Fire Dampers	Next Unit 2 refueling outage	Unit 3 outage- related activities will be completed during the Fall '85 Outage.
Relocate Local Control Station for MCC	Fall '85 Outage	Complete
Installation of Fire Doors	9-01-85	Complete
Alternate Feeds to Reactor Pressure and Level Transmitters	Unit 3 - Fall '87 Outage	Outage related activity. May involve procurement of safety related instrumentation.
Access to Cold Shutdown Motor Operated Valves	9-1-86	Involves installation of galleries in high radiation areas.
HPCI Room Curbs	6-1-86	Complete
Alternate Access to Iso. Condenser Pipe Pipe Chase	Unit 3-Fall '85 Outage	Complete

Table 1 (Cont'd)

Appendix R Fire Protection Modifications

Dresden Station Units 2/3

Original Modifications

<u>Modification</u>	<u>NRC Commitment</u>	<u>Remarks</u>
Installation of Fire Doors	4-1-84	Complete
CRD Pump Crosstie	Fall '84 Outage	Complete
Service Water Pump Local Control and Isolation	2-1-84	Complete
DG 2/3 Modifications	Next Unit 2 Refueling Outage	Complete, except for fire wrap.
Fire Detection Suppression	1-1-85	Complete

Table 1 (Cont'd)

Appendix R Fire Protection ModificationsDresden Station Unit 2/3New Modifications

<u>Modification</u>	<u>Completion Date</u>	<u>Remarks</u>
Fire Detection and Suppression	Next Unit 2 refueling Outage	Installation will begin by 9-85.
Fire Barrier Pipe and Conduit Penetration	Next Unit 2 refueling Outage	Will involve access to high radiation areas.
Transfer Switch for DG 2/3 Cooling Water Pump	Next Unit 2 refueling Outage	Complete
Emergency Lighting	Next Unit 2 refueling Outage	
Fire Wrap of Conduit	Next Unit 2 refueling Outage	
Curbing in the Cribhouse	8-1-85	Complete

TABLE 2

DRESDEN 2&3INTERIM COMPENSATORY MEASURES

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building</u>		
Torus Basement Elev. 476'-6" (1.1.2.1)	<ol style="list-style-type: none"> 1. Provide linear thermal detection along cable trays due to the use of an alternate shutdown method independent of this area. 2. Provide 1-hour protection for the alternate power source to Inboard Isolation Condenser Valves cabling routed through this zone. 	<p>1 and 2) These two modifications although in progress, are not yet operational. The linear detection is designed to provide early warning of fire in the area of certain balance of plant cable trays, which are the only significant hazards which could expose the alternate feed to the isolation condenser inboard valves. The wrap of this feed is designed to provide additional assurance of control capability for these valves. The normal feeds for these valves are located on 517'-6" in the vicinity of MCC 28-1. As an interim measure a roving 20-minute fire watch will be maintained for this normal feed area (Reactor Building Elev. 517'-6" in the vicinity of MCC 28-1). This fire watch will be maintained until these two modifications associated with the alternate feed are completed whenever the reactor is in startup or run mode.</p>

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building (Cont'd)</u>		
Ground floor Elev. 517'-6" (1.3.2)	<ol style="list-style-type: none"> 1. Provide fire detection throughout Shutdown Cooling Pump room (Area 1.3.2) due to the use of an alternate shutdown method independent of this area. 2. Seal all penetrations to the Shutdown Cooling Pump room (1.3.2) to a 3-hour rating (as described in Section 3.2 of Enclosure III to the September 18, 1985 Revision 1 to the August 10, 1984 exception request submittal to provide a 3-hour barrier between alternate shutdown methods. 	<p>1 and 2) The detection in the shutdown cooling pump room is designed to provide early warning of a fire within the room. The penetration seals are designed to upgrade the walls to a 3-hour rated equivalence. Although these modifications are incomplete, an alternate shutdown path using the HPCI and LPCI systems would be available for a fire in the shutdown cooling pump room. Until these modifications are completed, a roving 20-minute fire watch will be maintained outside the room as an interim measure whenever the reactor is in startup or run mode. (The entrance door is 3-hour rated and held open by a fusible link.) Since the room is a high radiation area, the fire watch will not physically enter the room, but smoke or fire would be visible from the locked high radiation gate.</p>

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building (Cont'd)</u>		
Ground floor Elev. 517'-6" (1.1.2.2)	1. Provide detection throughout fire zone due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained throughout this area until this modification is complete whenever the reactor is in startup or run mode. This watch will not enter the TIP Room since it is a locked high radiation area with limited access and low combustible loading. Also, the TIP Room contains no components necessary for safe shutdown.
	2. Provide an alternate power feed to the inboard isolation condenser valves (Previously identified in the 1982 Associated Circuits Analysis) Outage mod. This modification will allow reopening of a spuriously closed inboard isolation condenser valve.	2) A roving 20-minute fire watch will be maintained in the vicinity of MCC 28-1 (Elev. 517'-6" reactor building) whenever the reactor is in startup or run mode until this modification is complete. This will provide an adequate interim level of protection for the existing normal feeds for the isolation condenser inboard valves.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building (Cont'd)</u>		
Mezzanine floor Elev. 545'-6" (1.1.2.3, 1.1.2.5.C)	1. Provide fire detection throughout Zone 1.1.2.3 due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in this area until these modifications are complete whenever the reactor is in startup or run mode. High radiation areas will not be entered on these rounds due to ALARA concerns. These areas are limited access and have low combustible loading.
	2. Seal all penetrations to the isolation condenser pipe chase (1.1.2.5.C) to provide a 3-hour barrier between alternate shutdown methods.	2) A roving 20-minute fire watch will be maintained outside this pipe chase until this modification is complete whenever the reactor is in startup or run mode. This will provide an adequate interim level of protection by insuring that this barrier is not breached by a fire. This pipe chase is a limited-access high radiation area with low combustible loading.
	3. Reroute pressure and level instrumentation cables to ensure availability of reactor pressure and level indication in the control room for a fire below this elevation.	3) A roving 20-minute fire watch will be maintained in this area until either this modification is complete or the area detection is made operational. This will provide an adequate interim level of protection since multiple local indications are available.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building (Cont'd)</u>		
Main floor Elev. 570'-0" (1.1.2.4, 1.1.2.5.B)	1. Provide detection throughout Zone 1.1.2.4 due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in the area until these modifications are complete whenever the reactor is in startup or run mode. This will provide an adequate interim level of protection.
	2. Seal all penetrations to the isolation condenser pipechase (1.1.2.5.B) to provide a 3-hour barrier between alternate shutdown methods.	2) A roving 20-minute fire watch will be maintained outside the pipe chase until this modification is complete whenever the reactor is in startup or run mode. This will provide an adequate interim level of protection by insuring that the barrier is not breached by a fire. This pipe chase is a limited-access high-radiation area with low combustible loading.
	3. Seal all penetrations to the isolation condenser floor Elev. 589'-0" (1.1.2.5.A) except the hatchway and stairs to provide a 3-hour barrier between alternate shutdown methods.	3) See No. 1 above.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building (Cont'd)</u>		
	4. Provide automatic water suppression around the hatchway, stairs, and ladder opening at the ceiling level to provide an equivalent 3-hour barrier between alternate shutdown methods.	4) See No. 1 above.
Isolation Condenser floor Elev. 589'-0" (1.1.2.5.A, 1.1.2.5.D)	1. Provide fire detection throughout Fire Zone 1.1.2.5.A due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in these areas until these modifications are complete whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2 Reactor Building (Cont'd)</u>		
	2. Provide automatic water suppression at the ceiling around the hatchway and stairs to provide an equivalent 3-hour barrier between alternate shutdown methods.	2) See No. 1 above.
Southeast Corner Room Elev. 476'-6" (11.2.2)	1. Provide detection throughout zone due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in this area until this modification is complete whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection.
Southwest Corner Room Elev. 476'-6" (11.2.1)	1. Provide detection throughout zone due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in the area until the modification is complete whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building</u>		
Torus Basement Elev. 476'-6" (1.1.1.1)	<ol style="list-style-type: none"> 1. Provide linear thermal detection along cable trays due to the use of an alternate shutdown method independent of this area. 2. Provide 1-hour protection for the alternate power source to the inboard isolation condenser valves cabling routed through this zone. 	<p>1 and 2) These two modifications methods are not yet operational. The linear detection is designed to provide early warning of fire in the area of certain balance-of-plant cable tray which are the only sufficient hazard which could expose the alternate feed to the isolation condenser inboard valves. The wrap of this feed is designed to provide additional assurance of control capability for the valves. The normal feeds for the valves are located on Elev. 517'-6" in the area of MCC 38-1. As an interim compensatory measure, a roving 20-minute fire watch will be maintained for the normal feed area (Reactor building Elev. 517'-6" in the vicinity of MCC 38-1) until these two modifications associated with the alternate feeds are completed whenever the reactor is in startup or run mode.</p>

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		
Ground floor Elev. 517'-6" (1.4.1)	<ol style="list-style-type: none"> 1. Provide detection throughout area 1.4.1 due to the use of an alternate shutdown method independent of this area. 2. Seal all penetrations to the TIP room (1.4.1) to a 3-hour rating to provide a 3-hour barrier between alternate shutdown methods. 	<ol style="list-style-type: none"> 1) The detection in the TIP Room is designed to provide early warning or a fire within the room. The penetration seals are designed to upgrade the walls to a 3-hour rated equivalence. Although these modifications are incomplete, an alternate shutdown path using the HPCI system would be available. Until these modifications are completed, a roving 20-minute fire watch will be maintained outside the room as an interim measure whenever the reactor is in startup or run mode. This will provide an adequate interim level of protection by insuring that a fire is detected before it breaches the barrier to the extent that it could damage alternative safe shutdown components. The TIP Room is a high radiation area with limited access and low combustible loading. 2) See No. 1 above.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		
Ground Floor Elev. 517'-6" (1.1.1.2)	<ol style="list-style-type: none"> 1. Provide detection throughout zone due to the use of an alternate shutdown method independent of this area. 2. Seal openings to Unit 2 Reactor Building to a 3-hour rating to provide a 3-hour barrier between reactor buildings. 	<ol style="list-style-type: none"> 1) A roving 20-minute fire watch will be maintained through the area until this modification is complete whenever the reactor is in startup or run mode. This watch will not enter the shutdown cooling pump room or TIP Room since they are high radiation limited-access areas with low combustible loading and alternative independent methods of shutdown are available. 2) See No. 1 above.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		
	3. Provide an alternate power feed to the inboard isolation condenser valves (Previously identified in 1982 Associated Circuits Report) OUTAGE MOD. This will enable reopening of a spuriously closed normally open inboard isolation condenser valve.	3) A roving 20-minute fire watch will be maintained in the vicinity of MCC 38-1 whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection by assuring operability of the normal power feeds. The TIP Room will not be entered by this patrol since it is a high radiation limited-access area with low combustible loading and alternate safe shutdown components would not be affected by loss of the TIP Room. If a fire were to escape the TIP Room, it would be discovered by the fire watch in the adjacent area prior to it causing significant damage.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		
Mezzanine floor Elev. 545'-6" (1.1.1.3, 1.1.1.5.C)	1. Provide detection throughout Zone 1.1.1.3 due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in the accessible areas of this floor until these modifications are complete whenever the reactor is in startup or run mode. High radiation areas will not be entered by this patrol due to their low combustible loading and since these areas either do not affect safe shutdown or alternative safe shutdown components would not be affected by loss of area in question.
	2. Seal all penetrations to the isolation condenser pipe chase (1.1.1.5.C) to provide a 3-hour barrier between alternate shutdown methods.	2) A roving 20-minute fire watch will be maintained outside this pipe chase until this modification is complete whenever the reactor is the startup or run mode. This will provide an adequate interim level of protection by insuring the fire barrier is not breached by a fire. This pipe chase is a limited-access high radiation area with low combustible loading.
	3. Seal all penetrations to Unit 2 Reactor Building (Zone 1.1.2.3) to provide a 3-hour barrier between reactor buildings.	3) See No. 1 above.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		
Main floor Elev. 570'-0" (1.1.1.4, 1.1.1.5.B)	4. Reroute pressure and level cables to ensure availability of reactor pressure and level indication in the control room for a fire below this elevation.	4) A roving 20-minute fire watch will be maintained in this area until either this modification is complete or the associated area detection is made operational. This will provide an adequate interim level protection since multiple local indications are available.
	1. Provide detection throughout Zone 1.1.1.4 due to the use of an alternate shutdown method independent of this area.	1) A roving 20-minute fire watch will be maintained in this area until these modifications are complete whenever the reactor is in startup or run mode. These will provide an adequate interim level of protection.
	2. Seal all penetrations to the isolation condenser pipe chase (1.1.1.5.B) to provide a 3-hour barrier between alternate shutdown methods.	2) A roving 20-minute fire watch will be maintained outside this area until this modification is complete whenever the reactor is in startup or run mode. This will provide an adequate interim level of protection of insuring that the fire barrier is not breached by a fire. This pipe chase is a limited-access high radiation area with low combustible loading.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		

- | | | |
|----|---|---------------------|
| 3. | Seal all penetrations to the isolation condenser floor Elev. 589'-0" (1.1.1.5.A) except the hatchway and ladder to provide a 3-hour barrier between alternate shutdown paths. | 3) See No. 1 above. |
| 4. | Provide automatic water suppression around the hatchway and ladder opening at the ceiling to provide an equivalent 3-hour barrier between alternate shutdown paths. | 4) See No. 1 above. |

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 3 Reactor Building (Cont'd)</u>		
Isolation Condenser floor Elev. 589'-0" (1.1.1.5.A, 1.1.1.5.D)	<ol style="list-style-type: none"> 1. Provide detection throughout Zone 1.1.1.5.A due to the use of an alternate shutdown method independent of this area. 2. Provide automatic suppression for the hatchway at the ceiling level to provide an equivalent 3-hour barrier between alternate shutdown methods. 	<ol style="list-style-type: none"> 1) A roving 20-minute fire watch will be maintained in these areas until these modifications are complete whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection. 2) See No. 1 above.
Southwest Corner Room Elev. 476'-6" (11.1.1)	<ol style="list-style-type: none"> 1. Provide detection throughout zone due to the use of an alternate shutdown method independent of this area. 	<ol style="list-style-type: none"> 1) A roving 20-minute fire watch will be maintained in this area until this modification is complete whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection.
Southeast Corner Room Elev. 476'-6" (11.1.2)	<ol style="list-style-type: none"> 1. Provide detection throughout zone due to the use of an alternate shutdown method independent of this area. 	<ol style="list-style-type: none"> 1) A roving 20-minute fire watch will be maintained in this area until this modification is complete whenever the reactor is in the startup or run mode. This will provide an adequate interim level of protection.

TABLE 2

INTERIM COMPENSATORY MEASURES (Cont'd)

<u>ZONE/AREA</u>	<u>MODIFICATION</u>	<u>INTERIM JUSTIFICATION OR MEASURE</u>
<u>Dresden 2&3 Turbine Building</u>		
Ground floor Elev. 517'-6" (8.2.5.C, 8.2.5.E)	1. Provide a one-hour fire resistive enclosure for a cable riser containing safe shutdown required components in the Unit 2 turbine building trackway outside the auxiliary electric equipment room (AEER).	1) A roving 20-minute fire watch will be provided in this area (by the cable riser outside the AEER) until this modification is complete whenever either Unit 2 or Unit 3 is in startup or run mode. This will provide an adequate interim level of protection.
<u>Dresden 2&3 Cribhouse</u>		
Cribhouse (11.3)	1. Provide detection throughout the lower elevation to provide equivalent Appendix R separation for redundant service water pump and Diesel Generator (DG) 2/3 cooling water pump cabling. 2. Provide suppression for upper Elevations 517'-6" and 509'-6" to provide equivalent Appendix R separation for redundant service water pumps and associated cables.	1) A roving 20-minute fire watch will be maintained until this modification is completed, whenever Unit 2 or Unit 3 is in the startup or run mode. 2) Until this modification is completed, a roving 20-minute fire watch will be maintained in the cribhouse area whenever Unit 2 or Unit 3 is in startup or run mode. This will provide an adequate interim level of protection.

A

DRESDEN 2&3

APPENDIX A

DISCUSSION OF OFFSITE POWER RELIABILITY

DRESDEN 2&3

DRESDEN UNITS 2&3

DISCUSSION OF OFFSITE POWER RELIABILITY

Dresden Station Units 2&3 is requesting that for the interim (August 1984 through March 1985) the NRC accept the position that a Loss of Offsite Power (LOOP) in conjunction with a catastrophic fire which affects multiple safe shutdown equipment will not occur.

Summary of Current Offsite Power Configuration

The primary source of offsite power to Dresden Unit 2 is from the 138-kV switchyard (Bus 1) through Reserve Auxiliary Transformer 22 (see Figure A-1). This transformer can also be fed directly from 138-kV Bus 3. The primary source of offsite power to Dresden Unit 3 is from the 345-kV (red bus) through Reserve Auxiliary Transformer 32 (see Figure A-1). This transformer can also be fed directly from 345-kV (blue bus). Furthermore, the 345-kV switchyard (red bus) and the 138-kV switchyard are tied through an autotransformer (TR-83), and the 345-kV (blue bus) is tied to the 138-kV switchyard through another autotransformer (TR 81). An inter-unit 4-kV bus tie exists between the essential reactor building switchgear of Units 2&3 (see Figure A-2). Thus, with the loss of all primary offsite power sources to one unit, offsite power to that unit can be maintained through the bus ties between units. There are a total of 11 lines (5 at 138-kV and 6 at 345-kV) feeding offsite power to the Dresden Units 2&3 switchyard (See Figure A-3).

In order for a total loss of offsite power to occur at Dresden Units 2&3, it would be necessary for both transformers 22 and 32 to be out of service or a loss of power to both transformers.

LOOP Event Study

When evaluating offsite power loss events, it is best to segment the causes into three categories:

1. Grid collapse
2. Weather
3. Plant centered.

A review of Figure A-3 indicates that a LOOP due to grid collapse is unlikely to occur. Dresden Station receives offsite power from the Commonwealth Edison 765, 345 and 138-kV grid through 8 separate connections. These connections are through five transmission substations (Electric Junction, Goodings Grove, Bradley, Pontiac Midpoint, and Mazon) and three fossil generating stations (Powerton, Joliet, and Will County). Additionally, the Edison grid is interconnected with neighboring systems including over twenty-eight 765, 345, and 138-kV transmission lines.

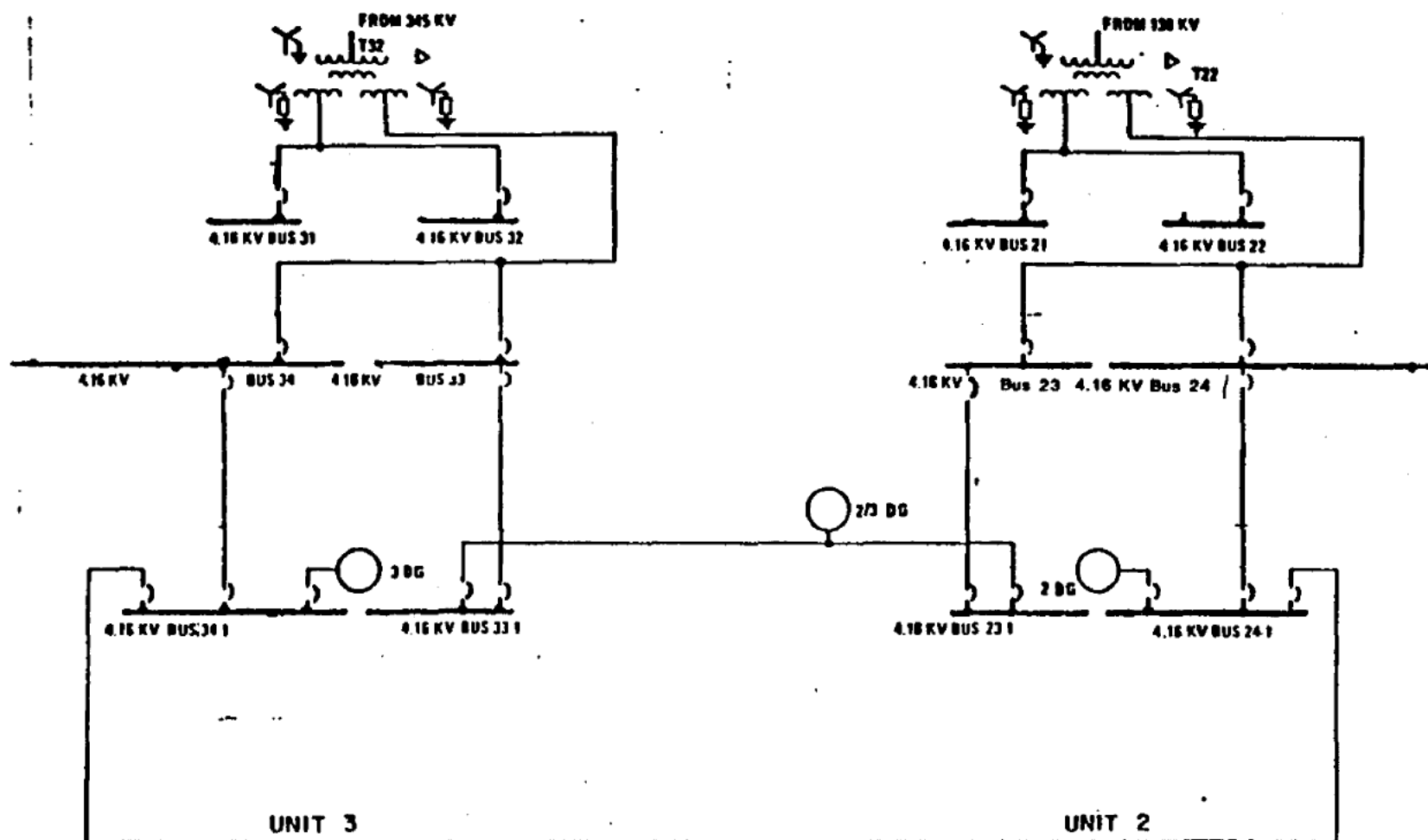
DRESDEN 2&3

In discussing the LOOP event due to weather, it must be emphasized that we are postulating this event to occur in a time frame limited to August 1984 through March 1985. This time frame is past the peak severe weather period for tornadoes (April and May) (Reference 1). Historically, Dresden Units 2&3 have not experienced an offsite power loss due to any cause, including weather (Reference 2). Dresden Unit 1 did lose offsite power in 1968 due to a tornado, but subsequent to this event, an additional right-of-way (345-kV switchyard) going south was added (see Figure A-1). Considering that 11 lines converge on the station over seven ROW's from the north, east, south, and west to feed the multiple switchyard, it is unlikely that a weather induced LOOP could occur.

Plant centered events are those where an initiating event (i.e., breakers, relays, etc.) or human error produces a loss of offsite power. Considering that the two primary offsite power sources are fed between them, it is unlikely that a plant-centered event could cascade to the point where all sources would be lost.

References

1. "Climates of the United States", published by the U.S. Department of Commerce.
2. EPRI Report (to be published), "Losses of Offsite Power at U.S. Nuclear Power Plants."



**DRESDEN STATION
UNITS 2 & 3**

**Auxiliary Electrical System
- 4160 Volt**

FIGURE A-2

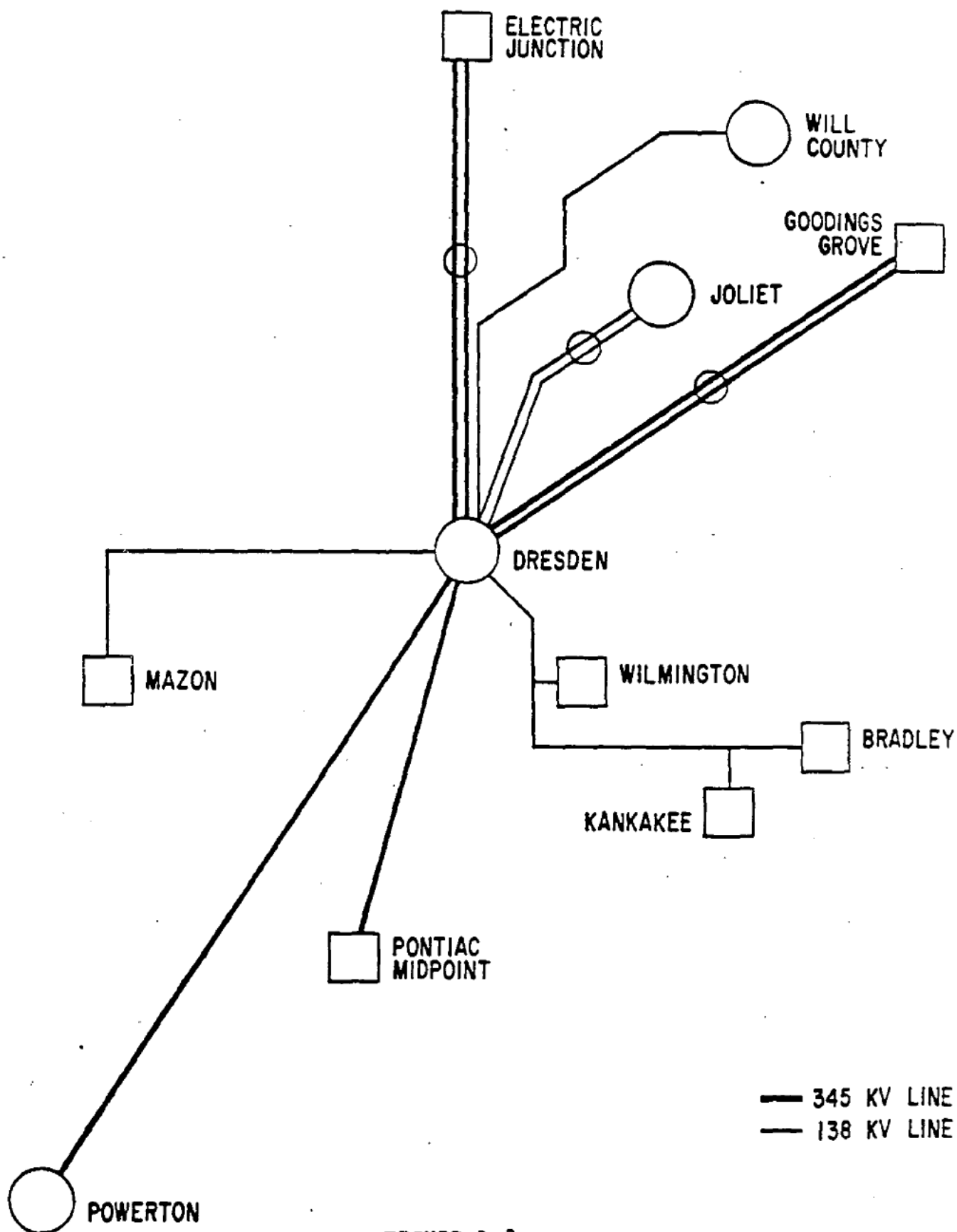


FIGURE A-3
TRANSMISSION SYSTEM INTERCONNECTIONS

APPENDIX R EXEMPTION REQUESTS AND ANALYSIS



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1.0 INTRODUCTION

In the Appendix R submittal dated July 1, 1982, CECo identified the need for a total of 13 exemptions from the requirements of Appendix R Section III.G.3 for complete area suppression in the vicinity of electrical equipment. Exemptions were requested for these plant locations in the vicinity of the equipment identified below:

1. All panels located in the control room
2. 4-kV SWGR's 23 and 24
3. 4-kV SWGR's 23-1 and 24-1
4. 480-V SWGR's 28 and 29
5. 480-V MCC's 28-7 and 29-7
6. 250-V MCC's 2A and 2B
7. 125-Vdc Main Bus 2 and 125-Vdc Reserve Bus 2*
8. 4-kV SWGR's 33 and 34
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10. 480-V SWGR's 38 and 39
11. 480-V MCC's 38-7 and 39-7
12. 250-V MCC's 3A and 3B
13. 125-Vdc Main Bus 3 and 125-Vdc Reserve Bus 3**

The NRC, in its February 2, 1983 Safety Evaluation Report (SER) for Dresden Station Units 2 and 3, granted the exemptions requested for the plant locations in the vicinity of the equipment listed above, identifying each location as a "fire area". The issuance of the SER effectively closed out the NRC's Appendix R review of the plant. This submittal incorporates the justification for lack of suppression in the vicinity of the above equipment.

*In the July 1, 1982 submittal, these pieces of equipment were referred to as the 125-V Distribution Panels 2A and 2B, respectively.

**In the July 1, 1982 submittal, these pieces of equipment were referred to as the 125-V Distribution Panels 3A and 3B, respectively.

Subsequent to the issuance of the SER, NRC clarification letters have been issued. Of particular importance is Generic Letter 83-33, "NRC Positions On Certain Requirements of Appendix R to 10 CFR 50" dated October 19, 1983. Comparison of the criteria contained in Generic Letter 83-33 against the bases for analysis performed in July 1, 1982 submittal identified several issues that have significant impact on the exemptions requested. Those issues include:

1. Full area detection and suppression, and
2. Fire area definitions.

CECo determined that a reassessment of Dresden Station against the criteria contained in Appendix R and as clarified in Generic Letter 83-33 was required.

This reassessment has additionally addressed spurious operation of valves, cold shutdown and exposed structural steel.

Since the June 1982 Associated Circuits Analysis was performed on a zone-by-zone basis, this Dresden 2&3 Appendix R reanalysis consisted of a zone interaction analysis to determine the effects of fire spreading from one zone to another. Where it was determined in the zone interaction analysis that the conditions of Appendix R were not met, then, a) the same alternate safe shutdown path was verified to be available for those fire zones, b) modifications were proposed, and/or c) exemptions are requested.

This Enclosure includes the requested exemptions and the supporting fire hazards analysis. These exemptions are written to reflect plant conditions after all proposed modifications are installed. The proposed modifications and corresponding interim compensatory measures are discussed in Enclosure II of this submittal.

The following exemption requests were identified in the zone interaction analysis. These requests are justified by an accompanying fire hazards analysis on the basis of providing protection equivalent to the requirements of Appendix R.

A. Unit 2 Reactor Building

1. Complete fire barriers around Fire Zone 1.3.2,
2. Complete 3 hour barrier between fire areas containing alternate shutdown capability,
3. Complete detection and suppression for Fire Area RB2-I,
4. Complete detection and suppression for Fire Area RB2-II,
5. Complete detection and suppression protection between redundant reactor instrumentation, and
6. Complete suppression and detection protection around isolation condenser valve alternate feed cable.

B. Unit 3 Reactor Building

1. Complete 3 hour barriers between fire areas containing alternate shutdown capability,
2. Complete detection and suppression for Fire Area RB3-I,
3. Complete suppression and detection for Fire Area RB3-II,
4. Complete detection and suppression protection between redundant reactor instrumentation,
5. Complete suppression and detection protection for isolation condenser valve alternate feed cable, and
6. Complete suppression and detection protection around cables and bus duct in Unit 3.

C. Turbine Building

1. Complete fire barriers between fire area zone groups,
2. Complete suppression and detection for Eastern Zone Group,
3. Complete suppression and detection for Western Zone Group, and
4. Complete suppression and detection for Central Zone Group.

D. Crib House

1. Three hour barriers between redundant pumps and complete area suppression and detection.

E. Hot Shutdown Repairs

1. Hot shutdown repair.

These exemption requests and accompanying fire hazard analysis document the compliance with the intent of Appendix R Section III.G.1 to provide fire protection features so that one shutdown path necessary to achieve and maintain hot shutdown is free from fire damage. Figures to support these exemption requests are included in Appendices A, B, and C of this Enclosure except for the Dresden 2&3 Fire Protection General Arrangement (FPGA) Drawings. These FPGA's show the fire barriers and location of safe shutdown equipment and cable and are provided under separate cover. The proposed modifications described and exemption requests described herein do not change the shutdown paths and philosophy utilized in previous analyses. No major redesign of systems was required.

The following is a list of phrases and terms used in the exemption requests and their definitions.

Cold Shutdown - A plant condition in which the reactor is subcritical and decay heat removed by the Shutdown Cooling or LPCI Systems. The primary system temperature is reduced to below 212 F and the heat sink is a heat exchanger with a secondary coolant loop.

Equivalent Fire Area - a collection of fire zones whose border with other fire areas or equivalent fire areas is 3-hour rated, or equivalent protection is justified in the Exemption Requests.

Equivalent Fire Barriers - those components of construction (walls, floors, and roofs) which are made of rated materials but contain nonrated penetrations (pipe, HVAC, electrical, and/or doorways). Justification has been provided for each of these barriers in the Exemption Requests.

Fire Area - that portion of a building or plant that is separated from other areas by 3-hr rated fire barriers (walls, floors, or roofs) with any openings or penetrations protected with seals or closures having a fire resistive rating equal to that of the barrier.

Fire Barrier - those components of construction (walls, floors and roofs) that are rated in hours by approving laboratories for resistance to a standard time/temperature curve to prevent the spread of fire. The primary containment boundary, though not tested, is considered a 3-hour fire barrier.

Fire Door - a tested door and door assembly constructed and installed for the purpose of preventing the spread of fire through openings in walls, partitions, or other horizontal or vertical construction. (See NFPA 80 for classification and types of fire doors.)

Fire Load - the amount of combustibles present in a given fire zone expressed in terms of potential heat release (Btu) due to combustion per square foot of fire zone floor in Btu/ft^2 . The fire load of a fire zone equals the heat load divided by its floor area.

Fire Zones - subdivisions of fire areas defining natural divisions in fire areas for the purpose of discussion.

Hot Shutdown - a plant condition in which the reactor is subcritical and the primary system temperature is sufficient to allow removal of decay heat by steam generation.

MOV - motor-operated valve.

Sprinkler system - a fixed system of piping and components from the supply valve to the point at which water discharges from the system to the fire area. The system is normally activated by heat from a fire.

Sprinkler system classification:

- Wet pipe - a system employing automatic closed-head (fusible link operated) sprinklers and/or nozzles attached to a fixed piping system containing water and connected to a water supply so that water discharges immediately from sprinklers individually open by a fire.
- Preaction system - a system employing automatic closed-head sprinklers and/or nozzles attached to a fixed piping system containing air that may or may not be under pressure, with a separate fire detection system installed in the same areas as the sprinklers. Actuation of the fire detection system opens a valve which permits water to flow into the sprinkler piping system and then to be discharged from any sprinklers or nozzle which may have been opened by the heat from the fire.
- Water spray system - a system employing directional open-head sprinklers and/or nozzles attached to a piping system connected to a water supply through an automatic valve which is opened by the operation of a separate fire detection system installed in the same areas as the sprinklers and/or nozzles. When this valve opens, water flows into the distribution piping system and discharges from all open sprinklers and/or nozzles simultaneously.

TIP - Traversing incore probe.

Zone Group - Same as equivalent fire area.

2.0 APPENDIX R SHUTDOWN PATHS

2.1 INTRODUCTION

There are five different (though not unrelated) Appendix R hot shutdown paths per unit. Four of the paths per unit utilize the respective unit's isolation condenser. The operation of the isolation condenser is described in Subsection 2.2.1. The four isolation condenser paths employ different power trains, diesel generators, CRD pumps, and operating methods. The fifth path per unit is the HPCI/LPCI method of shutdown and is described in Subsection 2.2.2. Table 2.1-1 outlines the differences between the Appendix R hot shutdown paths.

Different paths are to be used in the event of a fire in different areas of the plant as required by equipment and cable location and the various plant fire protection features. For a fire in any fire zone, at least one path will remain free of fire damage, ensuring that hot and cold shutdown can be achieved and maintained for a fire in any plant area. Table 2.1-2 indicates which paths will be used for a fire in a given fire zone.

All previous Dresden 2 and 3 submittals assumed that a fire would not spread from zone to zone. The zone interaction analysis expanded these analyses to incorporate the interaction between zones. Where a fire could be postulated to spread from one zone to another (i.e., the requirements of Appendix R Section III.G.2, are not explicitly met), either the same alternate safe shutdown path is demonstrated to be available or modifications are proposed to provide a 3-hour fire barrier or equivalent protection. Within each identified fire area, or equivalent fire area zone group, the same shutdown path is used as shown on Figures A-1 through A-3. The equivalent fire area/zone group associated with each fire zone is identified in Table 2.1-2 along with the alternate shutdown path. A description and justification demonstrating that the equivalent fire protection of each fire area zone group is equivalent to Appendix R criteria, is presented in the exemption requests that follow.

TABLE 2.1-1

OUTLINE OF APPENDIX R HOT SHUTDOWN PATHS

<u>SHUTDOWN PATH</u>	<u>UNIT TO BE SHUT DOWN</u>	<u>MAJOR SHUTDOWN SYSTEM</u>	<u>ELECTRICAL POWER TRAIN TO BE UTILIZED*</u>	<u>DIESEL GENERATOR TO BE USED</u>	<u>MANUAL OPERATION OF ISOLATION CONDENSER VALVES REQUIRED**</u>
A	Unit 2	Isolation Condenser	Unit 2	Swing	No
A1	Unit 3	Isolation Condenser	Unit 2	Swing	Yes
A2	Unit 2	Isolation Condenser	Unit 2	Swing	Yes
B	Unit 3	Isolation Condenser	Unit 3	Swing	No
B1	Unit 2	Isolation Condenser	Unit 3	Swing	Yes
B2	Unit 3	Isolation Condenser	Unit 3	Swing	Yes
C	Unit 2	HPCI/LPCI	Unit 2	Unit 2	N/A
D	Unit 3	HPCI/LPCI	Unit 3	Unit 3	N/A
E	Unit 2	Isolation Condenser	Unit 2	Unit 2	No
F	Unit 3	Isolation Condenser	Unit 3	Unit 3	No

*Cross ties are provided in the service water, condensate transfer, and control rod drive water piping such that the opposite unit can also be serviced by the other unit's pumps. A normally closed, manually operated valve must be opened to establish the CRD water cross tie. Procedures have been developed to utilize this capability.

**Isolation Condenser Valves 2(3)-1301-3 and 2(3)-1301-16 are available with manual operation capability. Procedures have been developed to utilize this capability.

TABLE 2.1-2

APPENDIX R SHUTDOWN PATHS BY FIRE ZONE

<u>FIRE ZONE</u>	<u>EQUIVALENT AREA/ ZONE GROUP</u>	<u>HOT SHUTDOWN PATHS</u>
1.1.1.1	RB3-II	A1
1.1.1.2	RB3-II	A1
1.1.1.3	RB3-II	A1
1.1.1.4	RB3-II	A1
1.1.1.5.A	RB3-I	D
1.1.1.5.B	RB3-I	D
1.1.1.5.C	RB3-I	D
1.1.1.5.D	RB3-II	A1*
1.1.1.6	RB3-II	B*
1.3.1	RB3-II	A1
1.4.1	RB3-I	D
1.1.2.1	RB2-II	B1
1.1.2.2	RB2-II	B1
1.1.2.3	RB2-II	B1
1.1.2.4	RB2-II	B1
1.1.2.5.A	RB2-I	C
1.1.2.5.B	RB2-I	C
1.1.2.5.C	RB2-I	C
1.1.2.5.D	RB2-II	B1*
1.1.2.6	RB2-II	A*
1.3.2	RB2-I	C
2.0	TB-V	A2 & B2
6.1	Western	A1
6.2	TB-V	A2 & B2
7.0.A.1	Eastern	B1
7.0.A.2	Eastern	B1
7.0.A.3	Eastern	B1
7.0.B	Western	A1
8.1	Eastern	B1*
8.2.1.A	Eastern	B1
8.2.1.B	Western	A1

TABLE 2.1-2 (Cont'd)

<u>FIRE ZONE</u>	<u>EQUIVALENT AREA/ ZONE GROUP</u>	<u>HOT SHUTDOWN PATHS</u>
8.2.2.A	Eastern	B1
8.2.2.B	Western	A1
8.2.4	Western	A1
8.2.5.A	Eastern	B1
8.2.5.B	Eastern	B1
8.2.5.C	Central	A2 & B2
8.2.5.D	Western	A1
8.2.5.E	Western	A1
8.2.6.A	Eastern	B1
8.2.6.B	Eastern	B1
8.2.6.C	Central	A2 & B2
8.2.6.D	Western	A1
8.2.6.E	Western	A1
8.2.7	Eastern	B1
8.2.8	TB-IV	A & B*
9.0.A	Eastern	B1
9.0.B	Western	A1
9.0.C	RB-2/3	E & F
11.1.1	RB3-II	A1
11.1.2	RB3-II	A1
11.1.3	RB-2/3	F
11.2.1	RB2-II	B1
11.2.2	RB2-II	B1
11.2.3	RB-2/3	E
11.3	Cribhouse	E & F or A & B**

*No shutdown cable or equipment is located in this zone. All methods of shutdown are available.

**The use of these shutdown paths is explained in Section 6.2.

2.2 HOT SHUTDOWN METHODS

2.2.1 Isolation Condenser Method

The isolation condenser method for achieving and maintaining hot shutdown is used in nearly all of the fire zones at Dresden 2&3. Figure A-4 shows system arrangement. This method was chosen because it relies on a minimum of power-operated equipment. Operation of the isolation condenser can be local or from the control room. For fire zones involving a large number of isolation condenser circuits, solutions were determined that minimize the use of electric power in the affected unit. Differences in eight alternate shutdown paths using the isolation condenser are described in Table 2.1-1.

2.2.1.1 Isolation Condenser Operation

The isolation condenser consists of two tube bundles in a large water-filled shell. The reactor steam flows through the tubes, is condensed, and returns to the reactor vessel. The water in the shell is boiled off and vented to the atmosphere. The vent line to the main steamline is isolated upon initiation of the condenser. Normal initiation occurs automatically when reactor pressure rises to 1070 psig for at least 15 seconds by opening normally closed valve M02(3)-1301-3. Makeup water for the condenser is supplied from the condensate storage tank or through the fire protection header via the service water pumps.

If a fire has affected automatic operation of the accessible isolation condenser valves M02(3)-1301-2 and M02(3)-1301-3 (Valve M02(3)-1301-2 is normally open), the operators will deenergize the valves at their power source. The valves may then be opened by use of the handwheels. Normally open valves M02(3)-1301-1 and M02(3)-1301-4 are located in the drywell, and are, therefore, not accessible for manual operation. In the event a fire causes these valves to spuriously close, a new alternate 480-V power feed from the affected unit to each of these valves is provided along with a local control station. Normal control and power cables are isolatable. If the valves spuriously close, the alternate feed will be energized and the valves opened. The operator will then deenergize the valves in the open

position. Valve M02(3)-1301-3 will be manually throttled to control the cool-down.

Valves A02(3)-1301-17 and A02(3)-1301-20 fail in the closed position which isolates the isolation condenser vent line as required. The most likely effect of a fire in the controls to these valves is the failure of the valves in the desired position. However, even if this does not occur, the operator can isolate the line by closing manual valve 2(3)-1301-16 located near the isolation condenser. Therefore, power is not required to initiate the isolation condenser, unless a fire spuriously closes the inboard valves. In this case, the alternate power feed will be used to reopen the valves.

2.2.1.2 Support Systems and Instrumentation

The isolation condenser shell side level is normally monitored in the control room on level indicator LI2(3)-1340-2. The operator can locally monitor the level at the isolation condenser on an existing glass by opening two manual valves.

Initial makeup to the condenser will be from the condensate transfer pump taking suction from the condensate storage tanks. As shown on the Figure A-4, any of the four condensate transfer pumps can supply makeup water to either unit's isolation condenser through the normally open tie line. Therefore, a fire in one unit will not prevent the other unit's pump from supplying makeup water. To initiate makeup flow, the operator will open valve M02(3)-1301-10. This valve is located near the isolation condenser and is accessible for manual operation if necessary. Condensate transfer pump discharge pressure is normally read in the control room on pressure indicator PI2(3)-3340-22. The operator can read the discharge pressure locally at the pump on mechanical indicators PI2(3)-3341-39A and PI2(3)-3341-39B. Condensate storage level is normally monitored in the control room on level indicators LI2/3-3341-3 and LI2/3-3341-4. The operator can locally monitor the level on mechanical indicators LI2/3-3341-77A and LI2/3-3341-77B located in the turbine building.

Since the isolation condenser is a closed cooling system for the reactor, large amounts of makeup water to the vessel are not needed. One of the four control rod drive pumps taking suction from condensate storage will provide all necessary makeup required due to primary coolant shrinkage and leakage for both units. The drive water headers for the two units are connected with a crosstie line (as shown on Figure A-5) which is normally isolated by manual valves. The valves are located on the mezzanine level of the turbine building in an area with accessibility to either set of pumps. Therefore, a fire in one unit will not prevent the other unit's pump from supplying makeup water to the affected unit.

The control rod drive pumps are normally cooled by the turbine building closed cooling water system. Since several operator actions would be required to power this system in the event of a loss of offsite power, a new cooling line to each pump is routed from the service water system. These lines will normally be isolated by manual valves and will only be placed in service if necessary due to fire-induced damage and loss of offsite power. These valves are located in the CRD pump rooms.

Should it become apparent that long-term operation (up to 72 hours) of the isolation condenser is necessary, the operator will place a priority on the condensate storage to be reserved for reactor makeup and will establish makeup to the isolation condenser from the service water system. Any one of the five service water pumps can supply makeup water to either unit's isolation condenser through the common header. Therefore, a fire in either unit will not prevent the other unit's pump from supplying makeup water. To establish makeup flow, the operator will open valve M02(3)-4102 from the fire header. Due to the length of time involved (at least 2 hours) before service water is necessary, the fire is assumed to be out and any suppression systems that may have activated are manually isolated from the main header. Service water header pressure is normally monitored in the control room on pressure indicator PI2/3-3904-4. The operator can locally monitor the pressure in the fire header on mechanical indicator PI2/3-4141-2 located in the crib house.

Local control pushbutton stations have been installed for the control rod drive pumps and condensate transfer pumps. Local control capability has been provided for the service water pumps.

Reactor level and pressure are normally monitored in the control room on various instruments. The operator can also locally monitor reactor level and pressure in the reactor building on instrument racks 2202(3)-5 and 2202(3)-6 at 545 foot elevation and instrument racks 2202(3)-7 and 2202(3)-8 at 517 foot elevation. Reactor temperature can be determined from saturation tables that are included with the safe shutdown procedure.

Initial pressure control for the reactor is normally supplied by the electromechanical relief valves. However, the target rock valve (mechanical mode) and mechanical safety valves on the steamlines will provide pressure control if operation of the relief valves has been affected by a fire. An inhibit switch has been installed in the control room to prevent a spurious depressurization of the reactor if automatic blowdown circuits are involved in a fire. For a fire in the control room or AEER power will be removed from the relief valves at the 125-Vdc distribution center.

2.2.1.3 Electrical Distribution

Power for the isolation condenser shutdown method is provided by one of the diesel generators. The diesel will normally start automatically upon a loss of offsite power. In case a fire affects the automatic operation of a diesel generator, it can be started locally by the operator in the diesel-generator room. For the case when the isolation condenser is operated manually, diesel generator 2/3 will supply the necessary power to the unaffected unit, and mechanical crossties will be utilized for shutdown as previously discussed. The dedicated diesel generator (2 or 3) is necessary only when the fire directly affects the diesel generator 2/3; for instance, a fire in the diesel generator 2/3 room or at the diesel generator 2/3 cooling water pump in the crib house. In each of these cases, the dedicated diesel generator can supply all necessary loads.

The diesel generator cooling water pump and ventilation fan normally start automatically when the diesel is started. Provisions have been made so the operator can start these auxiliaries locally.

The switchgear breakers are normally closed, controlled from the control room, or picked up automatically. For most fire zones, the necessary power is supplied by the other unit. Therefore, the necessary breaker control is still available in the control room. However, a fire in the control room or auxiliary electric equipment room could affect breaker control for both units. Local breaker control capability is installed for the 4-kV switchgear diesel feed breakers, the 4-kV switchgear normal feed breakers, the 4-kV to 480-V switchgear feed breakers, and the feeds to the control rod drive pumps and condensate transfer pumps. Local breaker control has been added for the service water pumps. Sufficient flexibility exists in the 125-Vdc system such that the operator can supply control power from either unit.

2.2.2 High-Pressure Coolant Injection (HPCI) Method

The HPCI method of shutdown is used only for a fire on the fourth floor of the reactor building, the isolation condenser pipe chase, and TIP Room (Unit 3) and Shutdown Cooling Pump Room (Unit 2). Such a fire could disable the valves to the isolation condenser. The HPCI system will be used by the operator to control reactor pressure and maintain reactor water level. All of the necessary operator actions are in the control room including instrument monitoring. Figures A-6 shows system arrangement.

2.2.2.1 HPCI Operation

The HPCI system consists of a steam turbine driven pump that can take suction from either the torus or the condensate storage tank and pump water to the reactor vessel. The steam that runs the turbine comes from the reactor and is exhausted to the torus.

To place the HPCI system into operation, the operator will start the auxiliary oil pump, the gland seal condenser exhaust fan, the emergency bearing oil pump, and the gland seal hotwell condensate pump. The operator will then open the test return to condensate storage valves M02(3)-2301-10 and M02(3)-2301-15. The operator will then supply steam to the HPCI turbine by opening valve M02(3)-2301-3. When the turbine comes up to speed, the operator will throttle M02(3)-

2301-10 to obtain the required system resistance. The HPCI turbine will then control reactor pressure in conjunction with the relief valves 2(3)-0203-3A through 2(3)-0203-3E which also discharge to the torus.

To add water to the reactor vessel the operator will open discharge valve M02(3)-2301-8. The operator can manually operate the flow controller in the control room. Water can also be added to the reactor vessel via the control rod drive pumps. If long-term operation of the HPCI system depletes the condensate storage supply, suction will be taken from the torus by opening valves M02(3)-2301-35 and M02(3)-2301-36.

2.2.2.2 Support Systems

The operator will place the HPCI room cooler in operation, supplying cooling water from the service water systems or the diesel generator cooling water pump.

Continued operation of the HPCI system can result in heatup of the torus water. However, the operator will place the LPCI system into operation in the torus cooling mode (See Figure A-7), thus maintaining the water temperature within acceptable limits.

One division of LPCI is sufficient to remove decay heat. To place the system into service, the operator will start the two LPCI pumps (Division II will be used) and open the valves in either the suppression chamber test return line (M02(3)-1501-20B and M02(3)-1501-38B) or the torus spray line (M02(3)-1501-18B and M02(3)-1501-19B). The two containment cooling service water pumps in Division II will be started to provide flow to the secondary side of the LPCI heat exchanger. Discharge valve M02(3)-1501-3B will be opened. The operator will throttle flow as appropriate to obtain the desired cooling. The operator will also verify that the LPCI and CCSW room coolers are in service.

Torus temperature and level indication are available in the control room.

2.2.2.3 Electrical Distribution

The necessary loads for the HPCI shutdown method will be supplied by the dedicated diesel generator (2 or 3). The HPCI valves and auxiliary pumps are powered from the 250-Vdc battery. Action is required by the operator to place the Division II 250-V battery charger into operation for long-term HPCI use. All other electrical distribution will be in service automatically upon loss of offsite power; however, the operator may shed loads from the diesel that are not necessary for safe shutdown. All of the necessary breakers will be operated from the control room. LPCI lineup for torus cooling is also controlled from the control room. All LPCI equipment is powered by 4-kV and 480-V power; 125-Vdc power is used for breaker control.

2.3 COLD SHUTDOWN METHODS

2.3.1 Shutdown Cooling Method

The shutdown cooling system would be started as soon as **the reactor** coolant system has been sufficiently cooled (T 350 F) and depressurized. Depressurization can be achieved by the main condenser through the turbine bypass valves (normal method if AC power is available), isolation condenser, HPCI or the electromatic relief valves. A system sketch of the Shutdown Cooling System (SDCS) is shown in Figure A-8. The SDCS design was based upon lowering reactor coolant system temperatures to 125 F within 24 hours after reactor shutdown. The system consists of three partial-capacity loops. FSAR Subsection 10.4.2 states that all three are necessary to perform the cooling function. However, plant operating experience has shown that at only eight hours after normal (main condenser) shutdown commencement, when the SDCS would normally be put into service and after reactor coolant system temperature has decreased to 350 F, only one pump and one heat exchanger (comprising one loop) are necessary to cool down. Thus, there is substantial excess capacity.

2.3.1.1 Shutdown Cooling Operation

The SDCS pumps take suction from the reactor recirculation loops through motor-operated valves 1001-1A and 1001-1B. These valves are inside containment. The lines join in one header outside of containment. This header feeds three separate loops. Each loop has a dc-powered motor-operated pump inlet isolation valve (1001-2A, 1001-2B or 1001-2C), a centrifugal pump rated at 6,750 gpm at full operation, a heat exchanger, and a dc-powered motor-operated pump outlet isolation valve (1001-4A, 1001-4B or 1001-4C). Downstream of the pump outlet isolation valves, and still outside containment, the three branches again feed a common header. This common header divides into two return lines, each containing an ac-powered motor-operated isolation valve (1001-5A and 1001-5B). Each return line penetrates the containment and rejoins the reactor coolant system through connections into one division of the Low Pressure Coolant Injection (LPCI) system. Each LPCI division connects to one of the reactor recirculation loops.

Although the capability exists to permit flow from and to both recirculation loops simultaneously, normally only one loop is selected for such service. Either recirculation loop valve(s) 0202-5A(B) and 0202-7A(B) or 0202-4A(B) must be closed to prevent back flow through the reactor recirculating pump.

Cold shutdown repair procedures have been developed to **establish power** and control capability to pumps and valves inside containment.

2.3.1.2 Support Systems

The major mechanical auxiliary systems to the shutdown cooling system are the RBCCW and service water systems (see Figures A-9 and A-10). Each of the three RBCCW pumps will deliver 8,800 gpm. Although the SAR states that two pumps (and heat exchangers) are needed for the cooldown and shutdown modes of operation, plant experience has shown that only one pump and heat exchanger combination is necessary in the assumed scenario. Any combination of one pump with one heat exchanger is possible because of the piping and valving arrangement and any of the loads to be cooled can be isolated, when feasible and necessary, to increase cooling to essential heat loads.

The RBCCW path to the shutdown cooling system heat exchangers begins at the discharge of the three RBCCW pumps which are in parallel branches.

The three pump discharge lines join into a header which feeds all of the components to be cooled (other than SDCS heat exchangers, this includes the drywell coolers, the SDCS pumps, fuel pool heat exchangers, nonregenerative heat exchangers of the reactor water cleanup system, and various other loads). There is an ac-powered motor-operated isolation valve (3704) on the discharge of the SDCS heat exchangers. This valve is accessible for manual operation if necessary.

Flow to cool the SDCS pumps is routed through a normally-open ac powered motor-operated inlet isolation valve (3701) which also serves to allow flow to or isolate flow from other loads to be cooled. This valve is accessible for manual operation.

Discharge of RBCCW from the cooled components is routed to one header which feeds the three RBCCW heat exchangers. The cooled heat exchanger effluent (service water is the cooling medium) feeds a single header from which the RBCCW pumps draw suction.

The RBCCW system pressure is lower than that of both the components being cooled and the service water cooling medium, meaning that any intersystem leakage at the heat exchangers would be leakage into the RBCCW system. This prevents radioactive material, from the cooled components, from escaping to the environment through the ultimate cooling medium. It also prevents impurities in the cooling medium from entering the reactor coolant system.

As noted above, the RBCCW system is cooled by the service water (SW) system. This system has five pumps, two of which are powered from Dresden 2 buses, two from Dresden 3 buses, and one from both Dresden 2 and 3 buses. All five pumps, with operator action, can be supplied power from the emergency diesel generators. All five pumps are located in the crib house and are rated at 15,000 gpm each. A common header connects the Dresden 2 and 3 systems. All valves in the service water piping which lead to or from the RBCCW heat exchangers are manual with the exception of air-operated temperature control valves on each heat exchanger. These valves fail open on loss of air.

2.3.1.3 Electrical Distribution

The necessary loads for the shutdown cooling system and its support systems will be provided by the emergency diesel generators. One diesel generator is needed to shutdown each unit. The valves in these systems are fed from the 480V system, from the 125Vdc system or can be operated manually. The pumps are powered from the 4kV system; 125Vdc power is used for breaker control.

2.3.2 LPCI/CCSW Division II Method

If the SDCS was inoperable for any reason the Low Pressure Coolant Injection (LPCI) system could be used to inject cooling water into the core once the injection initiation limits (350 psig) are met. The LPCI/CCSW system sketch is

shown on Figure A-11. The LPCI system is a low pressure, high volume system capable of providing substantial volumes of cooling water to the core. Not too much detail will be devoted to the individual systems here because each is safety-grade and is taken into account in the Dresden 2&3 SAR Loss-of-Coolant Accident (LOCA) Analysis, Chapter 6. The pumps in each system are powered from "emergency" buses, and all motor-operated valves are powered from "emergency" MCCs and are also outside containment, accessible for manual operation if needed.

2.3.2.1 LPCI Operation

The reactor vessel can be allowed to fill using LPCI, overflowing hot water to the pressure suppression chamber (torus) through the relief valves. The continuous cycle of water through the core, through the relief valves to the torus and back again after cooling via the containment cooling heat exchangers, would only be limited by the design of the relief valves themselves. These valves incorporate a spring which must be overridden by system pressure to open the valve. The valve will reseal at approximately 50 psig and will stay shut until the pressure is increased to 150 psia by the LPCI pumps.

2.3.2.2 Support Systems

The support systems necessary for operation of the LPCI/CCSW system to achieve and maintain cold shutdown are the LPCI and CCSW Room Coolers. Water is provided to the LPCI room cooler from the unit's dedicated diesel generator cooling water pumps or service water pumps. Water for the CCSW room cooler is taken from the pump discharge and routed through the cooler to the pump suction.

2.3.2.3 Electrical Distribution

The necessary loads for the LPCI/CCSW system will be supplied by dedicated diesel generator (Division II). The room cooler fans are powered from a 480 V MCC. The LPCI and CCSW pumps are powered by the 4-kV system; 125Vdc power is used to operate breakers.

2.4 STRUCTURAL STEEL BEAM FIRE EXPOSURE EVALUATION

2.4.1 Introduction

Based on the guidance contained in Generic Letters 83-33 and 84-09, the survivability of the structural steel at the Dresden Nuclear Power Station was evaluated to ensure fire related structural damage would not have an adverse effect on the plant's ability to safely shut down. The Unit 2/3 crib house, turbine building (including the control room and AEER), and reactor buildings were also reviewed in detail since all mechanical and electrical equipment needed to support either hot or cold shutdown are contained in these plant areas. This evaluation was conducted in three steps as follows:

1. Plant areas with protected steel (either fire resistive cover and/or automatic sprinkler protection) were eliminated from the review.
2. The fire exposure was quantified to determine the thermal environment for the steel beams.
3. Calculations were conducted to determine heat transfer to the steel beams.
4. The structural load supported by the beams was compared to the degraded strength of the beams resulting from the elevated temperatures.

Based on the results of these evaluations, the majority of structural steel supporting the unrated floors in the general area of the turbine building would not fail due to fire exposure. When a failure of the steel was calculated, additional measures of protection in the form of automatic sprinklers or a fire resistive coating was provided. The structural steel supporting the 3-hour rated ceiling of the control room was calculated assuming limited ventilation, not to fail from generalized heating effects. The justification for not providing a fire resistive coating for the structural steel in the control room is provided in Section 10.1.

2.4.2 Methodology

The first step in the evaluation was to identify those areas required for safe shutdown which contained unprotected exposed steel necessary to support the structure (ceiling above area). This resulted in a list of areas in the turbine building which required evaluation. Areas which contained steel with approved fire resistive coverage and/or automatic sprinkler protection were considered adequately protected without further analysis. (The NRC accepted automatic water suppression systems in lieu of passive steel protection at Limerick Generating Station.¹) August 10, 1984 and September 11, 1985, Dresden submittals to the NRC were used as the basis of determining where sprinkler protection was, or would be, provided.

The next step was to quantify the severity of the fire exposure in terms of a thermal environment seen by the structural steel element. The methodology applied in this step was that developed and applied by PLC and approved by the NRC for use at Limerick Generating Station.¹ (The methodology is attached as Appendix D of this submittal).

The generalized methodology then incorporated the specific condition (cable materials) at the Dresden Station. The conservative assumption was made that the bulk of the cables installed in the plant were non IEEE 383 qualified, PE/PVC jacket and insulation. Test data obtained from fire research conducted by both Factory Mutual Research Corporation (sponsored by the Electric Power Research Institute¹) and Sandia National Laboratories (sponsored by the USNRC¹) was used to develop heat release rates, plume temperatures and separation criteria for cable tray arrays (see Section 2.4.3).

With the exception of the Unit 3 Battery Room, Unit 3 125V DC Panel Room, Unit 2 Battery Room, and Unit 2/3 Control Room, all of the areas evaluated were large open areas so only the effects of fire plumes needed to be evaluated.

Since transient combustibles were assumed to be only at floor level, the most severe fire exposure to ceiling level structural steel would be from direct plume or flame impingement from localized cable tray fires. The data outlined in

Subsection 2.4.3 was used to evaluate these cases and determine which structural elements needed heat transfer evaluation.

In order to determine the duration of localized exposure fires, it was necessary to evaluate the number of cables and their characteristic burning rates (mass combustion rates, and heat release rates). Cable raceway drawings contained the number of cables in each tray, identified from reference point to reference point. (No documentation was available on subsequent cable additions to those shown on the base documents which could influence the fire exposure to the structural steel.) To translate this cable information into the mass of combustible material available to burn and subsequently into exposure duration, cable specification data supplied by Sargent and Lundy and the cable manufacturers (General Electric and Simplex) were used to quantify an "average" cable.

2.4.3 Separation Criteria and Localized Heating

Separation criteria and localized heating are a function of the burning rate of the cables and the number of cables in the exposing trays. To determine the mass burning rate and subsequent heat release rate, fire test data EPRI/FMRC² and Sandia Laboratory³ was used. The peak burning rate for the test area at FMRC was 18.2 Kg/min for the PE/PVC cables tested. These cables represent a more severe case than Dresden - Quad Cities. This mass burning rate reduces to combustion rate of 0.278 lb/min ft² of tray. Using a heat of combustion of $H_c = 11,000$ Btu/lb, a peak heat release rate of 3060 Btu/min-ft² was calculated (580 kw/m²).

The heat release rate data and the temperature profile data from the FMRC tests and Sandia Laboratories test were used to develop separation criteria and plume temperature using fire plume relationships of Alpert and Ward. (See reference 8 on page 20 of Appendix D). This yielded a separation/exposure criteria shown in Table 2.4-1.

¹References identified here are listed on page 20 of Appendix D.

SEPARATION CRITERIA FOR CABLE TRAYS

# of Trays (30" wide)	Separation/Exposure Criteria (in feet)		
	1100 F	1300 F	1500 F
1	3.5	3.0	3.0
2	4.5	4.0	3.5
3	5.5	5.0	4.0
4	6.0	5.0	5.0
5	6.5	6.0	5.0
6	7.0	6.0	6.0

3.0 UNIT 2 REACTOR BUILDING APPENDIX R EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Sections III.G.2, III.G.3, and III.L of Appendix R to the extent that the alternative shutdown capability criteria of III.G.2, III.G.3, and III.L would have to be met for the Fire Areas RB2-I and RB2-II of the Dresden 2 reactor building. CECo specifically requests exemption from:

1. The requirements of III.G.3 and III.L that the Fire Areas RB2-I and RB2-II be separated from each other and adjacent fire areas by complete 3-hour barriers, and
2. The requirement of III.G.3 that fire areas relying on alternate shutdown capability be provided with area fire detection and fixed area fire suppression.
3. The requirement of III.G.2 for separation of redundant instrumentation and isolation condenser valve power and control cables.

The justifications for these exemptions are presented in the following sections:

<u>SECTION</u>	<u>JUSTIFICATION FOR:</u>
3.2	Lack of complete 3-hour Fire Barriers Around Fire Zone 1.3.2
3.3	Lack of Complete 3-hour Fire Barriers Between Fire Areas
3.4	Lack of Complete Detection and Suppression in Fire Area RB2-I
3.5	Lack of Complete Detection and Suppression in Fire Area RB2-II
3.6	Separation of Redundant Instrumentation
3.7	Separation of Redundant Isolation Condenser Cables

3.0 UNIT 2 REACTOR BUILDING APPENDIX R EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Section III.G.3 of Appendix R to the extent that the alternative shutdown capability criteria of III.G.3 ~~would~~ have to be met for the Fire Area RB2-II of the Dresden 2 reactor building. **CECo** specifically requests exemption from:

1. The requirements of III.G.3 that safe cold shutdown equipment be independent of RB2-II.

The justification for these exemptions are presented in the following sections:

<u>SECTION</u>	<u>JUSTIFICATION FOR:</u>
3.8	Availability of Cold Shutdown Equipment within RB2-II

3.1 REACTOR BUILDING AREA DESCRIPTION

The Unit 2 reactor building is separated into fire areas as shown on Figure A-2. All penetrations between fire areas containing different shutdown paths that are not fire rated are identified and justified in the exemption requests.

The Unit 2 and Unit 3 reactor buildings are separated by a 3-hour fire barrier except for: A) an unrated door on elevation 476 feet 6 inches at column rows G/44 which connects the Unit 2 and 3 reactor building equipment drain tank rooms, and B) the refueling floor elevation 613 feet 0 inch which has no separation between units.

The Unit 2 reactor building is separated from the turbine building by 3-hour rated fire barriers except for certain HVAC ducts without fire dampers. Fire Area RB-2/3, i.e., Fire Zones 9.0.C (diesel generator 2/3 room) and 11.2.3 (Unit 2 HPCI room), are separated from the Unit 2 reactor building by 3 hour rated fire barriers except for an HVAC duct without a fire damper.

4kV Bus ducts and standby gas treatment system ductwork penetrate the walls separating the reactor building from the turbine building. These ducts do not contain fire seals or dampers.

As seen in Figure A-2, two hot shutdown paths are available in the reactor building. These are the Isolation Condenser Method (B1) and the HPCI/LPCI Method (C).

The equipment and cabling associated with the HPCI/LPCI method of shutdown are located below the 589-foot elevation. The isolation condenser, valves, equipment, and cabling necessary for the isolation condenser path are located on the 589 foot elevation (Fire Zone 1.1.2.5.A), in the isolation condenser pipe chase on elevations 545 feet 6 inches and 570 feet (Fire Zones 1.1.2.5.B and 1.1.2.5.C), in the shutdown cooling pump room (Fire Zone 1.3.2) on elevation 517 feet 6 inch and the turbine building. The areas which contain this isolation condenser equipment in the reactor building do not contain any equipment or

cabling associated with the HPCI/LPCI shutdown path, and are separated from adjacent zones by 3-hour rated fire barriers or their equivalent. Automatic thermally actuated preaction water curtains or wet pipe sprinklers are provided around the stairwell, ladder, HVAC ducts and 20-foot x 20-foot open hatch which connects the fire zone containing the Unit 2 isolation condenser (Fire Zone 1.1.2.5.A, elevation 589 feet) and the zone below (Fire Zone 1.1.2.4, elevation 570 feet).

Power and control cables and their MCC's for the inboard and outboard isolation condenser valves, are contained in Fire Zone 1.1.2.2. An inboard isolation condenser valve alternate power and control feeds are routed through the 476 foot 6 inch elevation (Fire Zone 1.1.2.1) from Unit 3 MCC 38-1. A 1-hour fire resistive wrap is used to protect the alternate power and control feeds to these valves.

The isolation condenser shutdown path is available in every zone in the reactor building except Fire Zones 1.1.2.5.A, 1.1.2.5.B, 1.1.2.5.C and 1.3.2. In these zones, the HPCI/LPCI shutdown path is available.

Detection is provided throughout the reactor building except on the refuel floor, standby liquid control area, (Fire Zone 1.1.2.5.D), the regenerative and non-regenerative HX's in Fire Zone 1.1.2.3, the isolation condenser pipe chase and torus basement (elevation 476 feet 6 inch). The torus basement is provided with linear thermal detection in and under cable trays in the fire zone. The combustible loading in this torus area is extremely low. Thermal detection is provided for Fire Zones 1.1.2.1 and 1.1.2.2. Localized detection is provided over the standby liquid control pumps in Fire Zone 1.1.2.5.D. A fire in the isolation condenser pipe chase would be detected in Fire Zone 1.1.2.5.A. The regenerative and non-regenerative HX's are separated from the rest of Fire Zone 1.1.2.3 by thick shield walls which run from floor to ceiling. The refuel floor at elevation 613 feet 0 inch is common for Unit 2 and Unit 3 (Fire Zones 1.1.2.6 and 1.1.1.6) and is open to the isolation condenser floor at elevation 589 feet 0 inch (Fire Zone 1.1.2.5.A) below by way of the open 20-foot x 20-foot hatch, stairwell, HVAC ducts without fire dampers and unsealed mechanical penetrations. An automatic thermally activated preaction water curtain is provided around the

hatch and stairwell and a wet pipe sprinkler provides protection for the HVAC ducts. This separates the zones with an equivalent level of protection to a 3-hour fire barrier. The refuel floor contains no equipment or cabling associated with safe shutdown.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 3.2, Justification for lack of complete 3-hour fire barriers around Fire Zone 1.3.2). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

3.2 JUSTIFICATION FOR LACK OF COMPLETE FIRE BARRIERS AROUND FIRE ZONE 1.3.2

3.2.1 Introduction

Fire Zone 1.3.2 contains the power and control feeds to the inboard isolation condenser valves located in the inerted drywell. The floor, ceiling and walls are 3 hour rated barriers except for the following:

1. The ceiling has a mechanical penetration containing an HVAC duct with no fire damper and 3 pipes which leads to Fire Zone 1.1.2.3.
2. The west wall contains a ventilation louver and an adjacent mechanical penetration open to the steam pipe chase.
3. The floor contains a 3-foot 0-inch by 4-foot 3-inch opening which is covered by a steel plate with some openings for pipes and six additional unsealed mechanical penetrations.

Appendix R Sections III.G.3 and III.L requires that alternate shutdown paths be separated by complete 3-hour rated fire barriers. The subsequent analysis provides justification for an exemption to these requirements with regard to the penetrations in the floor, ceiling, and walls surrounding Fire Zone 1.3.2.

3.2.2 Fire Protection System

Fire Zone 1.3.2 contains complete fire detection and has a manual hose station and fire extinguisher available in the event of a fire in this fire zone.

3.2.3 Safe Shutdown Equipment

The only Appendix R hot shutdown components contained in Fire Zone 1.3.2 are the power and control feeds to the inboard isolation condenser valves which are located in the inerted drywell. There is no safe shutdown equipment located in the steam pipe chase or torus basement except for a single associated cable in the torus basement (Fire Zone 1.1.2.1) and the alternate power and control cables to the inboard isolation condenser valves which are routed in a 1-hour fire wrapped conduit through the torus basement Fire Zone 1.1.2.1 (See Section 3.7).

3.2.4 Fire Hazards Analysis

The ceiling contains an HVAC duct and pipes. They are surrounded by a concrete block wall from Elevation 545 feet 6 inches to 551 feet 6 inches in Fire Zone 1.1.2.3. See Figure C-2. At the top of this wall is a steel plate with openings cut for the HVAC duct and the pipes which continue into Fire Zone 1.1.2.3. The immediate vicinity of the pipes and duct penetrations is protected by a wet pipe sprinkler. This would either contain a fire in Fire Zone 1.3.2 if it should originate there, or keep a fire from entering if it occurs outside. In addition, both fire zones have low combustible loading, complete detection and no continuity of combustibles. Fire Zone 1.3.2 is high radiation area. If a fire damper and seals were to be installed, the exposure would be significant.

The west wall contains an air operated ventilation louver with no fire damper and an adjacent mechanical penetration. This wall contacts the steam pipe chase. A fire damper installed over the louver or sealing of the penetration would not increase the protection of power and control feeds to the inboard isolation condenser valves located in the inerted drywell because the steam pipe chase contains negligible combustibles.

The steam pipe chase is part of secondary containment and is surrounded by thick reinforced concrete shield walls. The penetrations, except in Fire Zone 1.3.2 in the surrounding barriers are sealed with noncombustible seals. Water suppression is provided in the turbine building side of these barriers. Detection is provided in the reactor building. Access to the steam pipe chase is gained from the turbine building through double non-rated doors. The combustible loading in the steam pipe chase is low and there is no continuity of combustibles. Transient combustibles are limited by access to this high radiation area. The steam pipe chase does not contain suppression or detection.

In addition, the equipment located in the steam pipe chase is not part of any of the shutdown paths identified in Section 2.0.

Both the steam pipe chase and Fire Zone 1.3.2 are high radiation areas. If a fire damper were to be installed, the exposure would be significant. Therefore, in

order to follow the ALARA guidelines and since the installation of a fire damper would not significantly increase the level of protection in Fire Zone 1.3.2, the fire damper will not be installed nor will the penetration be sealed.

The floor contains a 3-foot 0-inch by 4-foot 3-inch opening which is covered by steel plate with some pipe openings. Also in the general floor are additional unsealed mechanical penetrations. Beneath Fire Zone 1.3.2 is the torus area Fire Zone 1.1.2.1. Both Fire Zone 1.3.2 and 1.1.2.1 have low combustible loading ($18,700 \text{ Btu/ft}^2$, and 400 Btu/ft^2 respectively). Fire Zone 1.3.2 has complete fire detection. There is a minimum of 40 feet horizontal separation between the floor penetration and the only fixed combustibles (in the cable pans) in the torus level below. These are no intervening combustibles which are unsealed passing through the barrier. There is no continuity of combustibles through the open mechanical penetrations. The cable pans have linear thermal fire detection installed. A single cable associated with the isolation condenser method of shutdown is routed in conduit in Fire Zone 1.1.2.1 at least 40 feet from the penetration. Local controls allow starting of diesel generator 2/3 and operation of switchgear even if this cable is damaged. The alternate feed to the inboard isolation condenser valves which originate in Fire Zone 1.3.2 are routed through Fire Zone 1.1.2.1 as seen on Figure C-3. These cables are 1-hour fire wrapped in Fire Zone 1.1.2.1.

3.2.5 Conclusions

Based on this analysis, the intent of Appendix R requirements are met. Fire Zone 1.3.2 is therefore considered an equivalent fire area because a fire will not propagate beyond its boundry into adjacent fire zones. The justification for an exemption from complete 3-hour fire barriers is summarized as follows:

1. Fire Zone 1.3.2 has complete fire detection. It has a low combustible loading. Also manual fire protection is available in the event of a fire.
2. Adjacent Fire Zone 1.1.2.2 has complete fire detection. It has low combustible loading.
3. A wet pipe sprinkler protects the mechanical penetration into 1.1.2.3. The installation of the damper and sealing the penetration would not increase the level of protection.

4. The steam pipe chase contains no safe shutdown equipment and the combustibles are negligible.
5. Fire Zone 1.3.2 and the steam pipe chase are high radiation areas. The installation of a fire damper and sealing of the penetration would not increase the level of protection between these fire zones.
6. There is minimum of 40 feet separation between unprotected cables in the torus area (Fire Zone 1.1.2.1) and the unsealed penetration to Fire Zone 1.3.2. There is no equipment associated with the isolation condenser except for the alternate feed cables for the inboard isolation condenser valves in Fire Zone 1.1.2.1.
7. All the cable trays in Fire Zone 1.1.2.1 are provided with linear heat detection in and under the trays. Fire Zone 1.1.2.1 has a very low combustible loading.
8. There is no continuity of combustibles through these open penetrations in the fire zone boundaries.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 3.3, Justification for lack of complete 3-hour fire barriers between fire areas). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECO has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

3.3 JUSTIFICATION FOR LACK OF COMPLETE 3-HOUR BARRIERS BETWEEN FIRE AREAS

3.3.1 Introduction

The Unit 2 reactor building is divided into two fire areas as shown on Figure A-2. Each fire area is separated from all other fire areas by 3-hour rated (or equivalent) fire barriers. In the event of a fire in one fire area, an alternate shutdown method has been identified which does not use the equipment located in the affected fire area. The following analysis provides justification for the lack of complete 3-hour rated fire barriers between fire areas containing alternate shutdown paths as required in Appendix R.

The above fire areas are composed of fire zones which have been identified with one of two shutdown paths available in the reactor building. The fire areas, identified as RB2-I and RB2-II, contain the following fire zones:

<u>RB2-I</u>	<u>RB2-II</u>
1.3.2	1.1.2.1
1.1.2.5.A	1.1.2.2
1.1.2.5.B	1.1.2.3
1.1.2.5.C	1.1.2.4
	1.1.2.5.D
	1.1.2.6/1.1.1.6
	11.2.1
	11.2.2

In the event of a fire in Fire Area RB2-I, HPCI/LPCI shutdown path C has been identified as being free of fire damage (see description of shutdown paths in Section 2.0). For a fire in Fire Area RB2-II, isolation condenser shutdown path B1 has been identified as remaining free of fire damage. Fire Zone 1.1.2.6 of Fire Area RB2-II has normal shutdown path A as a primary shutdown path. Fire Zones 1.1.2.5.D and 1.1.2.6/1.1.1.6 contain no equipment or cabling associated with either path.

3.3.2 Fire Protection System

Fire Areas RB2-I (except for Fire Zone 1.1.2.5.A which is discussed in Section 3.2) and RB2-II are separated from each other by complete 3-hour rated fire barriers except for openings between Fire Zones 1.1.2.5.A, 1.1.2.4 below, and 1.1.2.6 above. Openings which exist between these fire zones consist of a 20-foot x 20-foot hatch, a stairwell, a ladder opening, HVAC ducts, and unsealed mechanical penetrations.

The hatch, and stairwell openings are surrounded by an automatic closed-head, preaction water curtain which is actuated by a linear thermal fire detection system. The ladder opening and major HVAC ducts are protected by a wet pipe or preaction sprinkler. Fire Zones 1.1.2.5.A and 1.1.2.4 have fire detection throughout the zones. Low combustible loadings are present in each of the three zones connected by these openings. The detection and suppression systems installed within Fire Areas RB2-I and RB2-II are covered in Sections 3.4 and 3.5, respectively.

Fire Area RB2-II is separated from the turbine building by a 3 hour barrier except for an HVAC duct penetrating the wall to the eastern zone group, standby gas treatment system piping, two 4kv bus ducts and 2 HVAC ducts penetrating to the turbine building vent floor. These ducts do not have fire dampers. Mechanical penetrations are also present through the ceiling of Fire Zone 1.1.2.1 into the turbine building. These penetrations have noncombustible seals. Fire Area RB2-II is also separated from the HPCI room by a 3 hour barrier except for a HVAC duct which does not have a fire damper.

3.3.3 Safe Shutdown Equipment

The Appendix R hot shutdown equipment located in Fire Areas RB2-I and RB2-II is listed in Table 3.3-1 and Table 3.3-2. Fire Area RB2-I contains only necessary equipment or cabling associated with isolation condenser shutdown paths. Fire Area RB2-II contains cabling associated with the isolation condenser shutdown paths, necessary cabling and equipment associated with HPCI/LPCI shutdown path C and the power and control feeds to the inboard isolation condenser valves which

are necessary for the isolation condenser paths. The justification for this deviation from requirements of Appendix R is presented in Section 3.7.

3.3.4 Fire Hazards Analysis

3.3.4.1 Fire Area RB2-I

The shutdown cooling pump room, equivalent Fire Area 1.3.2, is surrounded by Fire Area 1.2.2 (inerted drywell), the steam chase and Fire Zones 1.1.2.3, 1.1.2.2, 1.1.2.1 and 8.2.5.A. The walls, floor and ceiling surrounding equivalent Fire Area 1.3.2 are 3-hour rated fire barriers except as identified and justified in Section 3.2.

The remaining reactor building fire zones which are part of Fire Area RB2-I, (1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C) are interconnected. Fire Zones 1.1.2.5.B and 1.1.2.5.C form the isolation condenser pipe chase. The pipe chase is surrounded and protected from a fire in Fire Area RB2-II by walls and floor which are 3-hour fire barriers. The access doors to the pipe chase (one each on the 545 foot 6 inch and 570 foot 0 inch elevations) are 3-hour rated. The pipe chase opens into Fire Zone 1.1.2.5.A above, through open steel grating.

Fire Zone 1.1.2.5.A, the isolation condenser floor, is enclosed by walls, floor, and ceiling constructed of 3-hour rated reinforced concrete with similarly rated penetrations except as noted below. Both the floor and ceiling of this fire zone have a 20-foot x 20-foot hatchway and a stairwell opening. These openings are protected by equivalent 3-hour protection in the form of an automatic closed-head, preaction water curtain, actuated by a linear thermal detection system as similar to that described in Generic Letter 83-33. Complete area fire detection is provided in Fire Zone 1.1.2.5.A. Access doors to this fire zone are 3-hour rated.

HVAC ducts and unsealed mechanical penetrations from the refuel floor (Fire Zone 1.1.2.6) penetrate the ceiling of Fire Zone 1.1.2.5.A. Fire Zone 1.1.2.6 does not contain any safe shutdown cabling or equipment. Fire Zones 1.1.2.6 and 1.1.2.5.A have low fire loadings of less than 500 Btu/ft² and 1000 Btu/ft²

respectively. The ceiling level water curtains for the stairway and hatchway also provides protection of the HVAC duct located between them. There is no continuity of combustibles through these openings. The heat and products of combustion from a fire below the refuel floor would not spread to the refuel floor and impact both units.

An unsealed mechanical penetration and HVAC ducts without fire dampers penetrate the floor of Fire Zone 1.1.2.5.A to Fire Zone 1.1.2.4. These HVAC ducts and mechanical penetration are protected by an automatic wet pipe or preaction fire suppression system similar to that protecting the stairwell, hatch, and ladder openings. The floor also has a ladder hatchway open to the elevation below which is protected by wet pipe sprinklers. Fire Zones 1.1.2.5.A and 1.1.2.4 have low combustible loadings of 1000 Btu/ft² and 5000 Btu/ft² respectively and complete fire detection systems.

The fire zones associated with the isolation condenser shutdown path, (1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C,) form an equivalent fire area protected in a manner consistent with the NRC definition of a fire area and equivalent fire protection features for separation of alternate shutdown paths described in Generic Letter 83-33. Therefore, Fire Zones 1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C can be considered one equivalent fire area.

3.3.4.2 Fire Area RB2-II

Fire Area RB2-II in the reactor building is composed of fire zones that are separated from Fire Area RB2-I by 3-hour rated fire barriers except as noted in 3.3.4.1 above.

The border of Fire Area RB2-II contacts the Unit 3 reactor building, Fire Area RB-2/3 and the turbine building. The walls which comprise the reactor building border are 3-hour rated (or equivalent) fire barriers. All of the access doors to this fire area are rated to 3 hours with the exception of a door between the reactor building equipment drain tank room of both units at the torus level (Fire Zones 1.1.1.1 and 1.1.2.1). These rooms of both units have low fire loadings and there is a lack of continuity of combustibles through the wall. The torus level

is provided with linear thermal detection both in and under the major source of combustibles, the cable trays.

The walls that separate the RB2-II from the turbine building are 3 hour rated fire barriers except for 3 HVAC ducts which have no fire dampers, SBT piping and 4kV bus duct penetrations. One HVAC duct connects reactor building Fire Zone 1.1.2.3 to the Eastern Zone Group (TB-I), (Fire Zone 8.2.6.B.) Fire Zone 1.1.2.3 has complete detection in the area and Fire Zone 8.2.6.B has complete water suppression. Both fire zones have low combustible loading, i.e. less than 17,000 Btu/ft² and 19,000 Btu/ft². Both RB2-II and the eastern zone group (TB-I) have alternative shutdown path B1 identified for use in the event of a fire. Therefore no fire damper is warranted.

Two HVAC ducts without fire dampers connect RB2-II and reactor building vent floor located in the turbine building. These ducts are the HVAC supply and return for the reactor building ventilation system. The vent floor is located above the turbine building operating floor Fire Zone 8.2.8.A. Fire Zone 8.2.8.A contains no safe shutdown equipment and has a combustible loading of less than 13,000 Btu/ft². The vent floor (Fire Zone 8.2.8.B) has a combustible loading of less than 3000 Btu/ft². The ducts enter reactor building Fire Zone 1.1.2.4 and Fire Zone 1.1.2.5.D. Fire Zone 1.1.2.4 has complete detection. Fire Zone 1.1.2.5.D contains no safe shutdown equipment and has detection over the standby liquid control system. Both of these fire zones have low combustible loadings of less than 5000 Btu/ft² and 2000 Btu/ft² respectively. Fire dampers are not warranted in these ducts since a fire propagating to either side of the barrier would not affect safe shutdown.

The northern ceiling of Fire Zone 1.1.2.1 borders the turbine building. It is constructed of reinforced concrete with pipe penetrations from the reactor building drain tank room to the turbine building (Fire Zone 8.2.5.C.) These pipe penetrations are provided with noncombustible seals. Fire rated seals are unwarranted due to the low combustible loading below the barrier and no combustible material passing through the seal material.

RB2-II is separated from Fire Area RB-2/3 which is comprised of Fire Zones 9.0.C (2/3 diesel generator room), 11.1.3 (Unit 3 HPCI Room) and 11.2.3 (Unit 2 HPCI Room) by 3-hour rated barriers except for an HVAC opening with no fire damper which connects Fire Zone 11.2.1 in RB2-II and Fire Zone 11.2.3 in RB-2/3. RB2-II and RB-2/3 fire areas both have identified alternative shutdown paths which employ the isolation condenser. Fire Area RB2-II utilizes the 2/3 diesel generator power train (Division I) while Fire Area RB-2/3 utilizes the Unit 2 dedicated diesel generator (Division II) to shut down Unit 2. Fire Zone 11.2.1 has complete fire detection and a fire loading of less than 22,000 Btu/ft². Fire Zone 11.2.3 is provided with both water suppression and detection. It has a combustible loading of 122,000 Btu/ft² made up mainly of 1000 gal of lube oil contained in the HPCI pump. A fire would have to affect both the 2/3 diesel generator (Division I) and the Unit 2 diesel generator (Division II) powertrains before it would disable both alternate shutdown paths. A fire in 11.2.1 would have to propagate through Fire Zone 11.2.3 and up into Fire Zone 9.0.C to affect the Division I powertrain. This scenario itself is very unlikely since Fire Zone 11.2.3 is provided with automatic water suppression. In addition, there is no continuity if combustibles through the HVAC opening and no combustibles in the proximity of the HVAC duct. For these reasons this one penetration can not affect safe shutdown and therefore the damper is not warranted.

3.3.5 Conclusions

The boundaries separating the fire zones associated with the alternative shutdown path, i.e., isolation condenser path B1 and HPCI/LPCI path C are not complete 3-hour rated fire barriers by definition because of the hatchways, stairwells, ladder openings, HVAC ducts, and unsealed mechanical penetrations. However, the above analysis indicates that Fire Areas RB2-I and RB2-II meet the intent of Generic Letter 83-33 and Appendix R Section III.L which require that alternate shutdown paths be separated from each other so that a single fire cannot disable alternate shutdown paths.

TABLE 3.3-1
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB2-I

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.3.2</u>	
None	Not Applicable
<u>Fire Zone 1.1.2.5.A</u>	
Unit 2 Isolation Condenser (IC)	A, A2, B1, E
IC Valve M02-1301-10	A, A2, B1, E
IC Valve M02-4102	A, A2, B1, E
IC Valve A02-1301-17	A, A2, B1, E
IC Valve A02-1301-20	A, A2, B1, E
<u>Fire Zone 1.1.2.5.B</u>	
IC Valve M02-1301-2	A, A2, B1, E
<u>Fire Zone 1.1.2.5.C</u>	
IC Valve M02-1301-3	A, A2, B1, E

TABLE 3.3-2
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB2-II

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.1.2.1</u>	
LPCI Valve M02-1501-13B	C
LPCI Valve M02-1501-18B	C
LPCI Valve M02-1501-19B	C
LPCI Valve M02-1501-20B	C
LPCI Valve M02-1501-38B	C
HPCI Valve M02-2301-5	C
<u>Fire Zone 1.1.2.2</u>	
480-V MCC 28-1	A,A1,A2,E
480-V MCC 29-1	C
480-V MCC 29-4	C
<u>Fire Zone 1.1.2.3</u>	
4-kV SWGR 23-1	A,A1,A2
4-kV SWGR 24-1	C,E
<u>Fire Zone 1.1.2.4</u>	
125-Vdc Reactor Building Distribution Panel	A,A1,A2,C,E
250-Vdc MCC 2A	A,C,E
250-Vdc MCC 2B	A,C,E
480-V SWGR 28	A,A1,A2,C,E
480-V SWGR 29	A,C,E
<u>Fire Zone 1.1.2.5.D</u>	
None	Not Applicable
<u>Fire Zone 1.1.2.6</u>	
None	Not Applicable

TABLE 3.3-2 (Cont'd)

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 11.2.1</u>	
HPCI Valve M02-2301-36	C
LPCI Emergency Air Cooler 2-5746B	C
LPCI Pump 2C	C
LPCI Pump 2D	C
LPCI Valve M02-1501-11B	C
LPCI Valve M02-1501-32B	C
LPCI Valve M02-1501-3B	C
LPCI Valve M02-1501-5C	C
LPCI Valve M02-1501-5D	C
<u>Fire Zone 11.2.2</u>	
None	Not Applicable

3.4 JUSTIFICATION FOR LACK OF COMPLETE DETECTION AND SUPPRESSION IN FIRE AREA RB2-I

3.4.1 Introduction

Fire Area RB2-I in the reactor building contains cables and equipment necessary for the isolation condenser method of shutdown. HPCI/LPCI shutdown path C (see Section 2.0 for description) has been identified as an independent method to bring the plant to hot shutdown in the event of a fire in Fire Area RB2-I. Because alternative shutdown is utilized for this fire area, Appendix R Section III.G.3 requires that fire detection and fixed fire suppression be present throughout the fire area. However, as the subsequent analysis demonstrates, the fire protection features provide a level of protection which ensures that any fire will be quickly detected and extinguished. Additional detection and suppression systems would not significantly enhance the level of safety at Dresden. Therefore, an exemption is requested from the Appendix R Section III.G.3 requirement for fixed detection and suppression in Fire Zones 1.1.2.5.B and 1.1.2.5.C and for fixed suppression in equivalent Fire Area 1.3.2 and Fire Zone 1.1.2.5.A.

Fire Area RB2-I in the reactor building is made up of the following fire zones:

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
1.3.2	Reactor Building Elevation 517 feet 6 inches Shutdown Cooling Pump Room
1.1.2.5.A	Reactor Building - Reactor Floor - South Elevation 589 feet 0 inch
1.1.2.5.B	Reactor Building Elevation 570 feet 0 inch Isolation Condenser Pipe Chase

1.1.2.5.C

Reactor Building

Elevation 545 feet 6 inches

Isolation Condenser Pipe Chase

These fire zones are shown on Figures B-2 through B-5. The specific descriptions of these fire zones which contain the fire barrier description, fire loading for each zone, safety-related equipment, and suppression and detection capabilities located in each zone are contained in the Fire Hazards Analysis Section of this exemption request.

3.4.2 Fire Protection System

Fire Area RB2-I consists of equivalent Fire Area 1.3.2 and Fire Zones 1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C. Equivalent Fire Area 1.3.2 contains complete fire detection which alarms in the control room. This fire area does not contain fixed fire suppression. Appendix B contains figures showing fire protection systems installed within Fire Area RB2-I. A manual hose station is located near the 3-hour rated access door.

Fire Zones 1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C are connected forming a vertical pipe chase and the isolation condenser floor. Fire detection is present at the ceiling level of Fire Zone 1.1.2.5.A, the isolation condenser floor. A fire in the pipe chase is not probable since in-situ combustibles in the pipe chase are negligible. The three zones are connected by open grating, therefore a fire on the lower elevations would be detected by the fire detection system installed in Fire Zone 1.1.2.5.A. Manual hose stations and portable fire extinguishers are available in Fire Zone 1.1.2.5.A. The unrated openings in the 3-hour fire barrier between Fire Area RB2-I and Fire Area RB2-II of the reactor building are identified in Section 3.3. Automatic thermally actuated closed head water curtains or wet pipe sprinklers are provided as described in Section 3.3 ensuring an equivalent 3-hour fire barrier between alternate shutdown paths.

3.4.3 Safe Shutdown Equipment

Appendix R hot shutdown equipment located in this fire area and the shutdown path which employs the equipment are listed by fire zone in Table 3.4-1. All cabling

and equipment necessary for alternate hot shutdown are separated from this fire area by an equivalent 3-hour fire barrier.

3.4.4 Fire Hazards Analysis

3.4.4.1 Reactor Building - Shutdown Cooling Pump Room Elevation 517 feet 6 inches (Equivalent Fire Area 1.3.2)

The north wall of this equivalent fire area is constructed of reinforced concrete having a 3-hour rating to separate it from the Turbine Building. The east and southeast walls are constructed of reinforced concrete and concrete block and are 3-hour rated fire barriers. Access is gained to this area through a 3-hour rated door. The west wall of this fire area is the boundary of the drywell and steam pipe chase. The west wall contains a ventilation duct and an unsealed mechanical penetration open to the steam pipe chase. The ceiling and the floor contain unsealed mechanical penetrations. A justification from complete 3-hour rated fire barriers between alternate shutdown paths is presented in Section 3.2.

Equivalent Fire Area 1.3.2 is provided with complete smoke detection which alarms in the control room (Figure B-2). This fire area does not contain fixed suppression. A hose station is located in adjacent Fire Zone 1.1.2.2.

The combustible loading in this area is less than 19,000 Btu/ft². Transient combustibles are limited by access to this high radiation area. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capabilities are provided, fixed fire suppression is not warranted in this fire area. An exemption is therefore requested for the Appendix R Section III.G.3 requirement for fixed suppression throughout this equivalent fire area.

3.4.4.2 Reactor Building - Isolation Condenser Pipe Chase Elevation 545 feet 6 inches (Fire Zone 1.1.2.5.C)

The north wall which separates this fire zone from the inerted drywell is a 3-hour rated fire barrier. The west, south, and east walls of this fire zone are

constructed of 3-hour rated reinforced concrete with all penetrations sealed to a 3-hour rating. Access to this zone is through a 3-hour rated door located in the east wall. The floor of this zone which is part of the ceiling of Fire Zone 1.1.2.2 is constructed of reinforced concrete with all penetrations sealed to a 3-hour rating. The ceiling of this zone is open metal grating to Fire Zone 1.1.2.5.B. There is a ladder which leads through the grating for access to manually operated valves.

This zone and Fire Zone 1.1.2.5.B are part of the same shutdown path.

The fire zone is not provided with fire detection or fixed suppression. A hose station is available in adjacent Fire Zone 1.1.2.3 for use in this zone. In-situ combustibles are not present in the zone. Transient combustibles are limited by access to the high radiation area and administrative procedures. A fire on this elevation of the pipe chase would be detected by the fire detection system in Fire Zone 1.1.2.5.A above. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and manual fire suppression capabilities are provided, fire detection and fixed fire suppression are not warranted in this area. An exemption is requested from Appendix R Section III.G.3 requirement for fixed detection and suppression throughout this zone.

3.4.4.3 Reactor Building - Isolation Condenser Pipe Chase Elevation 570 feet
0 inch (Fire Zone 1.1.2.5.B)

The north wall which separates this zone from the inerted drywell is a 3-hour rated fire barrier. The west, south, and east walls of this zone are 3-hour rated fire barriers which separate it from Fire Zone 1.1.2.4. Access to this zone is through a 3-hour rated door located in the east wall. The floor and ceiling of this zone consist of open metal grating to Fire Zones 1.1.2.5.C and 1.1.2.5.A, respectively. A ladder provides personnel access from Fire Zone 1.1.2.5A and down to Fire Zone 1.1.2.5.C.

This fire zone is not provided with fire detection or fixed suppression. In-situ combustibles are negligible in this fire zone. Transient combustibles are limited by access to this high radiation area. A fire on this elevation of the

pipe chase would be detected by the fire detection system in Fire Zone 1.1.2.5.A above. This fire zone along with Fire Zones 1.1.2.5.A and 1.1.2.5.C all use the same shutdown path which is external to these zones. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers, fire detection and fixed fire suppression are not warranted in this area. An exemption is requested from Appendix R Section III.G.3 requirement for fixed detection and suppression throughout this zone.

3.4.4.4 Reactor Building - Reactor Floor - South Elevation 589 feet 0 inch (Fire Zone 1.1.2.5.A)

The south and east walls of this fire zone are constructed of reinforced concrete. The north wall separates this zone from the fuel pool, the dryer-separator storage pool, the inerted drywell and Fire Zone 1.1.2.5.D. This reinforced concrete wall is 3-hour rated and contains a 3-hour rated door which leads to Fire Zone 1.1.2.5.D. The west wall is a 3-hour fire barrier and separates this fire zone from the Unit 3 reactor building. The floor of this zone is constructed of 3-hour rated reinforced concrete with all mechanical and electrical penetrations sealed to a 3-hour rating except for HVAC ducts, a mechanical penetration area, a 20-foot x 20-foot hatchway, a stairwell, and a ladder opening. These openings are provided with an automatic closed head water curtain or wet pipe sprinkler to provide an equivalent 3-hour barrier. The ceiling is constructed of 3-hour reinforced concrete and has all electrical penetrations sealed to a 3-hour rating. Unsealed mechanical penetrations and HVAC ducts without fire dampers are present in the ceiling as well as a 20-foot x 20-foot unsealed hatchway and a stairwell which lead to Fire Zone 1.1.2.6. These latter two openings are protected with an automatic closed head water curtain to provide an equivalent 3-hour barrier.

This zone is connected through the floor by open metal grating to Fire Zones 1.1.2.5.B and 1.1.2.5.C. For a fire in these zones, alternate shutdown path C which is independent of these zones could be used.

This fire zone is provided with complete fire detection (Figure B-5), manual hose stations, and equivalent 3-hour barriers using water curtains to and wet pipe

sprinklers to provide an equivalent level of protection around openings. The detection system alarms in the control room. The fire zones directly above and below this zone are 1.1.2.6 and 1.1.2.4 which have fire loads less than 500 Btu/ft² and 5000 Btu/ft², respectively. The combustible loading in this zone is less than 1000 Btu/ft². Transient combustibles are limited by administrative control. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capabilities are provided, fixed fire suppression is not warranted in this area. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed suppression throughout this zone.

3.4.5 Conclusions

Based on the protection described above, the ability to safely shut down the plant is assured and the intent of Appendix R is satisfied. The technical bases that justify the exemption requests from the Appendix R Section III.G.3 requirement for fixed detection and suppression throughout Zones 1.1.2.5.B and 1.1.2.5.C and fixed suppression throughout equivalent Fire Area 1.3.2 and Fire Zone 1.1.2.5.A are summarized as follows:

1. Automatic fire detection installed in Fire Zone 1.1.2.5.A will provide adequate warning of fire which might occur in any of the three connected fire zones (1.1.2.5.A, 1.1.2.5.B or 1.1.2.5.C).
2. Manual hose stations and portable fire extinguishers are available in and adjacent to Fire Zone 1.1.2.5.A and adjacent to Fire Zones 1.1.2.5.B, 1.1.2.5.C, and equivalent Fire Area 1.3.2.
3. The HPCI/LPCI method of shutdown does not depend on any equipment or cabling located in Fire Zones 1.1.2.5.A, 1.1.2.5.B, 1.1.2.5.C, or equivalent Fire Area 1.3.2 and is separated from them by equivalent 3-hour rated fire barriers.
4. Complete fire detection is provided for equivalent Fire Area 1.3.2 which is completely enclosed with equivalent 3-hour barriers as justified in Section 3.2.

5. All penetrations to Fire Area RB2-I (1.1.2.5.A, 1.1.2.5.B, 1.1.2.5.C, and 1.3.2) are sealed to a 3-hour rating except for those identified in Sections 3.2 and 3.3.
6. The combustible loading in Fire Zones 1.1.2.5.A, 1.1.2.5.B, and 1.1.2.5.C is negligible (less than 1,000 Btu/ft²) and does not, therefore, warrant fixed suppression throughout these zones.

TABLE 3.4-1
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB2-I

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.3.2</u>	
None	Not Applicable
<u>Fire Zone 1.1.2.5.A</u>	
Unit 2 Isolation Condenser (IC)	A, A2, B1, E
IC Valve M02-1301-10	A, A2, B1, E
IC Valve M02-4102	A, A2, B1, E
IC Valve A02-1301-17	A, A2, B1, E
IC Valve A02-1301-20	A, A2, B1, E
<u>Fire Zone 1.1.2.5.B</u>	
IC Valve M02-1301-2	A, A2, B1, E
<u>Fire Zone 1.1.2.5.C</u>	
IC Valve M02-1301-3	A, A2, B1, E

3.5 JUSTIFICATION FOR LACK OF COMPLETE DETECTION AND SUPPRESSION IN FIRE AREA RB2-II

3.5.1 Introduction

Fire Area RB2-II in the reactor building contains cables and equipment associated with HPCI/LPCI method of shutdown. Isolation condenser shutdown path B1 (see Section 2.0 for description) has been identified as a method to bring the plant to hot shutdown independent of equipment and cabling in Fire Area RB2-II (Figure A-2). Fire Zone 1.1.2.6 of RB2-II has the normal shutdown path A identified as the primary shutdown path. Because alternative shutdown is utilized for this fire area, Appendix R requires that fire detection and fixed fire suppression be present throughout the fire area. However, as the subsequent analysis demonstrates, the existing fire protection features provide a level of protection which ensures that any fire will be quickly detected and extinguished. Additional detection and suppression systems would not significantly enhance the level of safety at Dresden.

Reactor Building Fire Area RB2-II is composed of the following fire zones:

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
1.1.2.1	Reactor Building - Basement Floor Elevation 476 feet 6 inches
1.1.2.2	Reactor Building - Ground Floor Elevation 517 feet 6 inches
1.1.2.3	Reactor Building - Mezzanine Floor Elevation 545 feet 6 inches

1.1.2.4	Reactor Building - Main Floor Elevation 570 feet 0 inch
1.1.2.5.D	Reactor Building - Reactor Floor North Elevation 589 feet 0 inch
1.1.2.6/1.1.1.6	Reactor Building - Refueling Floor Elevation 613 feet 0 inch
11.2.1	Reactor Building Southwest Corner Room Elevation 476 feet 6 inches
11.2.2	Reactor Building Southeast Corner Room Elevation 476 feet 6 inches

Fire Zones 1.1.2.5.D (reactor building - reactor floor elevation 589 feet 0 inch) and 1.1.2.6/1.1.1.6 (refuel floor) have no equipment or cabling associated with hot safe shutdown.

These fire zones are shown on Figures B-1 through B-6. The specific descriptions of these fire zones which contain the fire barrier description, fire loading of each zone, safety-related equipment, and suppression and detection capabilities located in each zone are contained in the Fire Hazards Analysis Section of this exemption request.

3.5.2 Fire Protection System

All of the fire zones contained in this fire area with the exception of 1.1.2.1, 1.1.2.3, 1.1.2.5.D, and 1.1.2.6 have fire detection provided throughout the zone which alarms in the control room. Appendix B contains figures showing fire protection systems installed in Fire Area RB2-II. Fire Zone 1.1.2.1 has linear

thermal detection in and under the cable tray in the zone which alarms in the control room. This type of fire detection is provided to rapidly identify a fire either involving or exposing the cabling, which represents the only fixed combustible in the zone. Fire Zone 1.1.2.3 has complete fire detection except for the regenerative and non-regenerative heat exchanger rooms which are separated from the rest of the fire zone by floor to ceiling shield walls. Fire Zone 1.1.2.5.D has local fire detection above the standby liquid control system pumps which contain the only significant combustible in the zone. There is no safe shutdown equipment or cabling in Fire Zone 1.1.2.5.D. This local detection would detect a fire in the zone and alarm in the control room.

There is no fire detection present in Fire Zone 1.1.2.6/1.1.1.6 because ceiling level detectors would be ineffective due to the negligible in-situ combustibles present (less than 1000 Btu/ft²) and the height of the ceiling on the refueling floor (45 feet). During normal operations there is a limited amount of transient combustibles present on the refueling floor. Transient combustibles are carefully evaluated and controlled by administrative procedure. The major sources of transient combustibles are associated with outages. No safe shutdown cabling or equipment are located on the refueling floor.

The fire zones which comprise Fire Area RB2-II do not contain fixed suppression. Hose stations and fire extinguishers are available to each fire zone.

A fire will be identified in the initial stages of development by the extensive fire detection system in this fire area, will be acted upon immediately by the fire brigade with manual fire protection equipment provided, and can not affect equipment or cabling associated with the alternate shutdown path which is separated with an equivalent 3-hour rated fire barrier. Combustible loadings are reasonably uniform and range from 200 Btu/ft² to 22,000 Btu/ft² within the fire area. An equivalent 3-hour barrier is provided between alternate shutdown paths with the exception of the power and control feeds to the inboard isolation condenser valves. The deviation is justified in Section 3.7. Detection is

provided for all fire zones except for those previously identified. For these reasons, the existing fire protection features are adequate and the addition of fixed suppression throughout Fire Area RB2-II is unwarranted.

3.5.3 Safe Shutdown Equipment

Appendix R hot shutdown equipment located in this fire area and the shutdown path which utilizes the equipment are listed by fire zone in Table 3.5-1. Hot shutdown can be achieved and maintained independent of Fire Area RB2-II utilizing the isolation condenser shutdown path B1. All equipment and cabling necessary for hot shutdown utilizing the B1 path are separated by an equivalent 3-hour fire barrier. The only exception to 3-hour barrier separation involves the power and control feeds for the inboard isolation condenser valves. Justification for this exception is presented in Section 3.7. Safe shutdown equipment and cables are identified on the F drawings Sheet 2 for isolation condenser shutdown path B1 and Sheet 3 for HPCI/LPCI shutdown path.

3.5.4 Fire Hazards Analysis

3.5.4.1 Reactor Building - Basement Floor Elevation 476 feet 6 inches (Fire Zone 1.1.2.1)

The north, south, and east walls of this fire zone form the exterior of the plant. The floor of this fire zone is the baselab of the reactor building. The west wall separates Fire Zone 1.1.2.1 (Unit 2) from Fire Zone 1.1.1.1 (Unit 3). This wall is made of 3-hour rated reinforced concrete with all penetrations sealed to a 3-hour rating. This wall contains an unrated door which connects the Unit 2 and 3 reactor building equipment drain tank rooms. Both equipment drain tank rooms are separated from the torus areas of the basement by a reinforced concrete wall containing the unrated door. The combustible loading in the drain tank room and torus area is very light (less than 1000 Btu/ft²).

The ceiling of Fire Zone 1.1.2.1 is of reinforced concrete construction. All penetrations through the ceiling which enter equivalent Fire Area 1.3.2 have 3-hour rated fire seals except as detailed in Section 3.2. All electrical pene-

trations through the ceiling into Fire Zone 1.1.2.2 are sealed. The ceiling also contains pipe penetrations in the reactor building drain tank room, which are provided with noncombustible seals, leading to the turbine building. The ceiling is not rated because of the unsealed mechanical penetrations leading to Fire Zones 1.1.2.2 and 8.2.5.C.

Fire Zone 1.1.2.1 borders the inerted drywell (Fire Area 1.2.2), Fire Zone 1.1.1.1 and the LPCI pump rooms (Fire Zones 11.2.1 and 11.2.2). The LPCI pump rooms are separated from the torus area by a wall constructed of reinforced concrete which contains unsealed penetrations. The wall bordering Fire Zone 1.1.1.1 is 3-hour rated except as stated above.

Fire Zone 1.1.2.1 contains linear thermal detection in and under the cable trays which alarms in the control room (Figure B-1). Manual suppression is available in the fire zone in the form of both hose stations and portable fire extinguishers.

Since the alternate shutdown path is separated by equivalent 3-hour rated fire boundaries, fire detection and manual fire suppression capability is available, and combustible loading is small and controlled, fixed fire suppression is unwarranted in this zone. An exemption is requested from Appendix R Section III.G.3 requirement for fixed fire protection throughout this zone.

3.5.4.2 Reactor Building - Elevation 517 feet 6 inches (Fire Zone 1.1.2.2)

The south and east walls of this zone are constructed of reinforced concrete. The portion of these walls which contact the airlocks leading to Fire Zone 9.0.C and 8.2.5.A are 3-hour rated. The north and west walls are constructed of reinforced concrete and have a 3-hour rating. The latter walls separate the ground floor of the reactor building from the turbine building and Unit 3 reactor building, respectively. Fire Zone 1.1.2.2 surrounds the drywell (Fire Area 1.2.2) and equivalent Fire Area 1.3.2 (shutdown cooling pump area). Both of these fire areas have 3-hour rated walls, doors and penetrations which separate them from Fire Zone 1.1.2.2. The floor of Fire Zone 1.1.2.2 is the ceiling of Fire Zone 1.1.2.1 and a description of the construction can be found in the

previous subsection. The ceiling of Fire Zone 1.1.2.2 is the floor of both Fire Zones 1.1.2.3 and 1.1.2.5.C. Separation of Fire Zone 1.1.2.2 from Zone 1.1.2.5.C above is provided by complete 3-hour rated barrier. The rest of the ceiling is constructed of reinforced concrete containing stairwells, hatches, and unsealed mechanical penetrations.

Fire Zone 1.1.2.2 is provided with complete fire detection which alarms in the control room (Figure B-2). This fire zone also has hose stations and fire extinguishers available.

The combustible loading in this zone is less than 21,000 Btu/ft² and is uniformly distributed. Transient combustibles on this floor are controlled by administrative procedures. Reactor pressure and level instrumentation are located in this fire zone. A separate exemption request to justify separation of reactor level and pressure instruments is found in Section 3.6.

MCC's 28-7 and 29-7 are located in this fire zone. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

Since the alternate shutdown path is separated by equivalent 3-hour rated fire barriers, the zone has complete fire detection to provide early warning of a fire, and manual fire protection equipment is available to aid prompt response and control of any fire, fixed fire suppression is unwarranted throughout this zone. An exemption is requested from Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

3.5.4.3 Reactor Building - Elevation 545 feet 6 inches (Fire Zone 1.1.2.3)

The south and east walls of this fire zone are made of reinforced concrete. The north and west walls of the fire zone are made of reinforced concrete and have a 3-hour fire rating except for the HVAC duct without a fire damper located in the north wall. The north and west walls separate this fire zone from the turbine building and Unit 3 reactor building, respectively. The floor of this fire zone

is the ceiling of Fire Zone 1.1.2.2 and equivalent Fire Area 1.3.2. A description of the ceiling of Fire Zone 1.1.2.2 can be found in the previous subsection. The section of floor above Fire Area 1.3.2 is an equivalent 3-hour rated fire barrier as described in Section 3.2. The ceiling of this fire zone (1.1.2.3) is constructed of reinforced concrete but contains unsealed mechanical penetrations, an equipment hatch, and two unprotected stairwells. All electrical penetrations through the ceiling are sealed. At the outer boundaries of this fire zone are Fire Area 1.2.2 (inerted drywell) and Fire Zone 1.1.2.5.C. The walls separating these fire zones are made of 3-hour fire barriers. The door leading to Fire Zone 1.1.2.5.C has a 3-hour fire rating. (Reactor level and pressure instrumentation is located in this zone on the east and south sides of the drywell. A separate exemption request justifying separation of RPV instrumentation is presented in Section 3.6.)

Fire Zone 1.1.2.3 is provided with complete fire detection throughout the zone (except for the heat exchanger area) which alarms in the control room (Figure B-3). This fire zone is equipped with manual hose stations and fire extinguishers.

The combustible loading in this zone is less than 17,000 Btu/ft² and is uniformly distributed. Transient combustibles on this floor are controlled by administrative procedure.

Switchgear 23-1 and 24-1 are located in this fire zone. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area. Water shields are installed above switchgears 23-1 and 24-1 to protect them from the water curtain suppression system located at the ceiling of the 589 feet 0 inch and 570 feet 0 inch elevations.

Since the alternate shutdown path is separated by equivalent 3-hour rated fire barriers and complete fire detection and manual fire suppression capability is available, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

3.5.4.4 Reactor Building - Elevation 570 feet 0 inch (Fire Zone 1.1.2.4)

The south and east walls of this fire zone are made of reinforced concrete. The north and west walls of the fire zone are made of reinforced concrete and are 3-hour fire rated fire barriers except for an HVAC duct located in the north wall which does not contain a fire damper. The north and west walls separate this fire zone from the turbine building and the Unit 3 reactor building, respectively. The floor of this zone is the ceiling of Fire Zone 1.1.2.3. A description of the ceiling of Fire Zone 1.1.2.3 can be found in the previous subsection. The ceiling of Fire Zone 1.1.2.4 has penetrations and openings to Fire Zone 1.1.2.5.A and Fire Zone 1.1.2.5.D. The penetrations leading to Fire Zone 1.1.2.5.A have been sealed to a 3-hour rating except for a mechanical penetration area. The openings in the ceiling which lead to Fire Zone 1.1.2.5.A consist of a 20-foot x 20-foot hatch opening, a stairwell, HVAC ducts without fire dampers and a ladder opening. To protect Fire Zone 1.1.2.5.A from a fire in this fire zone (1.1.2.4), an automatic thermally activated preaction water curtain is installed around the former two openings and a wet pipe sprinkler system around the latter two to provide an equivalent 3-hour fire barrier. The mechanical penetrations and openings in the ceiling which lead to Fire Zone 1.1.2.5.D are not sealed since no safe shutdown cabling or equipment associated with alternative shutdown path B1 is located in that fire zone. Adjacent to Fire Zone 1.1.2.4 are Fire Area 1.2.2 and Fire Zone 1.1.2.5.B. The walls separating these areas from Fire Zone 1.1.2.4 are 3-hour rated fire barriers. The access door to Fire Zone 1.1.2.5.B has a 3-hour rating.

Fire Zone 1.1.2.4 is provided with complete fire detection throughout the zone and manual suppression (Figure B-4). The detectors alarm in the control room. Hose stations and portable fire extinguishers are available for local suppression of a fire.

The combustible loading, less than 5,000 Btu/ft² is uniformly distributed. Transient combustibles in this fire zone are controlled by administrative procedure.

Switchgears 28 and 29 and 250 Volt DC MCC's 2A and 2B are located in this fire zone. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area. Water shields are installed above switchgears 28 and 29 to protect them from the water curtain suppression system located at the ceiling of the 589 feet 0 inch and 570 feet 0 inch elevations.

Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capability is available, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

3.5.4.5 Reactor Building - North Elevation 589 feet 0 inch (Fire Zone 1.1.2.5.D)

The west and north walls of this zone are made of reinforced concrete and separate this fire zone from the Unit 3 reactor building and turbine building, respectively. The east wall is constructed of reinforced concrete. The south wall separates this zone from Fire Area 1.2.2 and Fire Zone 1.1.2.5.A (drywell and isolation condenser floor). These walls are 3-hour rated fire barriers except for an HVAC duct without a fire damper in the north wall. The access doors through the walls are 3-hour rated. The floor of this fire zone constitutes part of the ceiling of Fire Zone 1.1.2.4. A description for the ceiling of Fire Zone 1.1.2.4 can be found in the previous subsection. The ceiling of Fire Zone 1.1.2.5.D is constructed of reinforced concrete and contains an open stairwell and unsealed mechanical penetrations.

The combustible loading in this zone is less than 2000 Btu/ft². Transient combustibles are controlled by administrative procedures. Fire detection is provided in the vicinity of the standby liquid control equipment in this zone (Figure B-5).

Since there is no safe shutdown equipment or cabling located in this fire zone an exemption is requested from Appendix R Section III.G.3 requirement for fixed suppression and detection throughout this zone.

3.5.4.6 Reactor Building - Refueling Floor Elevation 613 feet 0 inch (Fire Zones 1.1.2.6 and 1.1.1.6)

The Unit 2 (Fire Zone 1.1.2.6) and the Unit 3 (Fire Zone 1.1.1.6) refueling floors are not separated from each other by any wall or fire barrier. The south, east, and west walls as well as the ceiling are made of unprotected steel siding supported by unprotected steel columns. The north wall of the refueling floor is a 3-hour rated fire barrier only from plant elevation 613 feet 0 inch to elevation 622 feet 0 inch. Above elevation 622 feet 0 inch, the wall is made of steel siding supported by unprotected steel columns. This wall separates the reactor building from the turbine building. The floor of the refueling floor is the ceiling of Fire Zones 1.1.2.5.A and 1.1.2.5.D. The ceiling of Fire Zone 1.1.2.5.D is described in the previous subsection. The portion of the floor which acts as a ceiling of Fire Zone 1.1.2.5.A has unsealed mechanical penetrations and HVAC ducts without fire dampers. There is a 20-foot x 20-foot equipment hatch as well as a stairwell which are open between Fire Zones 1.1.2.6 and 1.1.2.5.A. These openings are protected by an automatic thermally activated preaction water curtain to provide an equivalent 3-hour fire barrier between Fire Zone 1.1.2.5.A and the refueling floor.

The refueling floor is provided with manual hose stations and fire extinguishers. Fire detection is not installed on this floor because the height of the ceiling is approximately 45 feet and installed detectors would be ineffective with the minimal fixed combustibles present (see discussion under Subsection 3.5.2, Fire Protection System). The combustible loading of the entire refueling floor is less than 1000 Btu/ft². Transient loads are controlled by administrative procedures.

Since there is no safe shutdown cabling or equipment located on the refueling floor an exemption is requested from Appendix R Section III.G.3 requirement for fixed suppression and detection throughout this zone.

3.5.4.7 Reactor Building - Southwest Corner Room Elevation 476 feet 6 inches
(Fire Zone 11.2.1)

The south wall of this fire zone is made of reinforced concrete. The west wall separates this fire zone from Fire Zones 11.1.2 and 11.2.3. This wall is made of reinforced concrete with all penetrations sealed and constitutes a 3-hour rated fire barrier except for an HVAC opening which does not contain a fire damper. See Section 3.3.4.2. The north wall of this fire zone is slanted between the south and west wall. The wall is constructed of reinforced concrete and contains a watertight door and unsealed penetrations. The floor of this fire zone is the base slab of the plant. The ceiling of this fire zone is constructed of reinforced concrete but has unsealed penetrations (concrete plugs, checkered plate hatch covers, and an unprotected stairwell opening).

The fire zone is provided with fire detection throughout (Figure B-1). The detectors alarm in the control room. A hose station and fire extinguishers are also provided in the zone.

Transient fire loadings are controlled through administrative procedures. The combustible loading in the fire zone is less than $22,000 \text{ Btu/ft}^2$. Since the alternate shutdown path is separated by equivalent 3-hour rated fire barriers and complete fire detection and manual fire suppression capability is available, fixed fire suppression is unwarranted in this zone. An exemption is requested from Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

3.5.4.8 Reactor Building - Southeast Corner Room Elevation 476 feet 6 inches
(Fire Zone 11.2.2)

The south and east walls of this fire zone are constructed of reinforced concrete. The north wall is slanted between the east and south walls. This wall is constructed of reinforced concrete and contains a water-tight door. The floor of this fire zone is the base slab of the reactor building. The ceiling of this zone is constructed of reinforced concrete which contains an open stairwell, hatches sealed by concrete plugs, and checkered plate. The ceiling also contains unprotected HVAC ducts and sealed cable penetrations.

This fire zone is provided with complete fire detection throughout the zone, a hose station, and a portable fire extinguisher (Figures B-1). The detectors alarm in the control room.

The fire loading in this fire zone is less than 15,000 Btu/ft². Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capability is available, fixed fire suppression is unwarranted in this zone. An exemption is requested from Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

3.5.5 Conclusions

Based on the protection described above, the ability to safely shut down the plant is assured and the intent of Appendix R is satisfied. The technical bases that justify the exemption requests for Appendix R Section III.G.3 requirements for fixed suppression throughout the specified fire zones are summarized as follows:

1. Automatic fire detection is installed in all fire zones containing safe shutdown equipment or cabling.
2. Manual hose stations and portable fire extinguishers are available for use in all fire zones.
3. The isolation condenser method of shutdown used in the event of a fire in one of the above zones does not depend on any equipment or cabling located in these zones and is separated from them by an equivalent 3-hour rated fire barrier.
4. All penetrations leading to Fire Area RB2-I are sealed to a 3-hour rating except as described in Sections 3.2 and 3.3.
5. The major openings between Fire Zone 1.1.2.5.A (RB2-I) and the adjacent RB2-II fire zones are protected by an automatic preaction water curtain. In

addition the combustible loading of these adjacent fire zones is very low (less than 5000 Btu/ft²), therefore complete fixed suppression is not warranted. (The maximum combustible loading in the reactor building fire zone not protected by a fixed suppression system is less than 22,000 Btu/ft².)

6. The inadvertent operation of a fixed water suppression system in this area could result in fault or failure of major electrical equipment located in the area which would degrade plant safety.

TABLE 3.5-1
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB2-II

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.1.2.1</u>	
LPCI Valve M02-1501-13B	C
LPCI Valve M02-1501-18B	C
LPCI Valve M02-1501-19B	C
LPCI Valve M02-1501-20B	C
LPCI Valve M02-1501-38B	C
HPCI Valve M02-2301-5	C
<u>Fire Zone 1.1.2.2</u>	
480-V MCC 28-1	A,A1,A2,E
480-V MCC 29-1	C
480-V MCC 29-4	C
Local Mechanical Reactor Level Indicators	A2
Local Mechanical Reactor Pressure Indicators	A2
<u>Fire Zone 1.1.2.3</u>	
4-kV SWGR 23-1	A,A1,A2
4-kV SWGR 24-1	C,E
<u>Fire Zone 1.1.2.4</u>	
125-Vdc Reactor Building Distribution Panel	A,A1,A2,C,E
250-Vdc MCC 2A	A,C,E
250-Vdc MCC 2B	A,C,E
480-V SWGR 28	A,A1,A2,C,E
480-V SWGR 29	A,C,E
<u>Fire Zone 1.1.2.5.D</u>	
None	Not Applicable

TABLE 3.5-1 (Cont'd)

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.1.2.6</u>	
None	Not Applicable
<u>Fire Zone 11.2.1</u>	
HPCI Valve M02-2301-36	C
LPCI Emergency Air Cooler 2-5746B	C
LPCI Pump 2C	C
LPCI Pump 2D	C
LPCI Valve M02-1501-11B	C
LPCI Valve M02-1501-32B	C
LPCI Valve M02-1501-3B	C
LPCI Valve M02-1501-5C	C
LPCI Valve M02-1501-5D	C
<u>Fire Zone 11.2.2</u>	
None	Not Applicable

3.6 JUSTIFICATION FOR SEPARATION OF REDUNDANT INSTRUMENTATION

3.6.1 Introduction

Fire Area RB2-II in the reactor building contains redundant reactor pressure and reactor water level instrumentation. The instrumentation transmitters are located on four instrumentation racks. The instrumentation divisions are located on opposite sides of the drywell in the reactor building (Figure C-1). The requirements in Appendix R state that more than twenty feet of space free of intervening combustibles should exist between redundant divisions. In addition, detection and suppression should be installed throughout the fire area.

The subsequent analysis provides justification for an exemption to the above requirement. The bases of the justification is that a fire in Fire Zones 1.1.2.2 and 1.1.2.3 would not impact the ability of operators to monitor the reactor in the main control room through redundant instrumentation located in these zones.

3.6.2 Fire Protection System

These Fire Zones (1.1.2.2 and 1.1.2.3) which contain the redundant reactor pressure and reactor water level instrumentation racks and cables are provided with complete fire detection (except above the regenerative and non-regenerative heat exchangers), (Figures B-2 and B-3). These zones also have manual hose stations and fire extinguishers available in the event of a fire.

Switchgears 23-1, 24-1, and 480 Volt MCC's 28-7 and 29-7 are located in these fire zones. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in these areas.

3.6.3 Safe Shutdown Equipment

The redundant instrument racks 2202-7 and 2202-8 in Fire Zone 1.1.2.2 are located adjacent to the east and west sides of the inerted drywell (Figure C-1). These

racks contain redundant level transmitters to control room wide range level indicators LI2-263-106A and B. The instrument racks 2202-5 and 2202-6 in Fire Zone 1.1.2.3 are located on the east side of the inerted drywell and near the west wall of Fire Zone 1.1.2.5.C (Figure C-1). These racks contain redundant narrow range level transmitters and wide range pressure transmitters to control room indicators LI2-640-29A and B and PI2-640-25A and B. Each instrument rack contains local reactor pressure and reactor water level indication.

3.6.4 Fire Hazards Analysis

3.6.4.1 Fire Zone 1.1.2.2

Each of the instrument racks located in Fire Zone 1.1.2.2 contain local reactor pressure and reactor water level instrumentation. The instrument racks are located adjacent to the east and west sides of the inerted drywell. Redundant wide range reactor water level transmitters are also present on each of the instrument racks. The instrument racks and associated cabling are separated by a minimum of 100 feet on Fire Zone 1.1.2.2. (See Figure C-1.)

Fire Zone 1.1.2.2 has complete fire detection which alarms in the control room. Manual hose stations and fire extinguishers are available in the event of a fire in this fire zone. A fire in this fire zone would be identified in the initial stages of development by the extensive fire detection system and would be acted upon immediately by the fire brigade with the manual fire protection equipment provided.

The routing of the instrument cables from the wide level transmitters on elevation 517'6" is in conduit routed below the cable pans located near the ceiling as shown in Figure C-1. No cable trays are routed within 20 ft of the instrument racks and as electrical cable is the majority of the fire load in this zone, it is unlikely that both transmitters will be damaged by a fire. Fire stops are in the cable trays that cross between the Division I and II sides of the reactor building. These trays are lightly loaded.

There are several reasons why a fire originating in one division of instrumentation in Fire Zone 1.1.2.2 would not affect the redundant division in Fire

Zone 1.1.2.3 above. First, the floor between Fire Zone 1.1.2.2 and 1.1.2.3 is made of reinforced concrete with all electrical penetrations sealed. Second, the fire loading in this zone is less than 21,000 Btu/ft². Finally, the majority of the smoke from a fire in Fire Zone 1.1.2.2 would escape to higher building elevations up through the open 20 foot x 20 foot equipment hatch located on the south side of this fire zone.

As indicated in the above analysis, ample measures are in place to prevent the spread of fire from one side of this fire zone to the other such as the 100 feet horizontal separation, an extensive detection system with early alarming of a fire, and fire stops in the cable trays. Therefore, the addition of fixed suppression in this fire zone is unwarranted.

3.6.4.2 Fire Zone 1.1.2.3

The instrument racks 2202-5 and 2202-6 located in this fire zone contain redundant divisions of reactor wide range pressure and reactor narrow range water level transmitters. The instrument racks are located adjacent to the east side of the inerted drywell and the west side of Fire Zone 1.1.2.5.C (Figure C-1). The minimum separation between the redundant instrument racks and cables is 75 feet. The reactor pressure and reactor water level instrument cables are routed from the transmitters to dedicated cable trays which run along the east and west walls of this zone (approximately 150 feet apart).

The major source of combustible material in this fire zone is contained in cable insulation and the 4kV switchgear. Fire stops are installed in the lightly loaded cable trays to impede the spread of a fire along the intervening cable tray system. Since, fire stops are installed in the cable trays which run in the proximity of the instrument racks, a fire is not likely to disable both divisions of instrumentation located in this fire zone.

In the unlikely event that both divisions of reactor pressure and reactor water level transmitters in this fire zone are disabled by fire, local reactor pressure and reactor water level indicators are installed on the instrument racks located in Fire Zone 1.1.2.2 below. This fire zone would remain free from the effects of a fire in Fire Zone 1.1.2.3 because all of the electrical penetrations through

the reinforced concrete floor are sealed and there is no continuity between combustible material located on each floor.

Fire Zone 1.1.2.3 has an extensive fire detection system which would detect a fire in the early stages of development. This alarm would be immediately acted on by the fire brigade with the manual fire protection equipment provided in the form of hose stations and fire extinguishers located in this fire zone. The majority of smoke from a fire in Fire Zone 1.1.2.3 would escape up through the open equipment hatch located on the south side of this fire zone. The fire loading in this fire zone is less than 17,000 Btu/ft².

The above analysis indicates that because of the extensive fire detection available for the early detection of a fire in the fire zone and the manual suppression systems available, automatic fixed suppression is unwarranted in this zone. In addition, redundant instrumentation is separated by a minimum of 75 feet with limited intervening combustibles (cables in cable trays); having fire stops to reduce fire spread. Also, local instrumentation in the fire zone below is available to the operators.

3.6.5 Conclusions

The previous analysis justifies an exemption request from the requirements of total area suppression and more than 20 feet of intervening space free from combustibles between redundant instrument trains. The technical bases that justify the exemption request are summarized as follows:

1. The minimum distance between divisions of reactor pressure and reactor water level instrumentation is 75 feet in Fire Zone 1.1.2.3 and 100 feet in Fire Zone 1.1.2.2. Therefore at least one division of instrumentation will be available in the control room for a fire in the reactor building.
2. The routing of the reactor pressure and reactor water level instrument cables is from the racks to the dedicated cable trays or in conduit supported from cable trays.
3. Local reactor pressure and reactor water level instrumentation are available on the instrument racks in each of the two zones.

3.7 JUSTIFICATION FOR SEPARATION OF REDUNDANT ISOLATION CONDENSER CABLES

3.7.1 Introduction

There are two shutdown paths in the reactor building, the isolation condenser path B1 and the HPCI/LPCI path C. In the event of a fire in any of the fire zones which comprise one of the above shutdown paths, the alternate shutdown path could be used to shut down the reactor. The two shutdown paths are completely independent except for the redundant inboard isolation condenser valves power and control feeds. Appendix R requires that total area suppression and detection be installed throughout the fire area. The following analysis justifies the lack of total area suppression.

The normally open motor-operated inboard isolation condenser valves are located in the inerted drywell. The normal power and control feeds for these valves run from the main control room to MCC 28-1 located in Fire Zone 1.1.2.2, and from there into equivalent Fire Area 1.3.2 (shutdown cooling pump room) and into the containment. Since a fire in Fire Zone 1.1.2.2 which uses isolation condenser shutdown path B1 could cause possible spurious operation of these valves resulting in possible cut-off of flow to or from the isolation condenser, alternate power and control feeds have been installed. These feeds are routed from DG-2/3 to Unit 3 MCC 38-1. From the MCC, the cables are routed through the Unit 3 reactor building and into a 1-hour rated fire wrapped conduit in the Unit 2 Fire Zone 1.1.2.1. The cables then pass through Fire Zone 1.1.2.1, and into equivalent Fire Area 1.3.2 (Figure C-3). Fire Zone 1.1.2.1 contains cabling and equipment for the HPCI/LPCI shutdown path.

3.7.2 Fire Protection System

The alternate power and control feeds from Unit 3 MCC 38-1 are routed in a rated 1-hour wrapped conduit through Fire Zone 1.1.2.1 (Unit 2 Torus Area). Fire Zone 1.1.2.1 has linear thermal detectors in and under the cable trays. Fire Zone 1.1.2.2 (Unit 2 ground floor area) has complete detection which alarms in the main control room. Fire Zones 1.1.1.2, 1.1.2.1, 1.1.2.2 and 1.3.2 contain the

main or alternate inboard isolation condenser valves power and control feeds and have manual hose stations and fire extinguishers available.

3.7.3 Safe Shutdown Equipment

The Appendix R hot shutdown equipment discussed in this justification consists of a) the main and alternate power and control feed, and b) the MCC power feed for the inboard isolation condenser valves. The alternate power and control feed is routed in a rated 1-hour wrapped conduit through Fire Zone 1.1.2.1 from MCC 38-1. The main power and control feed is located in Fire Zone 1.1.2.2 and is connected to MCC 28-1 also in the fire zone.

3.7.4 Fire Hazards Analysis

A fire in Fire Zone 1.1.2.2 could potentially damage the normal power and control feeds causing spurious closure of these normally open valves.

Closure of these valves would make the isolation shutdown path B1, normally used in the event of a fire in Fire Zone 1.1.2.2, inoperable. To recover from this possible spurious operation, separate power and control feeds from DG-2/3 have been added. These cables are routed in a rated 1-hour wrapped conduit through Fire Zone 1.1.2.1 (the torus area which contains cables and equipment used in the HPCI/LPCI shutdown method) and into equivalent Fire Area 1.3.2 which contains only cabling associated with the isolation condenser shutdown path (Figure C-3). The conduit is routed separately from the major source of combustibles in Fire Zone 1.1.2.1, the cable insulation. The fire loading in Fire Zone 1.1.2.1 is less than 1000 Btu/ft². The controls located in the DG-2/3 room enable an operator to reopen a spuriously closed valve. 1

Both Fire Zones 1.1.2.1 and 1.1.2.2 are equipped with manual hose stations and fire extinguishers. Transient loads are controlled by administrative procedures. An exemption is requested from Appendix R Section III.G.3 requirement for fixed suppression throughout the zone.

3.7.5 Conclusions

This analysis justifies exemption from complete fire suppression in the area between alternate shutdown cables. Justification for this is as follows:

1. The alternate inboard isolation condenser valves power and control feeds are protected with a rated 1-hour fire wrap throughout their routing in Fire Zone 1.1.2.1.
2. The routing of the conduit in Fire Zone 1.1.2.1 is separated from the cable trays which represent the only major combustible in this fire zone (Figure C-3).
3. The combustible loading in Fire Zone 1.1.2.1 is negligible (less than 1,000 Btu/ft²).
4. Fire detection in the form of linear thermal detectors which alarm in the main control room is installed in and under the cable trays in Fire Zone 1.1.2.1.
5. Manual hose stations and portable fire extinguishers are available in both Fire Zones 1.1.2.1 and 1.1.2.2.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 3.8, Justification for separation between mechanical components of Redundant Cold Shutdown Systems). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

3.8 JUSTIFICATION FOR SEPARATION BETWEEN MECHANICAL COMPONENTS OF REDUNDANT COLD SHUTDOWN SYSTEMS

3.8.1 Introduction

There are two shutdown methods which have been identified to bring Unit 2 to cold shutdown: shutdown cooling (SC) and Low Pressure Coolant Injection (LPCI). Of these SC has been identified as available throughout the turbine building and a majority of reactor building fire zones.

In the Unit 2 reactor building fire area, the shutdown cooling system can be used for cold shutdown in every fire zone except for the mezzanine floor, Fire Zone 1.1.2.3 (Fire Area RB2-II) and the shutdown cooling pump room, Fire Zone 1.3.2 (Fire Area RB2-I). On the mezzanine floor, the presence of the RBCCW pumps precludes the use of the shutdown cooling system. In the shutdown cooling pump room, the presence of the shutdown cooling pumps preclude the use of the shutdown cooling systems.

This exemption request justifies the presence of redundant mechanical cold shutdown equipment i.e., RBCCW and LPCI pumps and associated motors, in the same fire area. This equipment is separated by two floor elevations as well as horizontal separation. Only the analysis for availability of cold shutdown mechanical equipment (pumps and associated motors and valves) is involved. Electrical equipment within each of the reactor building fire areas i.e., RB2-I and RB2-II was assumed functionally disabled if a fire is postulated to occur anywhere within that fire area. The functional capability of mechanical equipment was assumed lost only if the fire occurred in the particular fire zone where the equipment is located except in two cases where the redundant valving is located in the fire zone of intended use. One of these valves are assumed to retain its manual operability. Subsection 3.8.4 provides justification for the separation between adjacent fire zones which assures the functional capability of at least one train of mechanical cold shutdown equipment. This equipment can be operated if a temporary feed from a power source in the other unit is provided.

3.8.2 Fire Protection System

The reactor building has complete fire detection except as listed below. The fire zones which do not have complete detection either contain no safe shutdown equipment or have very low fire loading, i.e., less than 1000 Btu/ft². The fire zones are:

- | | |
|-----------|--|
| 1.1.2.1 | Torus Basement |
| 1.1.2.5.B | Isolation Condenser Pipe Chase |
| 1.1.2.5.C | Isolation Condenser Pipe Chase |
| 1.1.2.6 | Refueling Floor |
| 1.1.2.3 | Mezzanine Floor (above heat exchanger area). |

3.8.3 Safe Shutdown Equipment

The cold shutdown mechanical equipment located in the reactor building is listed in Table 3.8-1.

3.8.4 Fire Hazards Analysis

The reactor building is divided into fire zones by floor elevations. These floor slabs present a substantial barrier to the spread of fire. However, they are not fire rated. The combustible loading is low and area-wide automatic fire detection would ensure that the fire was detected and extinguished before it spread to adjacent floor elevations disabling the mechanical components and their operators. The electrical penetrations through the floor are sealed. A 20-foot by 20-foot hatchway exists in each floor from elevation 545 feet 6 inch to elevation 613 feet 0 inch. This open path allows smoke and hot gases to escape to the refuel floor thus limiting the smoke damage to equipment above the fire zone containing the fire. Hose stations and manual fire extinguishers are located throughout the reactor building.

The location of the valving associated with the shutdown cooling and the LPCI methods of achieving cold shutdown are listed in Table 3.8-1. The valving is generally assumed to retain mechanical operability after fire. The major com-

ponents i.e., pumps and associated motors, of the LPCI/CCSW and the shutdown cooling methods of achieving cold shutdown are located in different fire zones. The pumps associated with the shutdown cooling method are located in Fire Zone 1.1.2.3 and 1.3.2 which do not adjoin Fire Zone 1.1.2.1 (which contains the LPCI pumps). The following provides justification for the separation between adjacent fire zones which assures the availability of these major components.

3.8.4.1 Fire Zone 1.1.2.3 (Elevation 545 feet 6 inches)

The cold shutdown equipment contained in this fire zone is listed in Table 3.8-1. The RBCCW pumps are located on the floor between column rows L-M and 39-40. The main combustible at the floor level is the 4kV switchgear which is located at least 15 feet from the pumps. The other major source of combustibles in this zone are cables in cable trays near the ceiling. The electrical penetrations through the floor and ceiling are sealed. Smoke and hot gases from a fire in this zone would escape up the 20-foot by 20-foot equipment hatch located between column rows M-N and 42-43. The pumps are located approximately 50 feet from the open hatch. The fire zone is provided with complete ionization detection except above the regenerative and nonregenerative heat exchanger area. The combustible load in this fire zone is less than 17,000 Btu/ft² and is composed mainly of cable in cable trays. There is no continuity of combustibles between zones and transient combustibles are controlled by administrative procedure. Therefore, a fire starting in this fire zone will not spread to adjacent zones. The LPCI pumps are approximately 70 feet below in Fire Zone 1.1.2.1 and no LPCI pumps or motors are located in the intervening Fire Zone 1.1.2.2.

3.8.4.2 Fire Zone 1.1.2.2 (Elevation 517 feet 6 inches)

The cold shutdown equipment contained in this fire zone is listed in Table 3.8-1. There is no mechanical equipment associated with the shutdown cooling method of achieving cold shutdown which has been identified for use in this fire zone.

This fire zone has complete fire detection which alarms in the control room. Hose stations and manual fire extinguishers are located in this fire zone. Fire Zone 1.3.2 which contains the shutdown cooling pumps is separated from this fire

zone by equivalent 3-hour barriers. The electrical penetrations in the floor and ceiling are sealed. Transient combustibles are controlled by administrative procedure and there is no continuity of combustibles between fire zones, therefore, a fire starting in this fire zone will not spread to adjacent fire zones. The majority of combustibles in this fire zone, cable in cable trays, are located near the ceiling. The only components of either cold shutdown method located in this fire zone are LPCI valves which can be manually operated.

3.8.4.3 Fire Zone 1.3.2 (Elevation 517 feet 6 inches)

This fire zone is separated from adjacent fire zones by equivalent 3-hour barriers. The cold shutdown equipment located in this fire zone is listed in Table 3.8.1.

3.8.4.4 Fire Zone 11.2.1 (Elevation 476 feet 6 inches)

The cold shutdown equipment in this zone is listed on Table 3.8-1. The LPCI pumps located in this zone are on the floor between column rows M-N and 43-44. This fire zone is protected by complete thermal fire detection. The combustible loading is less than 27,000 Btu/ft². The electrical penetrations through the ceiling are sealed. Smoke and hot gases from any fire in this zone would escape up the open stairwell in the ceiling and into the open hatchway which starts at the 545 foot 6 inch elevation. There is no continuity of combustibles and transient combustibles are administratively controlled. Therefore, a fire starting in this fire zone would not spread to adjacent fire zones. The major components, pumps and associated motors, of the shutdown cooling method of achieving cold shutdown are located in Fire Zone 1.3.2 which is surrounded by equivalent 3-hour barriers and Fire Zone 1.1.2.3 which is located approximately 70 feet above.

3.8.5 Conclusion

Based on the protection described above, the ability to safely achieve cold shutdown is insured and the intent of Appendix R for cold shutdown is satisfied. The separation of the redundant pumps, motors and valves ensure that one of the

two shutdown methods can be employed even though the cables to the pumps may be destroyed, because the motors of at least one of the independent trains will be unaffected by fire. Procedures have been developed to power the unaffected pumps from an unaffected 4kV power source. Justification for this is as follows:

1. The redundant cold shutdown mechanical components employed have approximately 70 feet vertical separation and 50 feet horizontal separation.
2. The floor elevation (Fire Zone 1.1.2.2) between these two fire zones has complete ionization detection and a fire loading of less than 21,000 Btu/ft².
3. There is no continuity of combustibles between Fire Zones 11.2.1, 1.1.2.2 and 1.1.2.3.

TABLE 3.8-1MECHANICAL COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 2 REACTOR BUILDING
FIRE AREAS RB2-I and RB2-IIFire Zone 1.1.2.1Shutdown Cooling

1. SC Valve M02-1001-5A
2. SC Valve M02-1001-5B
3. RBCCW Valve M02-3702
4. RBCCW Valve M02-3703

LPCI, Division II

1. LPCI Valve M02-1501-22B
2. LPCI Valve M02-1501-20B
3. LPCI Valve M02-1501-38B
4. LPCI Valve M02-1501-18B
5. LPCI Valve M02-1501-19B
6. LPCI Valve M02-1501-13B

Fire Zone 1.1.2.2LPCI, Division II

1. LPCI Valve M02-1501-21B

Fire Zone 1.1.2.3Shutdown Cooling

1. SC Heat Exchangers
2A-1003
2B-1003
2C-1003
2. RBCCW Pumps and Associated Motors
2A-3701
2B-3702
2/3-3701
3. RBCCW Heat Exchangers
2A-3702
2B-3702
2/3-3702

TABLE 3.8-1 (Cont'd)Fire Zone 1.1.2.3 (Cont'd)

4. RBCCW Valve M02-3701
5. RBCCW Valve M02-3704
6. Service Water Valve TCV-2-3904A
7. Service Water Valve TCV-2-3904B
8. Service Water Valve TCV-2-3904C
9. SC Valve M02-1001-4A
10. SC Valve M02-1001-4B
11. SC Valve M02-1101-4C

LPCI, Division II

1. LPCI Valve M02-1501-27B
2. LPCI Valve M02-1501-28B

Fire Zone 1.3.2Shutdown Cooling

1. SC Pumps and Associated Motors

2A-1002
2B-1002
2C-1002

2. SC Valves

M02-1001-2A
M02-1001-2B
M02-1001-2C

Fire Zone - 11.2.1LPCI, Division II

1. LPCI Pumps and Associated Motors

2C-1502
2D-1502

2. LPCI Emergency Air Cooler 2-5746B
3. LPCI Valve M02-1501-3B
4. LPCI Valve M02-1501-5C
5. LPCI Valve M02-1501-5D
6. LPCI Valve M02-1501-11B
7. LPCI Valve M02-1501-32B

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Part 2

4.0 UNIT 3 REACTOR BUILDING APPENDIX R EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Sections III.G.2, III.G.3 and III.L of Appendix R to the extent that the alternative shutdown capability criteria of III.G.2, III.G.3 and III.L would have to be met for the Fire Areas RB3-I and RB3-II of the Dresden 3 reactor building. CECo specifically requests exemption from:

1. The requirements of III.G.3 and III.L that the Fire Areas RB3-I and RB3-II be separated from each other and other fire areas by complete 3-hour barriers,
2. The requirement of III.G.3 that fire areas relying on alternate shutdown capability be provided with area fire detection and fixed area fire suppression, and
3. The requirement of III.G.2 for separation of (a) redundant instrumentation, (b) redundant isolation condenser valve power and control cables, and (c) redundant Unit 2 and Unit 3 power and control cables from DG 2/3.

The justifications for these exemptions are presented in the following sections:

<u>SECTION</u>	<u>JUSTIFICATION FOR:</u>
4.2	Lack of Complete 3-hour Fire Barriers Between Fire Areas
4.3	Lack of Complete Detection and Suppression in Fire Area RB3-I
4.4	Lack of Complete Detection and Suppression in Fire Area RB3-II
4.5	Separation of Redundant Instrumentation

4.0 UNIT 3 REACTOR BUILDING APPENDIX R EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Section III.G.3 and III.L of **Appendix R** to the extent that the alternative shutdown capability criteria of **III.G.3** and **III.L** would have to be met for the Fire Areas RB3-I and RB3-II of the **Dresden 3** reactor building. CECo specifically requests exemption from:

1. The requirements of III.G.3 and III.L that the Fire Areas RB3-I and RB3-II be separated from each other and other fire areas by complete 3-hour barriers,
2. The requirement of III.L.3 that safe cold shutdown equipment be independent of RB3-II.

The justifications for these exemptions are presented in the following sections:

<u>SECTION</u>	<u>JUSTIFICATION FOR:</u>
4.8	Lack of Complete 3-hour Barriers Around Fire Zone 1.4.1
4.9	Lack of Complete 3-hour Barriers Around Fire Zone 1.3.1
4.10	Availability of Cold Shutdown Equipment within RB3-II

- 4.6 Separation of Redundant Isolation Condenser Cables
- 4.7 Lack of Fire Suppression Between Redundant Power and Control Cables

4.1 REACTOR BUILDING AREA DESCRIPTION

The Unit 3 reactor building is separated into fire areas as shown on Figure A-1. All penetrations between fire areas containing different shutdown paths that are not fire rated are identified and justified in the exemption requests.

The Unit 2 and 3 reactor buildings are separated by a 3-hour fire barrier except for: A) an unrated door on elevation 476 feet 6 inches at column/rows G-44 which connects the Unit 2 and 3 reactor building equipment drain tank rooms, and (B) the refueling floor elevation 613 feet 0 inch which has no separation between units.

The Unit 3 reactor building is separated from the turbine building by 3-hour rated fire barriers except for HVAC ducts without fire dampers. Fire Area RB-2/3, i.e. Fire Zones 9.0.C (Diesel Generator 2/3 Room), 11.1.3 (Unit 3 HPCI Room), and 11.2.3 (Unit 2 HPCI Room), are separated from the Unit 3 reactor building by 3 hour rated fire barriers.

4 kV Bus ducts and standby gas treatment system ductwork penetrate the walls separating the reactor building the turbine building. These ducts do not contain fire seals or dampers.

As seen in Figure A-1, two hot shutdown paths are available in the reactor building. These are the isolation condenser method (A1) and HPCI/LPCI method (D).

The equipment and cabling associated with the HPCI/LPCI Method of shutdown are located below the 589 foot elevation. The isolation condenser, valves, equipment, and cabling necessary for the isolation condenser path are located on the 589 foot elevation (Fire Zone 1.1.1.5.A), in the isolation condenser pipe chase on elevation 545 feet 6 inches and 570 feet (Fire Zones 1.1.1.5.B and 1.1.1.5.C), in the TIP room (Fire Zone 1.4.1) on elevation 517 feet 6 inch and the turbine building. The areas which contain this isolation condenser equipment in the

reactor building do not contain any equipment or cabling associated with the HPCI/LPCI shutdown path, and are separated from adjacent zones by 3-hour rated fire barriers or their equivalent. Automatic thermally actuated preaction water curtains or wet pipe sprinklers are provided around the ladder, HVAC ducts and 20-foot x 20-foot open hatch which connects the fire zone containing the Unit 3 isolation condenser (Fire Zone 1.1.1.5.A, elevation 589 feet) and the zone below (Fire Zone 1.1.1.4, elevation 570 feet).

Power and control cables and their MCC's for the inboard and outboard isolation condenser valves, are contained in Fire Zone 1.1.1.2. Inboard isolation condenser valve alternate power and control feeds are routed through the 476 feet 6 inch elevation (Fire Zone 1.1.1.1) from Unit 2 MCC 28-1. A 1-hour rated fire resistive wrap is used to protect the alternate power and control feeds to these valves.

The isolation condenser path is available in every zone in the reactor building except Fire Zones 1.1.1.5.A, 1.1.1.5.B, 1.1.1.5.C and Fire Area 1.4.1. In these zones, the HPCI/LPCI shutdown path is available.

Detection is provided throughout the reactor building, except on the refuel floor, the standby liquid control tank area (Fire Zone 1.1.1.5.D) the regenerative and non-regenerative heat exchanger area (Fire Zone 1.1.1.3), the isolation condenser pipe chase and the torus basement (elevation 476 feet 6 inch). The torus is provided with linear thermal detection in and under cable trays. The combustible loading in this torus area is extremely low. Thermal detection is provided for Fire Zone 1.1.1.1 and 1.1.1.2. Localized detection is provided over the standby liquid control pumps in Fire Zone 1.1.1.5.D. Fire Zone 1.1.1.3 had complete detection except by the heat exchanger area. A fire in the isolation condenser pipe chase would be detected in Fire Zone 1.1.1.5.A. The regenerative and nonregenerative HX's are separated from the rest of Fire Zone 1.1.1.3 by thick shield walls which run from floor to ceiling. The refuel floor at elevation 613 feet 0 inch is common for Unit 2 and Unit 3 (Fire Zones 1.1.1.6/1.1.2.6) and is open to the isolation condenser floor at elevation 586 feet 0 inch (Fire Zone 1.1.1.5.A) below by way of the open 20-foot x 20-foot hatch, ladder, HVAC ducts without fire dampers, and unsealed mechanical pene-

trations. An automatic thermally actuated preaction water curtain is provided around the hatch. A wet pipe sprinkler is provided for the ladder and nearby HVAC ducts. This separates the fire zones with a barrier having an equivalent level of protection to a 3-hour fire barrier. The refuel floor contains no equipment or cabling associated with safe shutdown.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 4.2, Justification for lack of complete 3-hour fire barriers between fire areas). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

4.2 JUSTIFICATION FOR LACK OF COMPLETE 3-HOUR BARRIERS BETWEEN FIRE AREAS4.2.1 Introduction

The reactor building is divided into two fire areas as shown on Figure A-1. Each fire area is separated from all other fire areas by 3-hour rated or equivalent fire barriers. In the event of a fire in one fire area, an alternate shutdown method has been identified which does not use the equipment located in the affected fire area. The following analysis provides justification for the lack of complete 3-hour rated fire barriers between fire areas containing alternate shutdown paths as required in Appendix R.

The fire areas identified above are composed of fire zones with one of two shutdown paths available in the reactor building. The fire areas identified as RB3-I and RB3-II contain the following fire zones.

<u>RB3-I</u>	<u>RB3-II</u>
1.4.1	1.1.1.1
1.1.1.5.A	1.1.1.2
1.1.1.5.B	1.1.1.3
1.1.1.5.C	1.1.1.4
	1.1.1.5.D
	1.1.1.6/1.1.2.6
	11.1.1
	11.1.2
	1.3.1

In the event of a fire in Fire Area RB3-I, HPCI/LPCI shutdown path D has been identified as being free of fire damage (see description of shutdown paths in Section 2.0). For a fire in Fire Area RB3-II, isolation condenser shutdown path A1 has been identified as remaining free of fire damage. Fire Zone 1.1.1.6 of Fire Area RB3-II has normal shutdown path B as a primary shutdown path. Fire Zones 1.1.1.5.D and 1.1.1.6/1.1.2.6 have no equipment or cabling associated with either path.

4.2.2 Fire Protection System

Fire Areas RB3-I, and RB3-II are separated from each other by complete 3-hour rated fire barriers except for openings between Fire Zones 1.1.1.5.A, 1.1.1.4 below, 1.1.1.6 above, and Fire Zone 1.4.1 and 1.1.1.1. The opening between the latter two fire zones consists of mechanical penetrations with no continuity of combustibles present. Openings which exist between the remaining three fire zones consist of a 20-foot x 20-foot hatch, a ladder opening, HVAC ducts and unsealed mechanical penetrations. The hatch and ladder openings are surrounded by an automatic closed-head, preaction water curtain actuated by a linear thermal fire detection system or a wet pipe sprinkler. Fire Zones 1.1.1.5.A and 1.1.1.4 have fire detection throughout the zones. Low combustible loadings are present in each of the three zones connected by these openings. The detection and suppression systems installed within Fire Areas RB3-I and RB3-II are covered in Sections 4.3 and 4.4, respectively.

Fire Area RB3-II is separated from the turbine building by a 3 hour barrier except for an HVAC duct penetrating the wall to the western zone group standby gas treatment system piping, 4kV bus ducts and 2 HVAC ducts penetrating to the turbine building vent floor. These ducts do not have fire dampers. Mechanical penetrations are also present through the ceiling of 1.1.2.1 into the turbine building. These penetrations have noncombustible seals.

4.2.3 Safe Shutdown Equipment

The Appendix R hot shutdown equipment located in Fire Areas RB3-I and RB3-II is listed in Table 4.2-1 and Table 4.2-2. Fire Area RB3-I contains only necessary equipment or cabling associated with isolation condenser shutdown paths. Fire Area RB3-II contains cabling associated with the isolation condenser shutdown paths, necessary cabling and equipment associated with HPCI/LPCI shutdown path D and the power and control feeds to the inboard isolation condenser valves which are necessary for the isolation condenser paths. The justification for this deviation from requirements of Appendix R is presented in Section 4.6.

4.2.4 Fire Hazards Analysis

4.2.4.1 Fire Area RB3-I

The TIP room, Fire Zone 1.4.1, is surrounded by Fire Area 1.2.1 (inerted drywell), the steam pipe chase, and Fire Zones 1.1.1.1, 1.1.1.2, 1.1.1.3 and 8.2.5.C. The walls, floor, and ceiling surrounding Fire Zone 1.4.1 are equivalent 3-hour rated barriers. The access door to this fire area is 3-hour rated.

The remaining reactor building fire zones which are part of Fire Area RB3-I, 1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C, are interconnected. Fire Zones 1.1.1.5.B and 1.1.1.5.C form the isolation condenser pipe chase. The pipe chase is surrounded and protected from fire in Fire Area RB3-II by walls and floor which are 3-hour fire barriers. The access doors to the pipe chase one each on the 545-foot 6 inch and 570-foot 0-inch elevations) are 3-hour rated. The pipe chase opens into Fire Zone 1.1.1.5.A above, through open steel grating.

Fire Zone 1.1.1.5.A, the isolation condenser floor, is enclosed by walls, floor, and ceiling constructed of 3-hour rated reinforced concrete with similarly rated penetrations except as noted below. Both the floor and ceiling of this fire zone have a 20-foot x 20-foot hatchway opening. This opening is protected by equivalent 3-hour protection in the form of an automatic closed-head, preaction water curtain actuated by a linear thermal detection system similar to that described in Generic Letter 83-33. Complete area fire detection is provided in 1.1.1.5.A. The access doors to the Unit 2 isolation condenser floor (1.1.2.5.A) and to Fire Zone 1.1.1.5.D are both 3-hour rated doors.

HVAC ducts and unsealed mechanical penetrations from the refuel floor (Fire Zone 1.1.2.6) penetrate ceiling of Fire Zone 1.1.1.5.A. Fire Zone 1.1.1.6 does not contain any safe shutdown cabling or equipment. Fire Zone 1.1.1.6 and 1.1.1.5.A have low fire loadings of less than 1000 Btu/ft² each. There is no continuity of combustibles through these openings. The heat and products of combustion from a fire below the refuel floor would not spread to the refuel floor and impact both units.

HVAC ducts without fire dampers penetrate the floor of 1.1.2.5.A to 1.1.2.4. These HVAC ducts are protected by an automatic wet pipe or pre-action fire suppression system similar to that protecting the hatch, and ladder openings. The floor also has a ladder hatchway open to the elevation below which is protected by wet pipe sprinklers. Fire Zones 1.1.2.5.A and 1.1.2.4 have low combustible loads of 1000 Btu/ft² and 5000 Btu/ft² respectively and complete fire detection systems.

The fire zones associated with the isolation condenser shutdown path, (1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C) form an equivalent fire area protected in a manner consistent with the NRC definition of a fire area and equivalent fire protection features for separation of alternate shutdown paths described in Generic Letter 83-33. Therefore, Fire Zones 1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C should be considered one equivalent fire area.

4.2.4.2 Fire Area RB3-II

Fire Area RB3-II in the reactor building is composed of fire zones that are separated from Fire Areas RB3-I by 3-hour rated fire barriers except as noted in Section 4.2.4.1 above.

The border of Fire Area RB3-II contacts the Unit 2 reactor building, Fire Area RB-2/3 and the turbine building. The walls which comprise the reactor building border are 3-hour rated fire barriers except as noted below. All of the access doors to the fire area are rated to 3 hours with the exception of a door between the reactor building equipment drain tank room of both units at the torus level (Fire Zones 1.1.1.1 and 1.1.2.1). These rooms of both units have low fire loadings and there is a lack of continuity of combustibles through the wall. The torus level is provided with linear thermal detection both in and under the major source of combustibles, the cable trays.

The walls that separate the RB3-II from the turbine building are 3 hour rated fire barriers except for three HVAC ducts which have no fire dampers, SBT system piping and 4kV bus duct penetrations. One HVAC duct connects reactor building Fire Zone 1.1.1.3 to the Western Zone Group, Fire Zone 8.2.6.D. Fire Zone

1.1.1.3 has complete detection in the area and Fire Zone 8.2.6.D has complete water suppression. Both fire zones have low combustible loading, i.e. less than 16,000 Btu/ft² and 18,000 Btu/ft² respectively. Both RB3-II and the western zone group (TB-III) have alternative shutdown path A1 identified for use in the event of a fire. Therefore no fire damper is warranted.

Two HVAC ducts without fire dampers connect RB3-II and reactor building vent floor located in the turbine building. These ducts are the HVAC supply and return for the reactor building ventilation system. The vent floor is located above the turbine building operating floor Fire Zone 8.2.8.A. Fire Zone 8.2.8.A contains no safe shutdown equipment and has a combustible loading of less than 13,000 Btu/ft² with the vent floor combustible loading less than 3000 Btu/ft². The ducts enter reactor building Fire Zone 1.1.1.4 and Fire Zone 1.1.1.5.D. Fire Zone 1.1.1.4 has complete detection. Fire Zone 1.1.1.5.D contains no safe shutdown equipment and has detection over the standby liquid control system. Both of these fire zones have low combustible loading of less than 7000 Btu/ft² and 1000 Btu/ft² respectively. Fire dampers are not warranted in these ducts since a fire propagating to either side of the barrier would not affect safe shutdown.

The northern ceiling of Fire Zone 1.1.1.1 borders the turbine building. It is constructed of reinforced concrete with pipe penetrations from the reactor building drain tank room to turbine building Fire Zone 8.2.5.C. These pipe penetrations are provided with noncombustible seals. Fire rated seals are unwarranted due to the low combustible loading below the barriers and no combustible material passing through the seal material.

4.2.5 Conclusions

The boundaries separating the fire zones associated with the alternate shutdown paths, i.e., isolation condenser path A1 and HPCI/LPCI path D, are not complete 3-hour rated fire barriers by definition because of the hatchways, ladder openings, HVAC ducts, and unsealed mechanical penetrations. However, the above analysis indicates that Fire Areas RB3-I and RB3-II unequivocally meet the intent of Generic Letter 83-33 and Appendix R Section III.L which state that alternate shutdown paths be separated from each other so that a single fire cannot disable both shutdown paths.

TABLE 4.2-1
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB3-I

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.4.1</u>	
None	Not Applicable
<u>Fire Zone 1.1.1.5.A</u>	
Unit 3 Isolation Condenser (IC)	A1,B,B2,F
IC Valve M03-1301-10	A1,B,B2,F
IC Valve M03-4102	A1,B,B2,F
IC Valve A03-1301-17	A1,B,B2,F
IC Valve A03-1301-20	A1,B,B2,F
<u>Fire Zone 1.1.1.5.B</u>	
IC Valve M03-1301-2	A1,B,B2,F
<u>Fire Zone 1.1.1.5.C</u>	
IC Valve M03-1301-3	A1,B,B2,F

TABLE 4.2-2

APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB3-II

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.1.1.1</u>	
LPCI Valve M03-1501-13B	D
LPCI Valve M03-1501-18B	D
LPCI Valve M03-1501-19B	D
LPCI Valve M03-1501-20B	D
LPCI Valve M03-1501-38B	D
HPCI Valve M03-2301-36	D
HPCI Valve M03-2301-5	D
<u>Fire Zone 1.1.1.2</u>	
480-V MCC 38-1	B,B1,B2,F
480-V MCC 39-1	D
Local Mechanical Reactor Level Indicators	B2
Local Mechanical Reactor Pressure Indicators	B2
<u>Fire Zone 1.1.1.3</u>	
4-kV SWGR 33-1	B,B1,B2
4-kV SWGR 34-1	D,F
<u>Fire Zone 1.1.1.4</u>	
125-Vdc Reactor Building Distribution Panel	B,B1,B2,D,F
250-Vdc MCC 3A	B,D,F
250-Vdc MCC 3B	B,D,F
480-V SWGR 38	B,B1,B2,D,F
480-V SWGR 39	B,D,F
<u>Fire Zone 1.1.1.5.D</u>	
None	Not Applicable
<u>Fire Zone 1.1.1.6</u>	
None	Not Applicable

TABLE 4.2-2 (Cont'd)

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 11.1.1</u>	
LPCI Emergency Air Cooler 3-5746B	D
LPCI Pump 3C	D
LPCI Pump 3D	D
LPCI Valve M03-1501-11B	D
LPCI Valve M03-1501-32B	D
LPCI Valve M03-1501-3B	D
LPCI Valve M03-1501-5C	D
LPCI Valve M03-1501-5D	D
<u>Fire Zone 11.1.2</u>	
None	Not Applicable
<u>Fire Zone 1.3.1</u>	
None	Not Applicable

4.3 JUSTIFICATION FOR LACK OF COMPLETE DETECTION AND SUPPRESSION IN FIRE AREA RB3-I

4.3.1 Introduction

Fire Area RB3-I in the reactor building contains cables and equipment associated with the isolation condenser method of shutdown. HPCI/LPCI shutdown path D (see Section 2.0 for description) has been identified as an independent method to bring the plant to hot shutdown in the event of a fire in Fire Area RB3-I. Because alternative shutdown is utilized for this fire area, Appendix R requires that fire detection and fixed fire suppression be present throughout the fire area. However, as the subsequent analysis demonstrates, the existing fire protection features provide a level of protection which ensures that any fire will be quickly detected and extinguished. Additional detection and suppression systems would not significantly enhance the level of safety at Dresden. Therefore, the exemption is requested from the Appendix R Section III.G.3 requirement for fixed detection and suppression in Fire Zones 1.1.1.5.B and 1.1.1.5.C and for fixed suppression in Fire Zone 1.4.1 and Fire Zone 1.1.1.5.A.

Fire Area RB3-I in the reactor building is made up of the following fire zones.

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
1.4.1	Reactor Building Elevation 517 feet 6 inches TIP Room
1.1.1.5.A	Reactor Building - Reactor Floor - South Elevation 589 feet 0 inch
1.1.1.5.B	Reactor Building Elevation 570 feet 0 inch Isolation Condenser Pipe Chase

1.1.1.5.C.

Reactor Building

Elevation 545 feet 6 inches

Isolation Condenser Pipe Chase

These fire zones are shown on Figure B-2 through B-5. The specific descriptions of these fire zones which contain the fire barrier description, fire loading for each zone, safety-related equipment, and suppression and detection capabilities located in each zone are contained in the Fire Hazards Analysis Section of this exemption request.

4.3.2 Fire Protection System

Fire Area RB3-I consists of Fire Zone 1.4.1 and Fire Zones 1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C. Fire Zone 1.4.1 contains complete fire detection which alarms in the control room. This fire area does not contain fixed fire suppression. Appendix B contains figures showing fire protection systems within Fire Area RB3-I. A manual hose station is located near the 3-hour rated access door.

Fire Zones 1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C are connected forming a vertical pipe chase and the isolation condenser floor. Fire detection is present at the ceiling level of Fire Zone 1.1.1.5.A, the isolation condenser floor. A fire in the pipe chase is not probable since in-situ combustibles in the pipe chase are negligible. The three zones are connected by open grating, therefore, a fire on the lower elevations would be detected by the fire detection system installed in Fire Zone 1.1.1.5.A. Manual hose stations and portable fire extinguishers are available in Fire Zone 1.1.1.5.A. The unrated openings in the 3-hour fire barrier between Fire Area RB3-I and Fire Area RB3-II of the reactor building are identified in Section 4.2. Automatic thermally actuated closed head water curtains or wet pipe sprinkler are provided as described in Section 4.2 ensuring an equivalent 3-hour fire barrier between alternate shutdown paths.

4.3.3 Safe Shutdown Equipment

Appendix R hot shutdown equipment located in this fire area and the safe shutdown path which employs the equipment are listed by fire zone in Table 4.3-1. All

cabling and equipment necessary for alternate hot shutdown are separated from this fire area by an equivalent 3-hour fire barrier.

4.3.4 Fire Hazards Analysis

4.3.4.1 Reactor Building - TIP Room Elevation 517 feet 6 inches (Fire Zone 1.4.1)

The north wall of this fire zone is constructed of reinforced concrete having a 3-hour rating to separate it from the turbine building. The east wall is constructed of reinforced concrete and concrete block and is a 3-hour rated fire barrier. Access is gained to this zone through a 3-hour rated door. The west wall of this fire zone is the boundary of the drywell and steam pipe chase and is an equivalent 3-hour rated fire barrier. The floor and ceiling are equivalent 3-hour fire barriers.

The fire zone is provided with complete smoke detection which alarms in the control room (Figure B-2). This fire zone does not contain fixed suppression. The combustible loading in this zone is less than 5,000 Btu/ft². A hose station is located in adjacent Fire Zone 1.1.1.2. Transient combustibles are controlled by administrative procedures.

Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and the area has complete fire detection and a low fire loading, fixed fire suppression is not warranted in this fire zone. An exemption is therefore requested for the Appendix R Section III.G.3 requirement for fixed suppression throughout this fire zone.

4.3.4.2 Reactor Building - Isolation Condenser Pipe Chase Elevation 545 feet 6 inches (Fire Zone 1.1.1.5.C)

The north wall which separates this fire zone from the inerted drywell is a 3-hour rated fire barrier. The west, south, and east walls of this fire zone are 3-hour rated fire barriers. Access to this zone is through a 3-hour rated door

located in the west wall. The floor of this zone which is part of the ceiling of Fire Zone 1.1.1.2 is constructed of reinforced concrete and is a 3-hour rated barrier. The ceiling of this zone is open metal grating to Fire Zone 1.1.1.5.B. There is a ladder which leads through the grating for access to manually-operated valves. This zone and Fire Zone 1.1.1.5.B are part of the same shutdown path.

The fire zone is not provided with fire detection or fixed suppression. A hose station is available in adjacent Fire Zone 1.1.1.3 for use in this zone. In-situ combustibles are negligible in this zone. Transient combustibles are limited by access to this high radiation area and administrative procedures. A fire on this elevation of the pipe chase would be detected by the fire detection system in Fire Zone 1.1.1.5.A above. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and manual fire suppression capabilities are provided, fire detection and fixed fire suppression are not warranted in this area. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed detection and suppression throughout this zone.

4.3.4.3 Reactor Building - Isolation Condenser Pipe Chase Elevation 570 feet
0 inch (Fire Zone 1.1.1.5.B)

The north wall which separates this zone from the inerted drywell is a 3-hour rated fire barrier. The west, south, and east walls of this zone are 3-hour rated fire barriers which separate it from Fire Zone 1.1.1.4. Access to this zone is through a 3-hour rated door located in the west wall. The floor and ceiling of this zone consist of open metal grating to Fire Zone 1.1.1.5.C and 1.1.1.5.A, respectively. A ladder provides personnel access from Fire Zone 1.1.1.5.A and down to Fire Zone 1.1.1.5.C.

This fire zone is not provided with fire detection or fixed suppression. In-situ combustibles are negligible in this fire zone. Transient combustibles are limited by access to this high radiation area. A fire on this elevation of the pipe chase would be detected by the fire detection system in Fire Zone 1.1.1.5.A above. This fire zone along with Fire Zones 1.1.1.5.A and 1.1.1.5.C all use the

same shutdown path which is external to these zones. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers, fire detection and fixed fire suppression are not warranted in this area. An exemption is requested from Appendix R Section III.G.3 requirement for fixed detection and suppression throughout this zone.

4.3.4.4 Reactor Building - Reactor Floor - South Elevation 589 feet
0 inch (Fire Zone 1.1.1.5.A)

The south and west walls of this fire zone are constructed of reinforced concrete. The north wall separates this zone from the fuel pool, the dryer-separator storage pool, the inerted drywell and Fire Zone 1.1.1.5.D. This reinforced concrete wall is a 3-hour rated fire barrier and contains a 3-hour rated door which leads to Fire Zone 1.1.1.5.D. The east wall is a 3-hour fire barrier and separates this fire zone from the Unit 2 reactor building. The floor of this zone which is part of the ceiling of Fire Zone 1.1.1.4 is constructed of 3-hour rated reinforced concrete with all mechanical and electrical penetrations sealed with materials having a 3-hour rating except as follows. The floor contains a 20-foot x 20-foot hatchway, HVAC duct with no fire dampers and a ladder opening. These openings are protected with an automatic closed head water curtain or wet pipe sprinklers to provide an equivalent 3-hour fire barrier. The ceiling is constructed of 3-hour reinforced concrete and has electrical penetrations sealed with materials having a 3-hour rating. Mechanical penetrations in the ceiling are unsealed and HVAC ducts do not contain fire dampers. The ceiling also has a 20-foot x 20-foot unsealed hatchway which leads to Fire Zone 1.1.1.6. This opening is also protected with an automatic closed head water curtain to provide an equivalent 3-hour barrier.

This zone is connected through the floor by open metal grating to Fire Zones 1.1.1.5.B and 1.1.1.5.C. For a fire in these zones, alternate shutdown path D, which is independent of these zones, could be used.

This fire zone is provided with complete fire detection (Figure 8-5), manual hose stations, and equivalent 3-hour barriers using wet pipe sprinklers or automatic closed head water curtains to protect the open hatchway, HVAC ducts and ladder

opening. The detection system alarms in the control room. The fire zones directly above and below this zone are 1.1.1.6 and 1.1.1.4 which have fire loads of less than 1,000 Btu/ft² and less than 8,000 Btu/ft², respectively. The combustibles loading in this zone is less than 1,000 Btu/ft². Transient combustibles are limited by administrative control. Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capabilities are provided, fixed fire suppression is not warranted in this area. An exemption is requested from the Appendix R Section III.G.3 requirements for fixed suppression throughout this zone.

4.3.5 Conclusions

Based on the protection described above, the ability to safely shut down the plant is assured and the intent of Appendix R is satisfied. The technical bases that justify the exemption requests from the Appendix R Section III.G.3 requirement for fixed detection and suppression throughout Fire Zones 1.1.1.5.B and 1.1.1.5.C and fixed suppression throughout Fire Zone 1.4.1 and Fire Zone 1.1.1.5.A are summarized as follows:

1. Automatic fire detection installed in Fire Zone 1.1.1.5.A will provide adequate warning of fire which might occur in any of the three connected fire zones (1.1.1.5.A, 1.1.1.5.B or 1.1.1.5.C).
2. Manual hose stations and portable fire extinguishers are available in and adjacent to Zone 1.1.1.5.A.
3. The HPCI/LPCI method of shutdown does not depend on any equipment or cabling located in Fire Zones 1.1.1.5.A, 1.1.1.5.B, 1.1.1.5.C or 1.4.1 and is separated by an equivalent 3-hour rated fire barrier.
4. Complete fire detection is provided for Fire Zone 1.4.1 which is completely enclosed with equivalent 3-hour rated barriers.
5. All penetrations to Fire Area RB3-1 (1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C and 1.4.1) are sealed to a 3-hour rating except for those identified in Section 4.2.

6. The combustible loading in Fire Zones 1.1.1.5.A, 1.1.1.5.B, and 1.1.1.5.C is negligible (less than 1000 Btu/ft²) and does not, therefore, warrant fixed suppression throughout these zones.

TABLE 4.3-1
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB3-1

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.4.1</u>	
None	Not Applicable
<u>Fire Zone 1.1.1.5.A</u>	
Unit 3 Isolation Condenser (IC)	A1,B,B2,F
IC Valve M03-1301-10	A1,B,B2,F
IC Valve M03-4102	A1,B,B2,F
IC Valve A03-1301-17	A1,B,B2,F
IC Valve A03-1301-20	A1,B,B2,F
<u>Fire Zone 1.1.1.5.B</u>	
IC Valve M03-1301-2	A1,B,B2,F
<u>Fire Zone 1.1.1.5.C</u>	
IC Valve M03-1301-3	A1,B,B2,F

4.4 JUSTIFICATION FOR LACK OF COMPLETE DETECTION AND SUPPRESSION IN FIRE AREA RB3-II

4.4.1 Introduction

Fire Area RB3-II in the reactor building contains cables and equipment associated with the HPCI/LPCI method of shutdown. Isolation condenser shutdown path A1 (see Section 2.0 for description) has been identified as a method to bring the plant to hot shutdown independent of equipment and cabling in Fire Area RB3-II (Figure 4-2). Fire Zone 1.1.1.6 of RB3-II has the normal shutdown path B identified as the primary shutdown path. Because alternative shutdown is utilized for this fire area, Appendix R requires that fire detection and fixed fire suppression be present throughout the fire area. However, as the subsequent analysis demonstrates, the existing fire protection features provide a level of protection which ensures that any fire will be quickly detected and extinguished. Additional detection and suppression systems would not significantly enhance the level of safety at Dresden.

Reactor building Fire Area RB3-II is composed of the following fire zones.

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
1.1.1.1	Reactor Building - Basement Floor Elevation 476 feet 6 inches
1.1.1.2	Reactor Building - Ground Floor Elevation 517 feet 6 inches
1.1.1.3	Reactor Building - Mezzanine Floor Elevation 545 feet 6 inches

1.1.1.4	Reactor Building - Main Floor Elevation 570 feet 0 inch
1.1.1.5.D	Reactor Building - Reactor Floor North Elevation 589 feet 0 inch
1.1.1.6/1.1.2.6	Reactor Building - Refueling Floor Elevation 613 feet 0 inch
11.1.1	Reactor Building Southwest Corner Room Elevation 476 feet 6 inches
11.1.2	Reactor Building Southeast Corner Room Elevation 476 feet 6 inches
1.3.1	Reactor Building Shutdown Cooling Pump Room Elevation 517 feet 6 inches

Fire Zones 1.1.1.5.D (reactor building - reactor floor 589 feet 0 inch) and 1.1.2.6/1.1.1.6 (refuel floor) have no equipment or cabling associated with safe shutdown.

These fire zones are shown on Figures B-1 through B-6. The specific descriptions of these fire zones which contain the fire barrier description, fire loading of each zone, safety-related equipment, and suppression and detection capabilities located in each zone is contained in the Fire Hazards Analysis of this exemption request.

4.4.2 Fire Protection System

All of the fire zones contained in this fire area with the exception of 1.1.1.1, 1.1.1.3, 1.1.1.5.D, and 1.1.1.6 have area-wide detection provided throughout the zone which alarms in the control room. Appendix B contains figures showing fire protection systems in Fire Area RB3-II. Fire Zone 1.1.1.1 is provided with linear thermal detectors in and under the cable trays in the zone. These detectors alarm in the control room. This type of fire detection is provided to rapidly identify a fire either involving or exposing the cabling, which represents the only fixed combustibles in the zone. Fire Zone 1.1.1.3 has complete fire detection except for the regenerative and non-regenerative heat exchangers areas which are separated from the rest of the fire zone by floor to ceiling shield walls. Fire Zone 1.1.1.5.D has local fire detection above the standby liquid control system pumps which contain the only significant combustible in the zone. There is no safe shutdown equipment or cabling in Fire Zone 1.1.1.5.D. This local detection would detect a fire in the zone and alarm locally and in the control room.

There is no fire detection present in Fire Zone 1.1.1.6/1.1.2.6 because ceiling level detectors would be ineffective due to the negligible in-situ combustibles present (less than 1000 Btu/ft²) and the height of the ceiling on the refueling floor (45 feet). During normal operations there is a limited amount of transient combustibles present on the refueling floor. The major sources of transient combustibles are associated with outages. Transient combustibles are carefully evaluated and controlled by administrative procedures. No safe shutdown cabling or equipment are located on the refueling floor.

The fire zones which comprise this fire area do not contain fixed suppression. Hose stations and fire extinguishers are available to each fire zone.

A fire will be identified in the initial stages of development by the extensive fire detection system in this fire area, will be acted upon immediately by the fire brigade with manual fire protection equipment provided, and cannot affect

equipment or cabling associated with the alternate shutdown path which is separated by an equivalent 3-hour rated fire barrier. Combustible loadings are reasonably uniform and range from less than 1000 Btu/ft² to 23,000 Btu/ft² within the fire area. An equivalent 3-hour barrier is provided between the alternate shutdown paths with the exception of the power and control feeds to the inboard isolation condenser valves. The deviation is justified in Section 4.6. Detection is provided for all fire zones except for those previously identified. For these reasons, the existing fire protection features are adequate and the addition of fixed suppression throughout Fire Area RB3-II is unwarranted.

4.4.3 Safe Shutdown Equipment

Appendix R hot shutdown equipment located in this fire area and the shutdown path which utilizes the equipment are listed by fire zone in Table 4.4-1. Hot shutdown can be achieved and maintained independent of fire area RB3-II utilizing safe shutdown path A1. All equipment and cabling necessary for hot shutdown utilizing the A1 path are separated by an equivalent 3-hour fire barrier. The only exception to 3-hour barrier separation involves the power and control feeds to the inboard isolation condenser valves. Justification for this exemption is presented in Section 4.6. Safe shutdown equipment and cables are identified on the F drawings, Sheet 2 for the isolation condenser shutdown path and Sheet 3 for the HPCI/LPCI shutdown path.

4.4.4 Fire Hazards Analysis

4.4.4.1 Reactor Building - Basement Floor Elevation 476 feet 6 inches (Fire Zone 1.1.1.1)

The north, south, and west walls of this fire zone form the exterior of the plant. The floor of this fire zone is the baseslab of the reactor building. The east wall separates Fire Zone 1.1.1.1 (Unit 3) from Fire Zone 1.1.2.1 (Unit 2). This wall is made of 3-hour rated reinforced concrete with all penetrations sealed to a 3-hour rating. This wall contains an unrated door which connects the Unit 2 and Unit 3 reactor building equipment drain tank rooms. Both equipment drain tank rooms are separated from the torus areas of the basement by a rein-

forced concrete wall containing the unrated door. The combustible loading in the drain tank room and torus area is very light (less than 1000 Btu/ft²).

The ceiling of Fire Zone 1.1.1.1 is constructed of reinforced concrete. All penetrations through the ceiling which enter Fire Zones 1.4.1 and 1.3.1 have 3-hour rated fire seals except as detailed in Section 4.2 and Subsection 4.4.4.9. All electrical penetrations through the ceiling into Fire Zone 1.1.1.2 are sealed. The ceiling also contains pipe penetrations in the reactor building drain tank room which are provided with noncombustible seals to the turbine building. The ceiling is not rated because of unsealed mechanical penetrations leading to Fire Zones 1.1.1.2 and 8.2.5.C.

Fire Zone 1.1.1.1 borders the inerted drywell (Fire Area 1.2.1), Fire Zones 1.1.2.1, 11.1.3 and the LPCI pump rooms (Fire Zones 11.1.1 and 11.1.2). The LPCI pump rooms are separated from the torus area by a wall of reinforced concrete construction which contains unsealed penetrations. Fire Zone 1.1.2.1 is separated from Fire Zone 1.1.1.1 by 3-hour barriers except as noted above. The border of Fire Zone 11.1.3 is 3-hour rated.

Fire Zone 1.1.1.1 is provided with linear thermal detectors in and under the cable trays. These detectors alarm in the control room (Figure B-1). Manual suppression is available in the fire zone in the form of both hose stations and portable fire extinguishers.

Since the alternate shutdown path is separated by equivalent 3-hour rated fire boundaries, fire detection and manual fire suppression capability are available and combustible loading is small and controlled, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed fire protection throughout this zone.

4.4.4.2 Reactor Building - Elevation 517 feet 6 inches (Fire Zone 1.1.1.2)

The south and west walls of this zone are constructed of reinforced concrete. The portion of these walls which contact Fire Zone 9.0.C and the airlock leading to Fire Zone 8.2.5.E are 3-hour rated. The north and east walls are constructed

of reinforced concrete and have a 3-hour rating. These latter two walls separate the ground floor of the reactor building from the turbine building and Unit 2 reactor building, respectively. Fire Zone 1.1.1.2 surrounds the drywell (Fire Area 1.2.1), Fire Zone 1.3.1 and Fire Zone 1.4.1 (TIP room). These areas have 3-hour rated walls, doors, and penetrations which separate them from Fire Zone 1.1.1.2. The floor of Fire Zone 1.1.1.2 is the ceiling of Fire Zone 1.1.1.1 and a description of the construction can be found in the previous subsection. The ceiling of Fire Zone 1.1.1.2 is the floor of both Fire Zones 1.1.1.3 and 1.1.1.5.C. Separation of Fire Zone 1.1.1.2 from Zone 1.1.1.5.C above is provided by complete 3-hour rated barrier. The rest of the ceiling is constructed of reinforced concrete containing stairwells, hatches, and unsealed mechanical penetrations.

Zone 1.1.1.2 is provided with complete fire detection which alarms in the control room (Figure B-2). This fire zone also has hose stations and fire extinguishers available.

The combustible loading in this zone is less than $23,000 \text{ Btu/ft}^2$ and is uniformly distributed. Transient combustibles on this floor are controlled by administrative procedures. Reactor pressure and level instrumentation are located in this fire zone. A separate exemption request to justify separation of reactor level and pressure instruments is found in Section 4.5.

MCC's 38-7 and 39-7 are located in this fire zone. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

Since the alternate shutdown path is separated by equivalent 3-hour rated fire barriers, the zone has complete fire detection to provide early warning of a fire, and manual fire protection equipment is available to aid prompt response and control of any fire, fixed fire suppression is unwarranted throughout this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

4.4.4.3 Reactor Building - Elevation 545 feet 6 inches (Fire Zone 1.1.1.3)

The south and west walls of this fire zone are made of reinforced concrete. The north and east walls of the fire zone are made of reinforced concrete and have a 3-hour fire rating except for the HVAC duct without a fire damper located in the north wall. The north and east walls separate this fire zone from the turbine building and Unit 2 reactor building, respectively. The floor of this fire zone is the ceiling of Fire Zones 1.1.1.2, 1.3.1 and 1.4.1. A description of the ceiling of Fire Zone 1.1.1.2 can be found in the previous section. The section of floor above Fire Zone 1.4.1 is a 3-hour rated fire barrier. The ceiling of this Fire Zone (1.1.1.3) is constructed of reinforced concrete but contains unsealed mechanical penetrations, an equipment hatch, and one unprotected stairwell. All electrical penetrations through the ceiling are sealed. At the outer boundaries of this fire zone are Fire Area 1.2.1 (inerted drywell) and Fire Zone 1.1.1.5.C. The walls separating these fire zones are 3-hour fire barriers. The door leading to Fire Zone 1.1.1.5.C has a 3-hour fire rating. (Reactor level and pressure instrumentation is located in this zone on the west and south sides of the drywell. A separate exemption request justifying separation of RPV instrumentation is presented in Section 4.5.)

Fire Zone 1.1.1.3 is provided with complete fire detection throughout the zone (except by the regenerative and non-regenerative heat exchangers) which alarms in the control room (Figure B-3). This fire zone is equipped with manual hose stations and fire extinguishers.

The combustible loading in this zone is less than 16,000 Btu/ft² and is uniformly distributed. Transient combustibles on this floor are controlled by administrative procedures.

Switchgears 33-1 and 34-1 are located in this fire zone. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area. Water shields are installed above switchgears 33-1 and 34-1 to protect them from the water curtain suppression system located at the ceiling of the 589 feet 0 inch and 570 feet 0 inch elevations.

Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capability are available, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed suppression throughout this zone.

4.4.4.4 Reactor Building - Elevation 570 feet 0 inch (Fire Zone 1.1.1.4)

The south and west walls of this fire zone are made of reinforced concrete. The north and east walls of the fire zone are made of reinforced concrete and are 3-hour fire rated fire barriers except for an HVAC duct without a fire damper located in the north wall. The latter walls separate this fire zone from the turbine building and Unit 2 reactor building, respectively. The floor of this zone is the ceiling of Fire Zone 1.1.1.3. A description of the ceiling of Fire Zone 1.1.1.3 can be found in the previous subsection. The ceiling of Fire Zone 1.1.1.4 has penetrations and openings to Fire Zone 1.1.1.5.A and Fire Zone 1.1.1.5.D. The penetrations leading to Fire Zone 1.1.1.5.A have been sealed to a 3-hour rating, except as described in Section 4.2. The openings in the ceiling which lead to Fire Zone 1.1.1.5.A consist of a 20-foot x 20-foot hatch opening and a ladder opening. To protect Fire Zone 1.1.1.5.A from a fire in Fire Zone 1.1.1.4 an automatic thermally activated preaction water curtain or a wet pipe sprinkler system is installed around each opening to provide an equivalent 3-hour fire barrier. The mechanical penetrations and openings in the ceiling which lead to Fire Zone 1.1.1.5.D are not sealed since no safe shutdown cabling or equipment associated with shutdown path A1 is located in the fire zone (see Section 4.2). Adjacent to Fire Zone 1.1.1.4 are Fire Area 1.2.1 and Fire Zone 1.1.1.5.B. The walls separating these areas from Fire Zone 1.1.1.4 are of 3-hour rated fire barriers. The access door to 1.1.1.5.B has a 3-hour rating.

Fire Zone 1.1.1.4 is provided with complete fire detection throughout the zone and manual suppression (Figure B-4). The detectors alarm in the control room. Hose stations and portable fire extinguishers are available for local suppression of a fire.

The combustible loading of less than 8,000 Btu/ft² is uniformly distributed. Transient combustibles in this fire zone are controlled by administrative procedures.

Switchgears 38 and 39 and 250 Volt DC MCC's 3A and 3B are located in this fire zone. An inadvertant actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area. Water shields are installed switchgears 38 and 39 to protect them from the water curtain suppression system located at the ceiling of the 589 feet 0 inch and 570 feet 0 inch elevations.

Since the alternate shutdown path is separated by equivalent 3-hour fire barriers and complete fire detection and manual fire suppression capability are available, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed suppression throughout this zone.

4.4.4.5 Reactor Building - North Elevation 589 feet 0 inch (Fire Zone 1.1.1.5.D)

The east and north walls of this fire zone are made of reinforced concrete and separate this fire zone from Unit 2 reactor building and turbine building, respectively. The west wall is constructed of reinforced concrete. The south wall separates this zone from Fire Area 1.2.1 and Fire Zone 1.1.1.5.A (drywell and isolation condenser floor). These walls are 3-hour rated fire barriers except for the north wall which contains an HVAC duct without a fire damper. The access doors through the walls are 3-hour rated. The floor of this fire zone constitutes part of the ceiling of Fire Zone 1.1.1.4. A description for the ceiling of Fire Zone 1.1.1.4 can be found in the previous subsection. The ceiling of Fire Zone 1.1.1.5.D is made of reinforced concrete construction and contains an open stairwell and unsealed mechanical penetrations.

The combustible loading in this zone is less than 1000 Btu/ft². Transient combustibles are controlled by administrative procedures. Fire detection is provided in the vicinity of the standby liquid control equipment in this zone (Figure B-5).

Since there is no safe shutdown equipment or cabling located in this fire zone an exemption is requested from Appendix R Section III.G.3 requirement for fixed suppression and detection throughout this zone.

4.4.4.6 Reactor Building - Refueling Floor Elevation 613 feet 0 inch (Fire Zones 1.1.1.6 and 1.1.2.6)

The Unit 2 (Fire Zone 1.1.2.6) and the Unit 3 (Fire Zone 1.1.1.6) refueling floors are not separated from each other by any wall or fire barrier. The south, east, and west walls as well as the ceiling are made of unprotected steel siding supported by unprotected steel columns. The north wall of the refueling floor is a 3-hour rated fire barrier only from plant elevation 613 feet 0 inch to elevation 622 feet 0 inch. Above elevation 622 feet 0 inch, the wall is made of steel siding supported by unprotected steel columns. This wall separates the reactor building from the turbine building. The floor of the refueling floor is the ceiling of Fire Zones 1.1.1.5.A and 1.1.1.5.D. The ceiling of Fire Zone 1.1.1.5.D is described in the previous section. The portion of the floor which acts as a ceiling of Fire Zone 1.1.1.5.A has unsealed mechanical penetrations and HVAC ducts without fire dampers. There is a 20-foot x 20-foot equipment hatch which is open between Fire Zones 1.1.1.6 and 1.1.1.5.A. This opening is protected by an automatic thermally activated preaction water curtain to provide an equivalent 3-hour barrier between Fire Area 1.1.1.5.A and the refueling floor.

The refueling floor is provided with manual hose stations and fire extinguishers. Fire detection is not installed on this floor because the height of the ceiling is approximately 45 feet and installed detectors would be ineffective with the minimal fixed combustibles present (see discussion under Subsection 4.4.2, Fire Protection System). The combustible loading of the entire refueling floor is less than 1000 Btu/ft². Transient loads are controlled administratively.

Since there is no safe shutdown cabling or equipment located on the refueling floor an exemption is requested from Appendix R Section III.G.3 requirement for fixed suppression and detection throughout this zone.

4.4.4.7 Reactor Building - Southwest Corner Room Elevation 476 feet 6 inches
(Fire Zone 11.1.1)

The south and west wall of this fire zone is made of reinforced concrete. The north wall of this fire zone is slanted between the south and west wall. This wall is constructed of reinforced concrete and contains a watertight door and unsealed penetrations. The floor of this fire zone is the base slab of the plant. The ceiling of this fire zone is constructed of reinforced concrete but has unsealed penetrations (concrete plugs, checkered plate hatch covers, and an unprotected stairwell opening).

The fire zone is provided with fire detection throughout (Figure B-1). The detectors alarm in the control room. A hose station and fire extinguishers are also provided in the zone.

The combustible loading in this fire zone is less than 17,000 Btu/ft². Transient fire loadings are controlled by administrative procedures. Since the alternate shutdown path is separated by equivalent 3-hour rated fire barriers and complete fire detection and manual fire suppression capability is available, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed fire suppression throughout this zone.

4.4.4.8 Reactor Building - Southeast Corner Room Elevation 476 feet 6 inches
(Fire Zone 11.1.2)

The south and east walls of this fire zone are constructed of reinforced concrete. The north wall is slanted between the east and south walls. This wall is constructed of reinforced concrete and contains a watertight door. The floor of this fire zone is the base slab of the reactor building. The ceiling of this zone is constructed of reinforced concrete which contains an open stairwell, hatches sealed by concrete plugs, and checkered plate. The ceiling also contains unprotected HVAC ducts and sealed cable penetrations.

This fire zone is provided with complete fire detection throughout the zone, a hose station, and portable fire extinguisher (Figure B-1). The detectors alarm in the control room.

The fire loading in this fire zone is less than 16,000 Btu/ft². Since the alternate shutdown path is separated by equivalent 3-hour barriers and complete fire detection and manual fire suppression capability are available, fixed fire suppression is unwarranted in this zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed fire suppression throughout the zone.

4.4.4.9 Reactor Building - Shutdown Cooling Pump Room
Elevation 517 feet 6 inches (Fire Zone 1.3.1)

The north and east walls separate this fire zone from the turbine building, the drywell, and the main steam pipe chase. These walls are equivalent 3-hour barriers. The south and west walls separate this fire zone from Fire Zone 1.1.1.2 and are 3-hour rated barriers. The floor and ceiling have penetrations sealed to a 3-hour or equivalent.

This fire zone is provided with complete fire detection throughout. A hose station and fire extinguishers located in adjacent Fire Zone 1.1.1.2 are available for use in this fire zone. The detectors alarm in the control room.

The fire loading in this fire zone is less than 15,000 Btu/ft². Since the alternate shutdown path is separated by equivalent 3-hour barriers and complete fire detection and manual fire suppression capability are available, fixed fire suppression is unwarranted in this fire zone. An exemption is requested from the Appendix R Section III.G.3 requirement for fixed suppression throughout the zone.

4.4.5 Conclusions

Based on the protection described above, the ability to safely shut down the plant is assured and the intent of Appendix R is satisfied. The technical bases

that justify the exemption requests for Appendix R Section III.G.3 requirement for fixed suppression throughout the specified fire zones are summarized as follows:

1. Automatic fire detection is installed in all fire zones containing safe shutdown equipment or cabling.
2. Manual hose stations and portable fire extinguishers are available for use in all fire zones.
3. The isolation condenser method of shutdown used in the event of a fire in one of the above zones does not depend on any equipment or cabling located in these zones and is separated by an equivalent 3-hour rated fire barrier.
4. All penetrations leading to Fire Area RB3-I are sealed to a 3-hour rating except as described in Section 4.2.
5. The major openings between Fire Zone 1.1.1.5.A (RB3-I) and the adjacent RB3-II fire zones are protected by an automatic preaction water curtain. In addition the combustible loading of these adjacent fire zones is very low (less than 8000 Btu/ft^2), therefore complete fixed suppression in these adjacent fire zones is not warranted. (The maximum combustible loading in the entire reactor building is less than $23,000 \text{ Btu/ft}^2$.)
6. The inadvertent operation of a fixed water suppression system in this area could result in fault or failure of major electrical equipment located in the area which would degrade plant safety.

TABLE 4.4-1
APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN FIRE AREA RB3-II

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.1.1.1</u>	
LPCI Valve M03-1501-13B	D
LPCI Valve M03-1501-18B	D
LPCI Valve M03-1501-19B	D
LPCI Valve M03-1501-20B	D
LPCI Valve M03-1501-38B	D
HPCI Valve M03-2301-36	D
HPCI Valve M03-2301-5	D
<u>Fire Zone 1.1.1.2</u>	
480-V MCC 38-1	B,B1,B2,F
480-V MCC 39-1	D
Local Mechanical Reactor Pressure Indicators	B2
Local Mechanical Reactor Water Level Indicators	B2
<u>Fire Zone 1.1.1.3</u>	
4-kV SWGR 33-1	B,B1,B2
4-kV SWGR 34-1	D,F
<u>Fire Zone 1.1.1.4</u>	
125-Vdc Reactor Building Distribution Panel	B,B1,B2,D,F
250-Vdc MCC 3A	B,D,F
250-Vdc MCC 3B	B,D,F
480-V SWGR 38	B,B1,B2,D,F
480-V SWGR 39	B,D,F
<u>Fire Zone 1.1.1.5.D</u>	
None	Not Applicable

TABLE 4.4-1 (Cont'd)

<u>EQUIPMENT</u>	<u>SHUTDOWN PATH</u>
<u>Fire Zone 1.1.1.6</u>	
None	Not Applicable
<u>Fire Zone 11.1.1</u>	
LPCI Emergency Air Cooler 3-5746B	D
LPCI Pump 3C	D
LPCI Pump 3D	D
LPCI Valve M03-1501-11B	D
LPCI Valve M03-1501-32B	D
LPCI Valve M03-1501-3B	D
LPCI Valve M03-1501-5C	D
LPCI Valve M03-1501-5D	D
<u>Fire Zone 11.1.2</u>	
None	Not Applicable
<u>Fire Zone 1.3.1</u>	
None	Not Applicable

4.5 JUSTIFICATION FOR SEPARATION OF REDUNDANT INSTRUMENTATION

4.5.1 Introduction

Fire Area RB3-II in the reactor building contains redundant reactor pressure and reactor water level instrumentation. The instrumentation transmitters are located on four instrumentation racks. The instrument divisions are located on opposite sides of the drywell in the reactor building (Figure C-1). The requirements in Appendix R state that more than 20 feet of space free from intervening combustibles should exist between redundant divisions. In addition detection and suppression should be installed throughout the fire area.

The subsequent analysis provides justification for an exemption to the above requirement. The bases of the justification is that a fire Fire Zones 1.1.1.2 and 1.1.1.3 would not impact the ability of operators to monitor the reactor in the main control room through redundant instrumentation located in these zones.

4.5.2 Fire Protection System

The Fire Zones 1.1.1.2 and 1.1.1.3 which contain redundant reactor pressure and reactor water level instrumentation racks and cables are provided with complete fire detection (except above the regenerative and nonregenerative heat exchangers) (Figures B-2 and B-3). These zones also have manual hose stations and fire extinguishers available in the event of a fire. The fire detectors alarm in the control room.

MCC's 38-7 and 39-7 and Switchgears 33-1 and 34-1 are located in these fire zones. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in these areas.

4.5.3 Safe Shutdown Equipment

The redundant instrument racks 2203-7 and 2203-8 in Fire Zone 1.1.1.2 are located adjacent to the east and west sides of the inerted drywell (Figure C-1). These

racks contain redundant wide range level transmitters to control room indicators LI3-263-106A and B. The instrument racks 2203-5 and 2203-6 in Fire Zone 1.1.1.3 are located on the west side of the inerted drywell and near the east wall of Fire Zone 1.1.1.5.C (Figure C-1). These racks contain redundant narrow range level transmitters and wide range pressure transmitters to control room indicators LI3-640-29A and B and PI3-640-25A and B. Each instrument rack contains local reactor pressure and reactor water level indication.

4.5.4 Fire Hazards Analysis

4.5.4.1 Fire Zone 1.1.1.2

Each of the instrument racks located in Fire Zone 1.1.1.2 contain local reactor pressure and reactor water level indicators. The instrument racks are located adjacent to the east and west sides of the inerted drywell. Redundant wide range reactor water level transmitters are also present on each of the instrument racks. The routing from these transmitters to the dedicated instrument cable trays in Fire Zone 1.1.1.3 is shown on Figure C-1. The instrument racks and associated cabling are separated by a minimum of 100 feet on Fire Zone 1.1.1.2. (See Figure C-1).

Fire Zone 1.1.1.2 has complete fire detection which alarms in the control room. Manual hose stations and fire extinguishers are available in the event of a fire in this fire zone. A fire in this fire zone would be identified in the initial stages of development by the extensive fire detection system and would be acted upon immediately by the fire brigade with the manual fire protection equipment provided.

The routing of the instrument cables from the wide level transmitters on elevation 517 feet 6 inches is in conduit routed below the cable pans located near the ceiling as shown in Figure C-1. No cable trays are routed within 20 ft of the instrument racks and as electrical cabling is the majority of the fire load in this zone, it is unlikely that both transmitters will be damaged by a fire. Fire stops are in the cable trays that cross between the Division I and II sides of the reactor building. These trays are lightly loaded.

There are several reasons why a fire originating in one division of instrumentation in Fire Zone 1.1.1.2 would not affect the redundant division in Fire Zone 1.1.1.3 above. First, the floor between Fire Zones 1.1.1.2 and 1.1.1.3 is made of reinforced concrete with all electrical penetrations sealed. Second, the fire loading in this zone is less than 23,000 Btu/ft². Finally, the majority of the smoke from a fire in Fire Zone 1.1.1.2 would escape up to higher building elevations through the open 20-foot x 20-foot equipment hatch located on the south side of this fire zone.

As indicated in the above analysis, ample measures are in place to prevent spread of fire from one side of this fire zone to the other such as 100 feet horizontal separation, a extensive detection system with early alarming of a fire and fire stops in the cable trays. Therefore the addition of fixed suppression in this fire zone is unwarranted.

4.5.4.2 Fire Zone 1.1.1.3

The instrument racks 2203-5 and 2203-6 located in this fire zone contain redundant divisions of reactor wide range pressure and reactor narrow range water level transmitters. The instrument racks are located adjacent to the east side of the inerted drywell and the west side of Fire Zone 1.1.1.5.C (Figure C-1). The minimum separation between the redundant instrument racks and cables is 75 feet. The reactor pressure and reactor water level instrument cables are routed from the transmitters to dedicated cable trays which run along the east and west walls of this zone (approximately 150 feet apart).

The major source of combustible material in this fire zone is contained in cable insulation and the 4kV switchgear. Fire stops are installed in the lightly loaded cable trays to impede the spread of a fire along the intervening cable tray system. Since, fire stops are installed in the cable trays which run in the proximity of the instrument racks, a fire is not likely to disable both divisions of instrumentation located in this fire zone.

In the unlikely event that both divisions of reactor pressure and reactor water level transmitters in this fire zone are disabled by fire, local reactor pressure and reactor water level indicators are installed on the instrument racks located

in Fire Zone 1.1.1.2 below. This fire zone would remain free from the effects of a fire in Fire Zone 1.1.1.3 because all of the electrical penetrations through the reinforced concrete floor are sealed and there is no continuity between combustible material located on each floor.

Fire Zone 1.1.1.3 has an extensive fire detection system which would detect a fire in the early stages of development. This alarm would be immediately acted on by the fire brigade with the manual fire protection equipment provided in the form of hose stations and fire extinguishers located in this fire zone. The majority of smoke from a fire in Fire Zone 1.1.1.3 would escape up through the open equipment hatch located on the south side of this fire zone. The fire loading in this fire zone is less than 16,000 Btu/ft².

The above analysis indicates that because of the extensive fire detection available for the early detection of a fire in the fire zone and the manual suppression systems contained within the fire zone, automatic fixed suppression is unwarranted in this zone. In addition, redundant instrumentation is separated by a minimum of 75 feet with limited intervening combustibles (cables in cable trays); having fire stops to reduce fire spread. Also, local instrumentation in the fire zone below is available to the operators.

4.5.5 Conclusions

The previous analysis justifies an exemption request from the requirements of total area suppression and more than 20 feet of intervening space free from combustibles between redundant instrument trains. The technical bases that justify the exemption request are summarized as follows:

1. The minimum distance between divisions of reactor pressure and reactor water level instrumentation is 75 feet in Fire Zone 1.1.1.3 and 100 feet in Fire Zone 1.1.1.2. Therefore, at least one of the divisions of instrumentation will be available in the control room for a fire in the reactor building.
2. The routing of the reactor pressure and reactor water level instrumentation cables is from the racks to the dedicated cable trays or in conduit supported from cable trays.

3. Local reactor water pressure and level instrumentation is available on the instrument racks in each of the two zones.
4. Complete fire detection is available throughout both fire zones except over the heat exchanger area.
5. The fire loading in each zone is low.
6. Manual suppression in the form of hose stations and fire extinguishers is present.
7. The inadvertent operation of a fixed water suppression system in this area could result in fault or failure of major electrical equipment located in the area which would degrade plant safety.
8. Spread of fire along intervening cable trays is impeded through use of fire stops in the cable trays.

4.6 JUSTIFICATION FOR SEPARATION OF REDUNDANT ISOLATION CONDENSER CABLES

4.6.1 Introduction

There are two shutdown paths in the reactor building, the isolation condenser path A1 and the HPCI/LPCI path D. In the event of a fire in any of the fire zones which comprise one of the above shutdown paths, the alternate shutdown path could be used to shut down the reactor. The two shutdown paths are completely independent except for the redundant inboard isolation condenser valves power and control feeds. Appendix R requires that total area suppression and detection be installed throughout the fire area. The following analysis justifies the lack of total area suppression.

The normally open motor-operated inboard isolation condenser valves are located in the inerted drywell. The normal power and control feeds for these valves run from the main control room to MCC 38-1 located in Fire Zone 1.1.1.2 and from there into Fire Zone 1.4.1 and into the containment. Since a fire in Fire Zone 1.1.1.2 which uses shutdown path A1 could cause possible spurious operation of these valves resulting in possible cut-off of flow to or from the isolation condenser, alternate power and control feeds have been installed. These feeds are routed from the DG-2/3 to Unit 2 MCC 28-1. From the MCC, the cables are routed through the Unit 2 reactor building and into a 1-hour rated fire wrapped conduit in the Unit 3 Fire Zone 1.1.1.1. The cables then pass through the Fire Zone 1.1.1.1 ceiling and into Fire Zone 1.4.1 (Figure C-3). Fire Zone 1.1.1.1 contains cabling and equipment for the HPCI/LPCI shutdown path.

4.6.2 Fire Protection System

The alternate power and control feeds from the Unit 2 MCC 28-1 are routed in a 1-hour rated wrapped conduit through Fire Zone 1.1.1.1 (Unit 3 torus area). Fire Zone 1.1.1.1 has linear thermal detectors in and under the cable trays in this fire zone. Fire Zone 1.1.1.2 has complete detection which alarms locally and in the main control room. The fire zones which have either the main or alternate inboard isolation condenser valves power and control feeds have manual hose stations and fire extinguishers.

4.6.3 Safe Shutdown Equipment

The safe shutdown equipment discussed in this justification consists of (a) the main and alternate power and control feed, and (b) the MCC power feed for the inboard isolation condenser valves. The alternate power and control feed is routed in a 1-hour rated wrapped conduit through Fire Zone 1.1.1.1 from MCC 28-1. The main power and control feed is located in Fire Zone 1.1.1.2 and is connected to MCC 38-1 also in the fire zone.

4.6.4 Fire Hazards Analysis

A fire in Fire Zone 1.1.1.2 could potentially damage the normal power and control feeds causing spurious closure of these normally open valves. Closure of these valves would make the isolation condenser shutdown path A1, normally used in the event of a fire in Fire Zone 1.1.1.2, inoperable. To recover from this possible spurious operation, a separate power and control feed from DG-2/3 has been added. These cables are routed in a 1-hour rated wrapped conduit through Fire Zone 1.1.1.1 (the torus area which contains cables and equipment used in the HPCI/LPCI shutdown method) and into Fire Zone 1.4.1 which contains only cabling associated with the isolation condenser shutdown path (Figure C-3). The conduit is routed separately from the major source of combustibles in Fire Zone 1.1.1.1, the cable insulation. The controls located in the DG-2/3 room enable an operator to reopen a spuriously operated closed valve.

The fire loading in Fire Zone 1.1.1.1 is less than 1,000 Btu/ft². Both Fire Zones 1.1.1.1 and 1.1.1.2 are equipped with manual hose stations and fire extinguishers. Transient loads are controlled by administrative procedures. An exemption is requested from Appendix R Section III.G.3 requirement for fixed suppression throughout the zone.

4.6.5 Conclusions

This analysis justifies exemption from complete fire suppression in the area between alternate shutdown cables. Justification for this is as follows:

1. The alternate inboard isolation condenser valves power and control feeds are protected with a 1-hour rated fire wrap throughout their routing in Fire Zone 1.1.1.1.
2. The routing of the conduit in Fire Zone 1.1.1.1 is separated from the cable trays which represents the only major combustibles in this fire zone (Figure C-3).
3. The combustible loading in Fire Zone 1.1.1.1 is negligible (less than 1,000 Btu/ft²).
4. Fire detection in the form of linear thermal detectors which alarm in the main control room is installed in and under the cable trays in Fire Zone 1.1.1.1.
5. Manual hose stations and portable fire extinguishers are available in both Fire Zones 1.1.1.1 and 1.1.1.2.

4.7 JUSTIFICATION FOR LACK OF FIRE SUPPRESSION BETWEEN REDUNDANT POWER AND CONTROL CABLES

4.7.1 Introduction

The 2/3 diesel generator is used to provide power for shutting down the affected units in the event of a fire, for most fire zones. The DG-2/3 area is located south of the Unit 3 reactor building. All redundant DG-2/3 auxiliaries control, power, and excitation cables are routed through Fire Zones 1.1.1.2 and 1.1.1.3 to the DG-2/3 room. Appendix R requires enclosure of one redundant division in a barrier having a 1-hour rating. In addition, fire detection and automatic fire suppression are required throughout the fire area.

The DG-2/3 supply of the Unit 2 4-kV bus duct and the diesel generator auxiliaries power and control cables are enclosed in a 1-hour rated wrap. The major source of in-situ combustible material in the area around the equipment is a limited amount of cable insulation.

4.7.2 Fire Protection System

The ground floor and second floor of the Unit 3 reactor building, Fire Zones 1.1.1.2 and 1.1.1.3, contain fire detection throughout (Figures B-2 and B-3). These detectors alarm in the main control room. There is a manual hose station and a portable extinguisher is available for use in the southeast corner of these fire zones.

MCC's 38-7 and 39-7 and Switchgears 33-1 and 34-1 are located in these fire zones. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in these areas.

4.7.3 Safe Shutdown Equipment

DG-2/3 is capable of supplying power to either Unit 2 or Unit 3 Division I equipment. The 4-kV power feeds from DG-2/3 are routed on the southeast corner

elevation 517 feet 6 inches in the Unit 3 reactor building through two bus ducts which run to the Unit 2 and Unit 3 switchgear located on elevation 545 feet 0 inch of the Unit 2 and Unit 3 reactor building, respectively. Also routed through the southeast corner of elevation 517 feet 6 inches are the DG-2/3 and auxiliaries power and control cables. These cables pass straight up through the floor of elevation 545'-6", where they run horizontally less than one foot above the floor to Unit 2.

4.7.4 Fire Hazards Analysis

Located in the southeast corner, in the vicinity of the DG-2/3 bus duct, are two cable trays containing power and control cables for Unit 3 equipment. These cable trays are lightly loaded and represent the only major source of combustibles in the corner. The cable trays are located at elevation 542 feet 5 inches and 535 feet 3 inches. The 1-hour wrapped 4-kV bus duct passes over the cable trays at elevation 536 feet 0 inch. The vertical 1-hour wrapped conduit containing the auxiliary control cables is routed several feet west of the lightly loaded cable trays. The 1-hour wrap material will provide adequate protection from any exposure fire involving the cable trays. The fire load over the entire Fire Zone 1.1.1.2 is 23,000 Btu/ft². The fire load in the southeast corner is less than 2,000 Btu/ft².

Fire Zone 1.1.1.3 contains no fixed combustibles in the vicinity of the 1-hour wrapped conduit carrying the DG 2/3 and auxiliaries power and control cables. All cable trays are located more than fifteen feet above the conduit, except for an enclosed riser that passes nearby at column row 45. The riser is fire stopped at the floor penetration. The fire load over the entire Fire Zone 1.1.1.3 is less than 16,000 Btu/ft².

Transient combustibles in these fire zone are controlled by administrative procedures. Therefore a floor exposure fire could not jeopardize the integrity of the DG 2/3 equipment with a 1-hour fire resistive barrier. This, in conjunction with the early warning fire detection, will provide adequate protection.

4.7.5 Conclusions

This analysis justifies exemption from complete fire suppression in the area between alternate power and control cables. The technical bases for this justification are summarized as follows:

1. The Unit 2 control cables, which are in conduit, and the Unit 2 4-kV bus duct are protected from fire by a 1-hour rated fire barrier.
2. The localized fire loading in the southeast corner of Fire Zone 1.1.1.2 is very low (less than 2,000 Btu/ft²) with an average combustible loading less than 23,000 Btu/ft².
3. Where the 1-hour wrapped cables pass through Fire Zone 1.1.1.3, they are very close to the floor and away from all fixed combustibles. The fire loading in this zone is less than 16,000 Btu/ft².
4. Manual suppression in the form of a hose station and a fire extinguisher is available for use near this corner.
5. Complete detection, which alarms in the main control room, is installed throughout the fire zone to provide early warning.
6. The inadvertent operation of a fixed water suppression system in this area could result in fault or failure of major electrical equipment located in the area which would degrade plant safety.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 4.8, Justification for lack of complete 3-hour barriers around Fire Zone 1.4.1). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

4.8 JUSTIFICATION FOR LACK OF COMPLETE FIRE BARRIERS AROUND FIRE ZONE 1.4.1

4.8.1 Introduction

Fire Zone 1.4.1 contains the power and control feeds to the inboard isolation condenser valves located in the inerted drywell. The floor, ceiling and walls are 3 hour rated barriers except for unsealed mechanical penetrations in the west wall of adjoining the main steam pipe chase and the floor adjoining Fire Zone 1.1.1.1.

Appendix R Sections III.G.3 and III.L requires that alternate shutdown paths be separated by complete 3-hour rated fire barriers. The subsequent analysis provides justification for an exemption to these requirements with regard to the penetrations in the floor and walls surrounding Fire Zone 1.4.1

4.8.2 Fire Protection System

Fire Zone 1.4.1 contains complete fire detection and has a manual hose station and fire extinguisher available in the event of a fire in this fire zone.

4.8.3 Safe Shutdown Equipment

The only Appendix R hot shutdown components contained in Fire Zone 1.4.1 are the power and control feeds to the inboard isolation condenser valves which are located in the inerted drywell. There is no safe shutdown equipment located in the steam pipe chase. The alternate power and control cables to the inboard isolation condenser valves (protected with a 1-hour fire wrap conduit) and valves associated with the LPCI system are routed through the torus basement Fire Zone 1.1.1.1.

4.8.4 Fire Hazards Analysis

The west wall contains an unsealed mechanical penetration. This penetration is open to the steam pipe chase. Sealing of the penetration would not increase the protection of power and control feeds to the inboard isolation condenser valves

located in the inerted drywell because the steam pipe chase contains negligible combustibles.

The steam pipe chase is part of secondary containment and is surrounded by thick reinforced concrete shield walls. The penetrations in the surrounding barriers are sealed with noncombustible seals. Water suppression is provided on the turbine building side of these barriers. Detection is provided in the reactor building. Access to the steam pipe chase is gained from the turbine building through double non-rated doors. The combustible loading in the steam pipe chase is low and there is no continuity of combustibles. Transient combustibles are limited by access to this high radiation area. The steam pipe chase does not have suppression or detection.

The equipment located in the steam pipe chase is not part of any of the shutdown paths identified in Section 3.8.1. In addition, both the steam pipe chase and Fire Zone 1.4.1 are high radiation areas. If a fire seal were to be installed, the personnel exposure would be significant. Since the installation of a fire seal would not significantly increase the level of protection in Fire Zone 1.4.1, the penetration will not be sealed.

The floor contains an 8'6" x 2'3" opening which is covered by steel plate with some pipe openings. Also in the general floor are three additional unsealed mechanical penetrations. Beneath Fire Zone 1.4.1 is the torus area Fire Zone 1.1.1.1. Fire Zone 1.4.1 and 1.1.1.1 have low combustible loadings (5,000 Btu/ft², and 1000 Btu/ft² respectively). Fire Zone 1.4.1 has complete fire detection. There is a minimum of 40 feet horizontal separation between the floor penetration and the only fixed combustible (cable in cable pans) in the torus level. No cables associated with the isolation condenser method of shutdown are routed in Fire Zone 1.1.1.1, except for the 1-hour fire wrapped alternate feed to the inboard isolation condenser valves. Linear fire detection is provided in and under the cable trays in this fire zone. Any combustibles which pass through the floor are sealed. There is no continuity of combustibles through the open mechanical penetrations.

4.8.5 Conclusions

Based on this analysis, the intent of Appendix R requirements are met and Fire Zone 1.4.1 is an equivalent fire area. The justification for an exemption from complete 3-hour fire barriers is summarized as follows:

1. Fire Zone 1.4.1 has complete fire detection. It has a low combustible loading. Also manual fire protection is available in the event of a fire.
2. The steam pipe chase contains no safe shutdown equipment and the combustibles are negligible.
3. Fire Zone 1.4.1 and the steam pipe chase are high radiation areas and the sealing of the mechanical penetration would not increase the level of fire protection.
4. There is a minimum of 40 feet separation between cables in the torus area (Fire Zone 1.1.1.1) and the unsealed penetration to Fire Zone 1.4.1. There is no equipment or cabling associated with the isolation condenser method of shutdown in Fire Area 1.1.1.1.
5. All the cable trays in Fire Zone 1.1.1.1 are protected by linear fire detection in and under the cable trays. Fire Zone 1.1.1.1 has a very low combustible loading.
6. There is no continuity of combustibles through the open penetrations in the fire zone boundaries. Therefore, a fire will not propagate beyond the boundary into adjacent zones.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECO) has withdrawn the following exemption request (Section 4.9, Justification for lack of complete 3-hour fire barriers around Fire Zone 1.3.1). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECO has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

4.9 JUSTIFICATION FOR LACK OF COMPLETE FIRE BARRIERS AROUND FIRE ZONE 1.3.1

4.9.1 Introduction

The method of bringing Unit 3 to cold shutdown in the event of a fire, for all fire zones except Fire Zone 1.3.1 and 1.1.1.3, is the shutdown cooling method. In Fire Zone 1.3.1, which is part of Fire Area RB3-II, the presence of the shutdown cooling pumps preclude the use of the shutdown cooling system. The barrier surrounding Fire Zone 1.3.1 has been upgraded to an equivalent 3-hour barrier. The subsequent analysis provides justification that the barrier surrounding Fire Zone 1.3.1 will protect these pumps from a fire in any adjacent fire zone and that the shutdown cooling system will be available in case of fire in Fire Area RB3-II.

The floor, ceiling and walls of this fire zone are 3-hour rated except for the following:

1. The ceiling contains an unsealed mechanical opening which consists of an HVAC duct with no fire damper and 3 pipes partially protected by a steel plate (see Figure C-2).
2. The east wall contains an unsealed ventilation louver and mechanical penetration open to the main steam pipe chase.
3. The floor contains an unsealed mechanical penetration leading to Fire Zone 1.1.1.1 which is part of Fire Area RB3-II.

4.9.2 Fire Protection System

Fire Zone 1.3.1 has complete photoelectric fire detection which alarms in the control room. A manual hose station and fire extinguisher are available in the event of a fire in this zone. A wet pipe sprinkler system protects the area above the HVAC duct and mechanical penetration (three pipes) leading to Fire Zone 1.1.1.3.

4.9.3 Safe Shutdown Equipment

There is no hot shutdown equipment located in Fire Zone 1.3.1. The cold shutdown equipment in this fire zone consists of three shutdown cooling pumps, their respective suction valves and associated power and control cabling.

4.9.4 Fire Hazards Analysis

The ceiling contains an HVAC duct and three pipes. These penetrations are surrounded by a concrete block wall from Elevation 545 feet 6 inches to 551 feet 6 inches in Fire Zone 1.1.1.3 (see Figure C-2). At the top of this wall is a steel plate with openings cut for the HVAC duct and the pipes which continue into Fire Zone 1.1.1.3. The immediate vicinity of the pipes and duct penetrations is protected by a wet pipe sprinkler. Since both fire zones have low combustible loading this sprinkler would either contain a fire in Fire Zone 1.3.1 if it should originate there, or keep a fire from entering if it occurs outside. Both fire zones have complete fire detection. Fire Zone 1.3.1 is high radiation area. If a fire damper and seals were to be installed, the radiation exposure would be significant.

The east wall contains a ventilation louver with no fire damper and an adjacent mechanical penetration. This wall contacts the main steam pipe chase. A fire damper installed over the louver, or sealing of the penetration, would not increase the protection of the shutdown cooling pumps because the steam pipe chase contains negligible combustibles.

The steam pipe chase is part of secondary containment and is surrounded by thick reinforced concrete shield walls. The penetrations in the surrounding barriers are sealed with noncombustible seals. Water suppression is provided on the turbine building side of these barriers. Detection is provided in the reactor building. Access to the steam pipe chase is gained from the turbine building through double non-rated doors. The combustible loading in the steam pipe chase is low and there is no continuity of combustibles. Transient combustibles are limited by access to this high radiation area. The steam pipe chase does not contain suppression or detection. In addition, the equipment located in the main steam pipe chase is not part of any of the shutdown paths identified in Section 2.0.

Both the main steam pipe chase and Fire Zone 1.3.1 are high radiation areas. If the penetrations were to be sealed, the exposure would be significant. Therefore, in keeping with ALARA guidelines and since the installation of a fire damper would not significantly increase the level of protection in Fire Zone 1.3.1, the fire damper will not be installed nor will the penetration be sealed.

The floor contains a 3-foot 0-inch by 4-foot 3-inch opening which is covered by steel plate with some pipe openings. Also in the floor are additional unsealed mechanical penetrations. Beneath Fire Zone 1.3.1 is the torus area Fire Zone 1.1.1.1. Both Fire Zone 1.3.1 and 1.1.1.1 have low combustible loading (14,900 Btu/ft², and 800 Btu/ft² respectively). Fire Zone 1.3.1 has complete photo-electric fire detection. There is a minimum of 40 feet horizontal separation between the floor penetration and the cable pans in the torus level below. There are no intervening combustibles which are unsealed passing through the barrier. There is no continuity of combustibles through the open mechanical penetrations.

4.9.5 Conclusions

Based on this analysis, the intent of Appendix R requirements are met. Fire Zone 1.3.1 is therefore considered an equivalent fire area. The justification for an exemption from complete 3-hour fire barriers is summarized as follows:

1. Fire Zone 1.3.1 has complete fire detection. It has a low combustible loading. Also, manual fire protection is available in the event of a fire.
2. Adjacent Fire Zone 1.1.1.2 has complete fire detection. It has low combustible loading.
3. A wet pipe sprinkler protects the mechanical penetration into 1.1.1.3. The installation of a fire damper and sealing of the penetration would not increase the level of protection.
4. The main steam pipe chase contains no safe shutdown equipment and negligible combustibles.
5. Fire Zone 1.3.1 and the main steam pipe chase are high radiation areas. The installation of a fire damper and sealing of the penetration would not increase the level of protection between these fire zones.

6. There is minimum of 40 feet separation between cables in the torus area (Fire Zone 1.1.1.1) and the unsealed penetration to Fire Zone 1.3.1.
7. Cable trays in Fire Zone 1.1.1.1 have linear heat detection provided in and under the trays. Fire Zone 1.1.1.1 has a very low combustible loading.
8. There is no continuity of combustibles through these open penetrations in the fire zone boundaries. Therefore, a fire will not propagate beyond the boundary into adjacent zones. This has been ensured due to separation of combustibles (of which there is very small amount); water suppression above the opening in the ceiling and provision of early warning fire detection systems.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 4.10, Justification for separation between mechanical components of Redundant Cold Shutdown Systems). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

4.10 JUSTIFICATION FOR SEPARATION BETWEEN MECHANICAL COMPONENTS OF REDUNDANT COLD SHUTDOWN SYSTEMS

4.10.1 Introduction

There are two shutdown methods which have been identified to bring Unit 3 to cold shutdown: shutdown cooling (SC) and Low Pressure Coolant Injection (LPCI). Of these SC has been identified as available throughout the turbine building and a majority of reactor building fire zones.

In the Unit 3 reactor building fire area, the shutdown cooling system can be used for cold shutdown in every fire zone except for the mezzanine floor, Fire Zone 1.1.1.3 (Fire Area RB3-II) and the shutdown cooling pump room, Fire Zone 1.3.1 (Fire Area RB3-II). On the mezzanine floor, the presence of the RBCCW pumps precludes the use of the shutdown cooling system. In the shutdown cooling pump room, the presence of the shutdown cooling pumps preclude the use of the shutdown cooling systems.

This exemption request justifies the presence of redundant mechanical cold shutdown equipment i.e., RBCCW and LPCI pumps and associated motors, in the same fire area. This equipment is separated by two floor elevations as well as horizontal separation. Only the analysis for availability of cold shutdown mechanical equipment (pumps and associated motors and valves) is involved. Electrical equipment within each of the reactor building fire areas i.e., RB3-I and RB3-II was assumed functionally disabled if a fire is postulated to occur anywhere within that fire area. The functional capability of mechanical equipment was assumed lost only if the fire occurred in the particular fire zone where the equipment is located except in two cases where the redundant valving is located in the fire zone of intended use. One of these valves are assumed to retain its manual operability. Subsection 4.10.4 provides justification for the separation between adjacent fire zones which assures the functional capability of at least one train of mechanical cold shutdown equipment. This equipment can be operated if a temporary feed from a power source in the other unit is provided.

4.10.2 Fire Protection System

The reactor building has complete fire detection except as listed below. The fire zones which do not have complete detection either contain no safe shutdown equipment or have very low fire loading, i.e., less than 1000 Btu/ft². The fire zones are:

- 1.1.1.1 Torus Basement
- 1.1.1.5.B Isolation Condenser Pipe Chase
- 1.1.1.5.C Isolation Condenser Pipe Chase
- 1.1.1.6 Refueling Floor
- 1.1.1.3 Mezzanine Floor (above heat exchanger area)

4.10.3 Safe Shutdown Equipment

The cold shutdown mechanical equipment located in the reactor building is listed in Table 4.10-1.

4.10.4 Fire Hazards Analysis

The reactor building is divided into fire zones by floor elevations. These floor slabs present a substantial barrier to the spread of fire. However, they are not fire rated. The combustible loading is low and area-wide automatic fire detection would ensure that the fire was detected and extinguished before it spread to adjacent floor elevations disabling the mechanical components and their operators. The electrical penetrations through the floor are sealed. A 20-foot by 20-foot hatchway exists in each floor from elevation 545 feet 6 inch to elevation 613 feet 0 inch. This open path allows smoke and hot gases to escape to the refuel floor thus limiting the smoke damage to equipment above the fire zone containing the fire. Hose stations and manual fire extinguishers are located throughout the reactor building.

The location of the valving associated with the shutdown cooling and the LPCI methods of achieving cold shutdown are listed in Table 4.10-1. The valving is generally assumed to retain mechanical operability after a fire. The major

components i.e., pumps and associated motors, of the LPCI/CCSW and the shutdown cooling methods of achieving cold shutdown are located in different fire zones. The pumps associated with the shutdown cooling method are located in Fire Zones 1.1.1.3 and 1.3.1 which do not adjoin Fire Zone 1.1.1 (which contains the LPCI pumps). The following provides justification for the separation between adjacent fire zones which assures the availability of these major components.

4.10.4.1 Fire Zone 1.1.1.3 (Elevation 545 feet 6 inches)

The cold shutdown equipment contained in this fire zone is listed in Table 4.10-1. The RBCCW pumps are located on the floor between column rows L-M and 48-49. The main combustible at the floor level is the 4kV switchgear which is located at least 15 feet from the pumps. The other major source of combustibles in this zone are cables in cable trays near the ceiling. The electrical penetrations through the floor and ceiling are sealed. Smoke and hot gases from a fire in this zone would escape up the 20-foot by 20-foot equipment hatch located between column rows M-N and 45-46. The pumps are located approximately 50 feet from the open hatch. The fire zone is provided with complete ionization detection except above the regenerative and nonregenerative heat exchanger area. The combustible load in this fire zone is less than 16,000 Btu/ft² and is composed mainly of cable in cable trays. There is no continuity of combustibles between zones and transient combustibles are controlled by administrative procedure. Therefore, a fire starting in this fire zone will not spread to adjacent zones. The LPCI pumps are approximately 70 feet below in Fire Zone 1.1.1.1 and no LPCI pumps or motors are located in the intervening Fire Zone 1.1.1.2.

4.10.4.2 Fire Zone 1.1.1.2 (Elevation 517 feet 6 inches)

The cold shutdown equipment contained in this fire zone is listed in Table 4.10-1. There is no mechanical equipment associated with the shutdown cooling method of achieving cold shutdown which has been identified for use in this fire zone. This fire zone has complete fire detection which alarms in the control room. Hose stations and manual fire extinguishers are located in this fire zone. Fire Zone 1.3.1 which contains the shutdown cooling pumps is separated from this fire zone by equivalent 3-hour barriers (See Section 4.9). The electrical

penetrations in the floor and ceiling are sealed. Transient combustibles are controlled by administrative procedure and there is no continuity of combustibles between fire zones therefore a fire starting in this fire zone will not spread to adjacent fire zones. The majority of combustibles in this fire zone, cable in cable trays are located near the ceiling. The only components of either cold shutdown method located in this fire zone are LPCI valves which can be manually operated.

4.10.4.3 Fire Zone 1.3.1 (Elevation 517 feet 6 inches)

This fire zone is separated from adjacent fire zones by equivalent 3-hour barriers (see Section 4.9). The cold shutdown equipment located in this fire zone is listed in Table 4.10.1.

4.10.4.4 Fire Zone 11.1.1 (Elevation 476 feet 6 inches)

The cold shutdown equipment in this zone is listed on Table 4.10-1. The LPCI pumps located in this zone are on the floor between column rows M-N and 49-50. This fire zone is protected by complete thermal fire detection. The combustible loading is less than 17,000 Btu/ft². The electrical penetrations through the ceiling are sealed. Smoke and hot gases from any fire in this zone would escape up the open stairwell in the ceiling and into the open hatchway which starts at the 545 foot 6 inch elevation. There is no continuity of combustibles and transient combustibles are administratively controlled. Therefore, a fire starting in this fire zone would not spread to adjacent fire zones. The major components, pumps and associated motors, of the shutdown cooling method of achieving cold shutdown are located in Fire Zone 1.3.1 which is surrounded by equivalent 3-hour barriers and Fire Zone 1.1.1.3 which is located approximately 70 feet above.

4.10.5 Conclusion

Based on the protection described above, the ability to safely achieve cold shutdown is insured and the intent of Appendix R for cold shutdown is satisfied. The separation of the redundant pumps, motors and valves ensure that one of the

two shutdown methods can be employed, even though the cables to the pumps may be destroyed, because the motors of at least one of the independent trains will be unaffected by fire. Procedures have been developed to power the unaffected pumps from an unaffected 4kV power source. Justification for this is as follows:

1. The redundant cold shutdown mechanical components employed have approximately 70 feet vertical separation.
2. The floor elevation (Fire Zone 1.1.1.2) between these two fire zones has complete ionization detection and a fire loading of less than 23,000 Btu/ft².
3. There is no continuity of combustibles between Fire Zones 1.1.1.1, 1.1.1.2 and 1.1.1.3.
4. Both the LPCI and the RBCCW pumps are located a minimum of 50 feet from the 20-foot by 20-foot equipment hatch.

TABLE 4.10-1MECHANICAL COLD SHUTDOWN EQUIPMENT CONTAINED IN THE UNIT 3 REACTOR BUILDING
FIRE AREAS RB3-I and RB3-IIFire Zone 1.1.1.1Shutdown Cooling

1. SC Valve M03-1001-5A
2. SC Valve M03-1001-5B
3. RBCCW Valve M03-3702
4. RBCCW Valve M03-3703

LPCI, Division II

1. LPCI Valve M03-1501-22B
2. LPCI Valve M03-1501-20B
3. LPCI Valve M03-1501-38B
4. LPCI Valve M03-1501-18B
5. LPCI Valve M03-1501-19B
6. LPCI Valve M03-1501-13B
7. LPCI Valve M03-1501-32B

Fire Zone 1.1.1.2LPCI, Division II

1. LPCI Valve M03-1501-21B
2. LPCI Valve M03-1501-27B
3. LPCI Valve M03-1501-28B

Fire Zone 1.1.1.3Shutdown Cooling

1. SC Heat Exchangers
3A-1003
3B-1003
3C-1003
2. RBCCW Pumps and Associated Motors
3A-3701
3B-3702
3. RBCCW Heat Exchangers
2A-3702
2B-3702
2/3-3702

TABLE 4.10-1 (Cont'd)

4. RBCCW Valve M03-3701
5. RBCCW Valve M03-3704
6. Service Water Valve TCV-3-3904A
7. Service Water Valve TCV-3-3904B
8. SC Valve M03-1001-4A
9. SC Valve M03-1001-4B
10. SC Valve M03-1101-4C

Fire Zone 1.3.1Shutdown Cooling

1. SC Pumps and Associated Motors

3A-1002
3B-1002
3C-1002

2. SC Valves

M03-1001-2A
M03-1001-2B
M03-1001-2C

Fire Zone - 11.1.1LPCI, Division II

1. LPCI Pumps and Associated Motors

3C-1502
3C-1502

2. LPCI Emergency Air Cooler 3-5746B
3. LPCI Valve M03-1501-3B
4. LPCI Valve M03-1501-5C
5. LPCI Valve M03-1501-5D
6. LPCI Valve M03-1501-11B
7. LPCI Valve M03-1501-32B

5.0 TURBINE BUILDING APPENDIX R EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Sections III.G.3 and III.L of Appendix R to 10 CFR 50 to the extent that the alternative shutdown capability criteria of III.G.3 and III.L would have to be met for the Eastern, Western, and Central Zone Groups of the Dresden 2&3 turbine building. CECo specifically requests exemption from:

1. The requirement of III.G.3 and III.L that the Eastern, Western, and Central Zone Groups be separated from each other and other fire area zone groups by complete 3-hour barriers, and
2. The requirement of III.G.3 that all zones in the three zone groups be provided with complete fire detection and fixed fire suppression.

The justifications for these exemptions are presented in the following sections:

<u>SECTION</u>	<u>JUSTIFICATION FOR:</u>
5.2	Lack of Complete Fire Barriers Surrounding Turbine Building Zone Groups
5.3	Lack of Complete Suppression and Detection in the Eastern Zone Group
5.4	Lack of Complete Suppression and Detection in the Western Zone Group
5.5	Lack of Complete Suppression and Detection in the Central Zone Group

5.1 TURBINE BUILDING AREA DESCRIPTION

The turbine building is typical of configurations found in all BWR's. The building is subdivided by extensive shield walls extending from floor to ceiling but formal fire walls are limited to very few building sections which include the control room and auxiliary electric equipment room (Fire Area TB-V), turbine oil storage area (Fire Zone 8.1), and diesel generator rooms (Fire Zones 9.0.A and 9.0.B). Figures B-7, B-9 and B-10 show the fire protection systems.

Fire Area TB-IV which is comprised of the turbine operating floor, the north and south vent floors and the off-gas recovery rooms does not contain any safe shutdown cabling or equipment. In addition, fixed water suppression systems are provided to protect the major hazards (which include the recirculation pump MG sets) in this zone.

The remainder of the turbine building (with the exception of Fire Zones 2.0 and 6.2) have been combined into three groups of zones: the Eastern Zone Group (TB-I), the Western Zone Group (TB-III), and the Central Zone Group (TB-II) as shown on Figure A-3. Fire Zones 2.0 and 6.2 form Fire Area TB-V.

All floors of the Eastern Zone Group of the turbine building (Fire Zones 8.2.1.A, 8.2.2.A, 8.2.5.A, 8.2.5.B, 8.2.6.A, 8.2.6.B, 8.2.7, 7.0.A, 8.1, and 9.0.A) contain Unit 2 cabling and equipment. If a fire were to occur in this portion of the station, only Unit 2 would be affected. Shutdown of this unit could be accomplished by utilizing the isolation condenser shutdown path B1.

The Central Zone Group on the ground and mezzanine floor levels of the turbine building (Fire Zones 8.2.5.C and 8.2.6.C) contain some cabling related to both Units 2 and 3. However, necessary cabling and equipment related to isolation condenser shutdown path A2 for Unit 2 and isolation condenser shutdown path B2 for Unit 3 are either unaffected by a fire in this zone group or are protected by a 1-hour rated wrap. The swing diesel generator (DG 2/3) supplies power to the minimal equipment required to shut down both units.

The Western Zone Group of the turbine building (Fire Zones 8.2.1.B, 8.2.2.B, 8.2.4, 8.2.5.D, 8.2.5.E, 8.2.6.D, 8.2.6.E, 6.1, 7.0.B, and 9.0.B) contains Unit 3 cabling and equipment on all elevations. A fire in these zones will only impact Unit 3 shutdown so isolation condenser shutdown path A1 is available for Unit 3 shutdown for a fire in these zones.

Fire Areas TB-V (control room/AEER) is separated from the Eastern Zone Group by complete 3-hour fire barriers.

The two central turbine building zones (8.2.5.C and 8.2.6.C) are separated from the Eastern and Western Zone Groups by shield walls on the mezzanine and ground floor levels with the exception of a stairwell leading down to Fire Zone 8.2.2.A and a corridor which penetrates these comprehensive concrete barriers extending from floor to ceiling on the ground level (517-foot 6-inch elevation) along column/row G and between column/rows 40 and 48. The shield walls are not specifically fire rated but are substantial reinforced concrete construction with cable penetrations sealed with noncombustible material. Personnel access is through substantial, metal doors. The corridor permits unimpeded access between Unit 2 and Unit 3. Automatic detection and water suppression are utilized to prevent fire spread down this corridor. In addition, Unit 3 cables which are a concern are enclosed with a 1-hour rated wrap for approximately 75 feet at the junction between the Central and Western Zone Groups. The presence of the fire detection, general sprinklers, water spray for major hazards, and cable wraps ensure that a fire in any of the zone groups could not affect the alternate shutdown in the adjacent zone group. The Unit 2 cables of concern are widely separated from the Central Zone Group by one floor elevation and approximately 100-foot horizontal separation. The Central Zone Group is sprinklered on the mezzanine level and is protected by a combination of automatic sprinklers and/or fire detection on the ground floor.

The Unit 3 cable tunnel (Fire Zone 8.2.4) is considered a part of the Western Zone Group. This tunnel passes from the Western Zone Group beneath the Central and Eastern Zone Groups to the auxiliary electric equipment room (TB-V). The tunnel is separated from the Central and Eastern Zone Groups by checkered plate hatches and reinforced concrete and from Fire Area TB-V by a 3-hour rated wall and door. Automatic detection and sprinklers are provided above each access hatch.

The tunnel has also been protected by complete fire detection and closed head water spray. This protection adequately ensures separation of the zone groups.

The eastern central and western zone groups are separated from the main operating floor (TB-IV) by a substantial reinforced concrete floor which is supported by exposed structural steel. This floor contains unsealed mechanical penetrations and open hatches and stairwells leading to the three fire area zone groups. The three fire area zone groups are separated from the Unit 2 and Unit 3 reactor buildings by a reinforced concrete barrier which is an equivalent 3-hour rated barrier. The separation between the Central Zone Group and the Radwaste Building is composed of substantial concrete or concrete block walls.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 5.2, Justification for lack of complete fire barriers surrounding Turbine Building Zone Groups). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

5.2 JUSTIFICATION FOR LACK OF COMPLETE FIRE BARRIERS SURROUNDING TURBINE BUILDING ZONE GROUPS

5.2.1 Introduction

The three major zone groups in the turbine building - the Eastern, Western, and Central Zone Groups - are comprised of individual fire zones on several elevations. Tables 5.2-1, 5.2-2, and 5.2-3 detail which zones make up the Eastern, Western, and Central Zone Groups, respectively. The zone groups are shown schematically on Figure A-3.

For a fire in one of these three zone groups, the affected unit (or units) is to be taken to hot shutdown using alternative shutdown methods which utilize equipment and cables that are located in the other two zone groups or protected by a 1-hour barrier and suppression and detection in the zone group for which they are used. An exemption to Appendix R is required for this configuration since the boundaries between the zone groups are not complete fire barriers. As the subsequent analysis demonstrates, sufficient protection is provided between the zone groups to ensure that for a fire in one zone group the other two zone groups will be free of fire damage and are, therefore, treated as fire areas. Also that a fire in a zone group or fire area external to these will not damage equipment or cabling in any more than one zone group fire area.

The only interfaces between the Eastern and Central Zone Groups are on the mezzanine, ground and basement floor elevations. The fire protection features of these interfaces are discussed in the Fire Hazards Analysis, Subsection 5.2.4.

The only interface between the Eastern and Western Zone Groups involves the Unit 3 cable tunnel (Fire Zone 8.2.4) which is part of the Western Zone Group and runs underneath Fire Zone 8.2.5.A and 8.2.5.B of the Eastern Zone Group. The fire protection features of this interface are discussed in the Fire Hazards Analysis, Subsection 5.2.4.

The interfaces between the Western and Central Zone Groups are on the mezzanine level and the ground floor level, and below the ground floor level where the Unit 3 cable tunnel crosses underneath the Central Zone Group. The fire protection features of these interfaces are discussed in the Fire Hazards Analysis, Subsection 5.2.4.

5.2.2 Fire Protection System

The extensive fire protection systems in the turbine building are shown on Figures B-7 through B-16. They are described in detail in the Fire Hazards Analysis, Subsection 5.2.4, of this request and Sections 5.3, 5.4, and 5.5 which follow.

5.2.3 Safe Shutdown Equipment

Appendix R hot shutdown equipment located in the Eastern, Western, and Central Zone Groups is listed in Tables 5.2-4, 5.2-5, and 5.2-6, respectively. Also listed in the tables are the shutdown paths for which the equipment is utilized.

The following alternate shutdown path(s) are available for a fire in a given zone group:

<u>Location of Fire</u>	<u>Shutdown Path Available for Unit 2</u>	<u>Shutdown Path Available for Unit 3</u>
Eastern Zone Group	B1	Normal
Western Zone Group	Normal	A1
Central Zone Group	A2	B2

For the Central Zone Group, simultaneous shutdown of both units may be required. Adequate manpower is available to accomplish simultaneous shutdown.

5.2.4 Fire Hazards Analysis

In the event of a fire in any one of the three major Turbine Building Zone Groups - Eastern, Western, and Central - the affected unit (or units) could be shut down

using an alternate shutdown path which utilizes equipment and/or cabling in the other two zone groups, except in the Central Zone Group where protection is provided in accordance with Appendix R Section III.G.2. Specifically:

1. For a fire in the Eastern Zone Group, only Unit 2 would be affected. This unit could be shut down using isolation condenser alternate shutdown path B1. All equipment and cables required by this shutdown path are independent of the Eastern Zone Group with the exception of certain Unit 3 control cables which are routed in cable risers adjacent to Fire Area TB-V. However, these cables are protected with a 1-hour barrier and automatic suppression and fire detection in accordance with Appendix R Section III.G.2 requirements.
2. For a fire in the Western Zone Group, only Unit 3 would be affected. This unit could be shut down using isolation condenser alternate shutdown path A1. All equipment and cables required by this shutdown path are independent of the Western Zone Group.
3. For a fire in the Central Zone Group, provisions have been made to ensure that it is possible to shut down both units simultaneously by alternate means. Given this situation, Unit 2 could be shut down using isolation condenser alternate shutdown path A2 and Unit 3 could be shut down using isolation condenser alternate shutdown path B2. All equipment and cables necessary to these shutdown paths are independent of the Central Zone Group with the exception of certain cables which are routed through the extreme southern portion of the ground floor level of this zone group. However, these cables are protected in the Central Zone Group with a 1-hour barrier and automatic fire detection and suppression, in accordance with Appendix R Section III.G.2 requirements.

It is important to ensure that, for a fire in one zone group, the other two zone groups are free of fire damage. Due to operating considerations, especially the need for unimpeded access along the turbine building ground floor corridor, providing complete fire barriers between the zone groups is not possible. Instead, the boundaries between the zone groups are protected by a combination of concrete shield walls and fire suppression and detection systems (shown on Figures B-7

through B-16) which provide significant protection and ensure that fire damage will be limited to only one zone group.

5.2.4.1 Eastern Zone Group Boundaries

The Eastern and Central Zone Groups have common boundaries on the mezzanine and ground floor levels. Figures B-9, 10, 12 and 13 show the configurations of these zone groups and the suppression and detection systems on these levels.

On the mezzanine level they are separated by continuous substantial, reinforced concrete shield walls or concrete floors. All penetrations through these barriers are sealed with noncombustible material and access is through substantial, locked, unlabeled, metal doors. Water suppression systems are provided on both sides of the barriers separating the zone groups with the exception of the low pressure heater pull area (located at column/rows 35.5-40/C) of the Central Zone Group which contains a negligible amount of combustibles. These extensive suppression systems ensure that any fire near the boundary would be quickly controlled and not affect the other zone group. Spot detection is provided in the southern portion of the Central Zone Group on this level. This combination of substantial walls with suppression systems on both sides of the wall provides a level of protection on the mezzanine level between the Eastern and Central Zone Groups equivalent to a 3-hour barrier.

On the ground floor level, the Eastern and Central Zone Groups are separated everywhere by substantial shield walls with the exception of the corridor running along column line G. No door is provided on the opening between the northern portion of the Central Zone Group and the Unit 2 CRD region (Fire Zone 8.2.2.A) on the 495-foot 0-inch elevation in the Eastern Zone Group. However, there is no continuity of combustibles between the zone groups near this opening and complete automatic sprinkler protection is provided in Fire Zone 8.2.2.A.

The shield walls on the ground floor level are substantial, unrated, reinforced concrete with noncombustible penetration seals and access through substantial, unlabeled, locked, metal doors. A water suppression system is provided along the entire length of this boundary wall on the Eastern Zone Group side. Water

suppression is also provided along the Central Zone Group side of the boundary wall in the southern part of the zone from column/row E. The corridor which runs between the Eastern and Western Zone Groups through the Central Zone Group is not provided with a physical barrier to fire. However, the entire corridor, from column/rows 40 to 48, is protected with water suppression and smoke detection systems. This combination of shield walls, water suppression systems, and fire detection provide a level of protection on the ground floor between the Eastern and Central Zone Groups which is equivalent to that prescribed in Appendix R Section III.G.2.

The Eastern Zone Group (TB-I) is separated from the control room/AEER (TB-V) by complete 3-hour rated barriers. The access to TB-V is gained through 3-hour rated doors. Unit 3 cables necessary for shutdown using the B1 path are routed in risers along the wall outside the control room and AEER (Fire Area TB-V) to the cable tunnel (TB-III). These cables are protected by a 1-hour fire wrap, detection and suppression. The boundary between TB-I and the Unit 2 Reactor Building Fire Area RB2-II is an equivalent 3-hour barrier (see Subsections 5.3.4.3 and 5.3.4.6).

TB-I is separated from TB-IV (operating floor) by a reinforced concrete barrier supported by unprotected steel. This floor contains unsealed mechanical penetrations, open hatches and stairwells. A fire in TB-I will not propagate to an adjacent zone group via the operating floor since there is no continuity of combustibles and the operating floor is a large open space. Also a fire initiated in TB-IV would not damage more than one zone group on the floors below because suppression is installed over the major hazards.

The border between TB-I and the Unit 1 turbine building is unrated. However if a fire were to begin in the Unit 1 turbine building and propagate into the Unit 2&3 turbine building only TB-I would be damaged because of the substantial barriers between zone groups and the extensive suppression and detection systems installed as previously discussed.

The Eastern Zone Group borders the Western Zone Group only along portions of the Unit 3 cable tunnel (Fire Zone 8.2.4).

The cable tunnel runs underneath Eastern Fire Zones 8.2.5.A and 8.2.5.B approximately along column line F.5. (See Figure B-11). The tunnel is separated from these zones by a reinforced concrete barrier except for one locked access manhole at column/row 40/F. However, the cable tunnel has a smoke detection and automatic water suppression system provided throughout. There is no continuity of combustibles between the cable tunnel and TB-I. Automatic fire detection and sprinklers are also provided above the manhole cover in the corridor of Fire Zone 8.2.5.A. Fire Zones 8.2.5.A and 8.2.5.B are generally provided with suppression and/or detection. This combination of suppression, detection, and barriers provides a level of protection equivalent to a complete 3-hour barrier and assures that no fire can propagate from the Eastern Zone Group to the Unit 3 cable tunnel and, therefore, from the Eastern to the Western Zone Group.

Cables routed through the Eastern Zone Group which could be used for alternative shutdown for a fire in the Western or Central Zone Group are located at least 100 feet from the Central Zone Group. Some intervening combustibles in the form of cabling are present on the ground floor level but necessary cabling is located on the mezzanine level.

5.2.4.2 Central Zone Group Boundaries

The boundary between this zone group (TB-II) and the eastern and western zone groups is discussed in Subsections 5.2.4.1 and 5.2.4.3 respectively. The boundary between TB-II and the Unit 2 and Unit 3 Reactor Building, Fire Area (RB2-II and RB3-II) is a 3-hour rated barrier except for penetrations sealed with non-combustible material which lead to the Unit 2 and Unit 3 equipment drain tank rooms.

TB-II shares a boundary with TB-IV (operating floor and north vent floor) which contains no safe shutdown equipment. This floor is a reinforced concrete slab supported on unprotected steel and contains unsealed mechanical penetrations open hatches and stairwell. The mezzanine level of TB-II (Fire Zone 8.2.6.C) has complete suppression except for the low pressure heater pull area and detection over the turbine oil reservoirs and the cable and pipe hatch at the southern end of this zone (see Figure B-3). This level of protection along with the lack of

continuity of combustibles between zone groups and the protection provided for the major hazards TB-IV assures that a fire in TB-II will not spread to either of the other two zone groups via TB-IV.

TB-II also shares a boundary with the Radwaste Building which does not contain any safe shutdown equipment. The wall is composed of concrete and concrete block supported on unprotected steel. The Radwaste Building does not share a boundary with either the eastern or western zone group, therefore were a fire to propagate into the Radwaste building which is highly unlikely due to the extensive suppression systems installed in TB-II at this boundary, the fire will not damage needed equipment in either the eastern or western zone group.

5.2.4.3 Western Zone Group Boundary

The Western and Central Zone Groups have common boundaries on the mezzanine and ground floor levels and along the Unit 3 cable tunnel (Fire Zone 8.2.4) which is part of the Western Zone Group and runs beneath Fire Zone 8.2.5.C. Figures B-9 through B-13 show the configurations of these zone groups and the suppression and detection systems on these levels.

On the mezzanine level, the zone groups are separated everywhere by substantial, reinforced concrete shield walls. All cable penetrations through these walls are sealed with noncombustible material and access is through substantial, unlabeled, locked metal doors. Mechanical piping penetrations are also sealed. Water suppression systems are provided on both sides of the wall separating the zone groups, with the exception of the low pressure heater pull area (located at column/rows 48-52.5/C) of the Western Zone Group which contains negligible combustibles. These extensive suppression systems ensure that any fire near the boundary would be quickly controlled and not affect the other zone group. This combination of substantial walls with suppression systems on both sides of the wall provides a level of protection on the mezzanine level between the Western and Central Zone Groups equivalent to a 3-hour barrier.

On the ground floor level, the Western and Central Zone Groups are separated everywhere by substantial concrete shield walls with the exception of the

corridor running along column/row G. No door is provided on the opening between the northern portion of the Central Zone Group and the Unit 3 CRD region (Fire Zone 8.2.2.B) on the 495-foot 0-inch elevation in the Western Zone Group. However, there is no continuity of combustibles between the zone groups near this opening and complete automatic sprinkler protection is provided in Fire Zone 8.2.2.B. The shield walls on the ground floor level are substantial, unrated concrete barriers with access through substantial, unlabeled, locked, metal doors. A water suppression system is provided along the entire length of this boundary wall on the Western Zone Group side with the exception of the portion of the wall adjacent to the Unit 3 low pressure heater pull space. Water suppression is also provided along the Central Zone Group side of the boundary wall in the part of the zone south of column/row E. The corridor which runs between the Western and Eastern Zone Groups through the Central Zone Group is not provided with a physical barrier to fire. However, the entire corridor, from column/rows 40 to 48, is protected with an automatic water suppression system and fire detection. Cables needed for isolation condenser shutdown paths B1 and B2 which are routed through the corridor are protected with a 1-hour fire rated wrap. Wrapping of these cables also eliminates the major in-situ combustibles in the corridor. This combination of shield walls, fire detection, water suppression systems, and protective barriers around cabling provide a level of protection on the ground floor between the Western and Central Zone Groups which is equivalent to that prescribed in Appendix R Section III.G.2.

The Central Zone Group also borders the Western Zone Group along portions of the Unit 3 cable tunnel (Fire Zone 8.2.4). The cable tunnel runs underneath Central Fire Zone 8.2.5.C approximately along column/row F. The tunnel is separated from Fire Zone 8.2.5.C by a reinforced concrete barrier except for a checkered plate covered hatch at approximately 48/F. Penetrations in this hatch are provided with noncombustible seals.

The cable tunnel is also protected by a smoke detection and automatic water suppression system throughout. Fire Zone 8.2.5.C is also provided with automatic suppression and detection over the hatch access. This combination of suppression, detection, and barrier provides a level of protection equivalent to a complete fire barrier and assures that no fire can propagate between the Central Zone Group and the Unit 3 cable tunnel.

The border between the Western Zone Group (TB-III) and the Unit 3 Reactor Building, Fire Area RB3-II is a complete 3-hour rated barrier except for an HVAC duct without a fire damper which enters Fire Zone 8.2.6.D from Fire Zone 1.1.1.3. Complete suppression is provided in Fire Zone 8.2.6.D and complete detection is installed in Fire Zone 1.1.1.3. Both of these fire zones have the same hot shutdown path identified, A1 and have low combustible loading of 17,200 Btu/ft² and 15,300 Btu/ft² respectively. Therefore the level of protection for this penetration provides an equivalent 3-hour barrier.

TB-III shares a boundary with TB-IV (operating floor). This floor is reinforced concrete containing unsealed mechanical openings and hatches and is supported on unprotected steel columns. Fire suppression or fire detection is provided over a majority of the bordering TB-III (Fire Zone 8.2.6.D and 8.2.6.E) (see Section 5.4). There is no continuity of combustibles between TB-III and TB-IV and major hazards are protected by suppression systems. This level of protection ensures that a fire initiated in TB-III will not spread to either the Central or Eastern Zone Groups via TB-IV.

The Western Zone Group Fire Zone 8.2.4 (Unit 3 Cable Tunnel) shares a boundary with TB-V (control room/AEER) which is 3-hour rated and contains a 3-hour rated door and HVAC fire damper. The boundary between the Eastern and Western Zone Groups is discussed in Subsection 5.2.4.1.

5.2.5 Conclusions

Based on this analysis, an exemption is requested for the Dresden Units 2 and 3 turbine building from the requirement of 10 CFR 50, Appendix R Sections III.G.3 and III.L, that alternative shutdown capability be located in a separate fire area from the area, room, or zone for which it is used. The technical bases that justify the exemption request are summarized as follows.

1. Alternative safe shutdown equipment is separated from the zone group/fire area for which it would be used by a combination of substantial shield walls and automatic water suppression systems.

2. Important DG 2/3 cabling in the common area of the turbine building is protected by a 1-hour fire rated barrier, fire detection, and an automatic water suppression system.
3. Extensive automatic sprinkler protection is provided on at least one side of the zone group boundaries everywhere and on both sides of the boundary in most instances.
4. The corridor on the ground floor is the only area where the three zone groups are not separated by substantial reinforced concrete barriers. However, the corridor is covered throughout by automatic detection and water suppression systems. The major in-situ combustibles between the zone groups is cables in cable trays. The majority of the cable trays between the Central and Western Zone Groups are protected by a 1 hour fire wrap. Safe shutdown cabling in the Eastern Zone Group is separated by approximately 100 feet from the Central Zone Group.
5. The installation of fire rated barriers throughout would not significantly increase plant safety and would impede plant access.
6. The Unit 3 control cables outside TB-V are 1-hour wrapped with water suppression and detection installed in the vicinity.
7. TB-IV is a large open space with major hazards protected by suppression systems and contains no safe shutdown equipment or cabling. There is no continuity of combustibles, therefore a fire would not propagate from one zone group to another via TB-IV.

TABLE 5.2-1

FIRE ZONES IN THE EASTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
8.2.7	Turbine Building - Mezzanine Elevation 549 feet 0 inch
8.2.6.A	Turbine Building - Mezzanine Elevations 534 feet 0 inch and 538 feet 0 inch Eastern Area
8.2.6.B	Turbine Building - Mezzanine Elevations 534 feet 0 inch and 538 feet 0 inch Condenser Area
8.2.5.A	Turbine Building - Ground Floor Elevation 517 feet 6 inches Eastern/Southern Area
8.2.5.B	Turbine Building - Ground Floor Elevation 517 feet 6 inches Condenser Area
8.2.2.A	Turbine Building - Basement Floor Elevation 495 feet 0 inch
8.2.1.A	Turbine Building - Basement Floor Elevation 469 feet 6 inches
7.0.A	Turbine Building - Station Battery Rooms Elevation 549 feet 0 inch
9.0.A	Unit 2 Diesel Generator Room Elevation 517 feet 6 inches
8.1	Clean and Dirty Oil Tank Room Elevation 517 feet 6 inches

TABLE 5.2-2
FIRE ZONES IN THE WESTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
8.2.6.E	Turbine Building - Mezzanine Elevation 534 feet 0 inch and 538 feet 0 inch Western Area
8.2.6.D	Turbine Building - Mezzanine Elevations 534 feet 0 inch and 538 feet 0 inch Condenser Area
8.2.5.E	Turbine Building - Ground Floor Elevation 517 feet 6 inches Western/Southern Area
8.2.5.D	Turbine Building - Ground Floor Elevation 517 feet 6 inches Condenser Area
8.2.4	Unit 3 Cable Tunnel Elevation 502 feet 6 inches
8.2.2.B	Turbine Building - Basement Floor Elevation 495 feet 0 inch
8.2.1.B	Turbine Building - Basement Floor Elevation 469 feet 6 inches
6.1	DC Panel Room Elevation 538 feet 0 inch
7.0.B	Turbine Building - Station Battery Room Elevation 551 feet 0 inch
9.0.B	Unit 3 Diesel Generator Room Elevation 517 feet 6 inches

TABLE 5.2-3

FIRE ZONES IN THE CENTRAL ZONE GROUP

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
8.2.6.C	Turbine Building - Mezzanine Elevation 534 feet 0 inch Common Area
8.2.5.C	Turbine Building - Ground Floor Elevation 517 feet 6 inches Common Area

TABLE 5.2-4

APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN THE EASTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>EQUIPMENT</u>	<u>SHUTDOWN PATH(S) FOR WHICH EQUIPMENT IS UTILIZED</u>
8.2.1.A	None	Not Applicable
8.2.2.A	CCSW Pump 2C CCSW Pump 2D CCSW Pump Room Cooler 2C CCSW Pump Room Cooler 2D CRD Pump 2A CRD Pump 2B	C C C C A,A1,A2 E
8.2.5.A	480-V MCC 29-2 Condensate Transfer Pump 2A Condensate Transfer Pump 2B HPCI Valve M02-2301-8	C,E A,A1,A2 E C
8.2.5.B	None	Not Applicable
8.2.6.A	480-V MCC 28-2 480-V MCC 28-3 4-kV Swgr 23 4-kV Swgr 24	A,A1,A2,C,E A,A1,A2 A,A1,A2 C,E
8.2.6.B	None	Not Applicable
8.2.7	None	Not Applicable
7.0.A	125-Vdc Battery Charger 2 125-Vdc Battery Charger 2A 125-Vdc Main Bus 2 125-Vdc Reserve Bus 2 250-Vdc MCC 2 125-Vdc Batteries 250-Vdc Batteries	C,E A,A1,A2 A,A1,A2,B,C,D,E,F A,C,E B,D,F A,A1,A2,B,C,D,E,F, B,D,F
9.0.A	Diesel Generator 2 DG 2 Oil Transfer Pump DG 2 Vent Fan	C,E C,E C,E
8.1	None	Not Applicable

TABLE 5.2-5

APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN THE WESTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>EQUIPMENT</u>	<u>SHUTDOWN PATH(S) FOR WHICH EQUIPMENT IS UTILIZED</u>
8.2.1.B	None	Not Applicable
8.2.2.B	CCSW Pump 3C CCSW Pump 3D CCSW Pump Room Cooler 3C CCSW Pump Room Cooler 3D CRD Pump 3A CRD Pump 3B	D D D D B,B1,B2 F
8.2.4	None	Not Applicable
8.2.5.D	None	Not Applicable
8.2.5.E	Condensate Transfer Pump 3A Condensate Transfer Pump 3B HPCI Valve M03-2301-8	B,B1,B2 F D
8.2.6.D	None	Not Applicable
8.2.6.E	480-V MCC 38-2 480-V MCC 38-3 4-kV Swgr 33 4-kV Swgr 34	B,B1,B2,D,F B,B1,B2 B,B1,B2 D,F
6.1	125-Vdc Battery Charger 3 125-Vdc Battery Charger 3A 125-Vdc Main Bus 3 125-Vdc Reserve Bus 3 250-Vdc MCC 3	D,F B,B1,B2 A,B,B1,B2,C,D,E,F B,D,F A,C,E
7.0.B	125-Vdc Batteries 250-Vdc Batteries	A,B,B1,B2,C,D,E,F A,C,E
9.0.B	Diesel Generator 3 DG 3 Oil Transfer Pump DG 3 Vent Fan	D,F D,F D,F

TABLE 5.2-6

APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN THE CENTRAL ZONE GROUP

<u>FIRE ZONE</u>	<u>EQUIPMENT</u>	<u>SHUTDOWN PATH(S) FOR WHICH EQUIPMENT IS UTILIZED</u>
8.2.5.C	None	Not Applicable
8.2.6.C	480-V MCC 39-2 Mechanical CRD Cross-Tie Valve	D,F A1,B1

5.3 JUSTIFICATION FOR LACK OF COMPLETE SUPPRESSION AND DETECTION IN THE EASTERN ZONE GROUP

5.3.1 Introduction

The Eastern Zone Group of the turbine building is composed of ten fire zones in the eastern portion of the turbine building. These fire zones are listed and briefly described in Table 5.3-1. The boundaries of this zone group are described in Section 5.2.

Because alternative shutdown is utilized for the Eastern Zone Group, Appendix R requires that fire detection and fixed fire suppression be present throughout. As seen in Figures B-7, B-8, and B-12, only detection or suppression is present in most portions of this zone group. However, these fire protection features provide a level of protection which ensures that any fire will be quickly detected and controlled and additional detection and suppression systems would not significantly enhance the level of safety at Dresden.

5.3.2 Fire Protection System

All ten fire zones of the Eastern Zone Group are provided with some form of automatic fire protection system - detection, suppression, or a combination of both - as shown on Figures B-7, B-8, and B-12. These were selected and designed to match the specific fire hazards in and safety and operational concerns associated with the particular zone. In addition, fire hose stations and portable extinguishers are available for manual fire fighting throughout the zone group.

The specific fire protection system existing or proposed for the ten fire zones is as follows.

5.3.2.1 Fire Zone 8.2.1.A (Elevation 469 feet 6 inches)

This fire zone is protected throughout by a wet pipe sprinkler automatic suppression system. No separate detection is provided.

5.3.2.2 Fire Zone 8.2.2.A (Elevation 495 feet 0 inch)

This fire zone is protected throughout by a wet pipe sprinkler automatic suppression system. No separate detection is provided.

5.3.2.3 Fire Zone 8.2.5.A (Elevation 517 feet 6 inches)

Major fire hazards in this fire zone are protected by automatic fire suppression and/or detection. A wet pipe sprinkler system protects the areas bounded by column/rows 36-38/G-H and 33-34/F-H and the cable risers near column/row 33/F. A preaction sprinkler system protects the area bounded by 33-35/D-D.5. Also, smoke detection and wet pipe sprinkler protection are provided throughout the corridor which connects Fire Zones 8.2.5.C and 8.2.5.E to Fire Zone 8.2.5.A. (This protection extends east to column/rows 40/F-H.).

5.3.2.4 Fire Zone 8.2.5.B (Elevation 517 feet 6 inches)

This fire zone is protected throughout by an automatic wet pipe sprinkler system except where the main condenser is located. No separate automatic detection is provided.

5.3.2.5 Fire Zone 8.2.6.A (Elevation 538 feet 0 inch)

Smoke detection is provided in this zone. Major fire hazards and the cable risers near column/row 33/F in this fire zone are also protected by automatic water suppression systems. Switchgears 23 and 24 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.3.2.6 Fire Zone 8.2.6.B (Elevation 534 feet 0 inch)

This fire zone is protected throughout by an automatic wet pipe sprinkler system except where the main condenser is located. No separate detection is provided.

5.3.2.7 Fire Zone 8.2.7 (Elevation 549 feet 0 inch)

This fire zone is provided with a smoke detection system. No automatic suppression system is provided.

5.3.2.8 Fire Zone 7.0.A (Elevation 549 feet 0 inch)

This fire zone is provided with an ionization smoke detection system throughout. No automatic suppression is provided. 125 volt dc main bus 2 and reserve bus 2 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.3.2.9 Fire Zone 9.0.A (Elevation 517 feet 6 inches)

This fire zone is provided with a total flooding CO₂ fire suppression system and a thermal detection system throughout.

5.3.2.10 Fire Zone 8.1 (Elevation 517 feet 6 inches)

This fire zone is protected throughout by a wet pipe sprinkler automatic suppression systems. No separate detection is provided.

5.3.3 Safe Shutdown Equipment

Safe shutdown equipment located in the Eastern Zone Group and the shutdown path(s) which employ the equipment are listed in Table 5.3-2.

No cabling or equipment required by the alternate shutdown path B1 (which is available for shutdown related to a fire in the Eastern Zone Group) is located in this zone group except for the Unit 3 control cables outside TB-V which are protected by a 1-hour wrap, water suppression and detection.

5.3.4 Fire Hazards Analysis

5.3.4.1 Fire Zone 8.2.1.A (Elevation 469 feet 6 inches)

This fire zone has a floor area of approximately 3,500 ft² and a ceiling height of approximately 25 feet. The total fire loading in this zone from in-situ combustibles is less than 5,000 Btu/ft². The four condensate/condensate booster pump units in the zones contain 6 gallons of lubricating oil each and there are approximately 5500 feet of cable insulation associated with cable routed in cable trays through the zone. The zone is protected throughout by automatic sprinkler system and the addition of fire detection is not warranted considering the light combustible loading. This zone is separated from Fire Zone 8.2.2.A, the only adjacent zone, by a reinforced concrete ceiling which has unsealed penetrations. This zone contains no equipment or cabling required by the B1 shutdown path.

5.3.4.2 Fire Zone 8.2.2.A (Elevation 495 feet 0 inch)

This fire zone has a floor area of approximately 3,200 ft² and a ceiling height of approximately 22 feet. The total fire loading from fixed combustibles in this zone is less than 14,000 Btu/ft². The major source of combustibles are the four containment cooling service water pumps each of which contains 10 gallons of lubricating oil and 1 pound of grease, the two control rod drive water pumps each holding approximately 11 gallons of lubricating oil, and 25,000 feet of cable insulation associated with electrical panels and cables in cable trays. The zone is protected throughout by an automatic sprinkler system and the addition of fire detection would not significantly increase the level of protection in this zone. This zone is separated from adjacent Fire Zone 8.2.1.A by a reinforced concrete floor with unsealed penetrations. It is separated from the adjacent zone, 8.2.5.B, by a reinforced concrete ceiling having penetrations with unrated seals. This zone has a stairwell leading to Fire Zone 8.2.5.C and is protected by a suppression system. The zone contains no equipment or cabling required by the B1 shutdown path.

5.3.4.3 Fire Zone 8.2.5.A (Elevation 517 feet 6 inches)

This fire zone has a total floor area of approximately 16,400 ft² and a ceiling height of approximately 16 feet. The total fire load from in-situ combustibles is less than 33,000 Btu/ft². The major hazards in this zone are the three reactor feed pumps, instrument and service air compressors, and electrical equipment and cabling. The feed pumps and instrument and service air compressors are protected with an automatic water suppression system. Suppression is also provided over the high pressure heaters, and the trackway area in the south-eastern part of the zone. In addition the corridor which leads to the common area of the turbine building is provided with suppression and detection. Detection is provided throughout those parts of the zone not covered by automatic suppression. This combination of suppression and detection systems ensures that, were a fire to start in this zone, it would be quickly detected and controlled. Therefore, the installation of additional fire protection systems is unwarranted. No equipment or cabling required by the B1 shutdown path is present in this zone except for the Unit 3 control cables adjacent to TB-V which are protected by a 1-hour wrap, suppression and detection.

5.3.4.4 Fire Zone 8.2.5.B (Elevation 517 feet 6 inches)

This fire zone has a floor area of approximately 13,600 ft² and a total fire loading of less than 2,000 Btu/ft². The only significant combustible material in this zone is the cable insulation on cables routed through this zone. The zone is protected throughout (except where the main condenser is located) by a wet pipe sprinkler system. In light of the extremely low combustible loading in this zone and the existing suppression system, the installation of a detection system is unwarranted. No equipment or cabling required by the B1 shutdown path is present in this zone. The border between this fire zone and TB-II is substantial shield walls and reinforced concrete floors with penetrations sealed with non-combustible seals.

5.3.4.5 Fire Zone 8.2.6.A (Elevation 538 feet 0 inch)

This fire zone has a total floor area of approximately 9,500 ft² and a ceiling height of approximately 26 feet. The total fire loading from fixed combustibles

is less than 66,000 Btu/ft². The hydrogen seal oil unit, which contains 425 gallons of lubricating oil, and cable insulation, associated with electrical panels and cabling, are the major sources of combustibles in the fire zone. The hydrogen seal oil unit and the cable concentration areas are protected by automatic water suppression systems. Detection is provided throughout the zone wherever suppression is not provided except for the portion of the zone south of the control room. This fire zone contains no equipment or cabling required by the B1 shutdown path except for the Unit 3 control cables adjacent to TB-V which are protected by a 1-hour wrap, water suppression and detection. Switchgears 23 and 24 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.3.4.6 Fire Zone 8.2.6.B (Elevation 534 feet 0 inch)

This fire zone has a total floor area of approximately 8,400 ft² and a ceiling height of approximately 26 feet. The only fixed combustible material present is cable insulation associated with cabling in cable trays. There are approximately 130,000 feet of cable insulation which results in a total fire loading of less than 19,000 Btu/ft². This zone is protected throughout (except where the main condenser is located) by a wet pipe sprinkler system. Installation of a detection system in this zone is not justified due to the low fire loading and the lack of major fire hazards, and the existing suppression system in this zone. No equipment or cabling associated with the B1 shutdown path is present in this zone. The border between this fire zone and TB-II is substantial shield walls and reinforced concrete floors with penetrations sealed with noncombustible seals.

5.3.4.7 Fire Zone 8.2.7 (Elevation 549 feet 0 inch)

This fire zone has a total floor area of approximately 3,400 ft² and a ceiling height of approximately 12 feet. The total fire loading for this zone is approximately 60,000 Btu/ft², with the major source of combustibles being cable insulation associated with cables routed through this zone. The cables are concentrated in the northern portion of the zone. Detection is provided in the

northern portion of the zone over these major cable concentrations. No equipment or cabling required by the B1 shutdown path is located in this zone.

5.3.4.8 Fire Zone 7.0.A (Elevation 549 feet 0 inch)

This fire zone, the Unit 2 Battery Area, has a total floor area of approximately 3,600 ft² and a ceiling height of approximately 12 feet. The total fire loading of this zone is less than 51,000 Btu/ft². The major sources of combustibles in this zone are the battery cells which are encased in acrylonitrile styrene copolymer plastic and cable insulation associated with cable in cable trays and electrical panels. Detection is provided throughout the zone. No equipment or cabling required by the B1 shutdown path is located in this zone. 125 vold dc main bus 2 and reserve bus 2 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.3.4.9 Fire Zone 9.0.A (Elevation 517 feet 6 inches)

This fire zone, the Unit 2 Emergency Diesel Generator Room, has a total floor area of approximately 900 ft² and a ceiling height of approximately 20 feet. The total fire loading in this zone due to fixed combustibles is approximately 185,000 Btu/ft². The major fire hazards in this zone are the diesel itself which contains 350 gallons of lubricating oil and the diesel fuel oil day tank which contains 750 gallons of diesel fuel. This zone is protected by a total flooding CO₂ fire suppression system and thermal detection system and no exemption is required for this zone.

5.3.4.10 Fire Zone 8.1 (Elevation 517 feet 6 inches)

This fire zone contains the clean and dirty oil tanks, has a floor area of 936 ft² and a ceiling height of approximately 20 feet. The total fire loading in this zone due to fixed combustibles is approximately 4.64x10⁶ Btu/ft². The major hazards are the oil tanks containing 14,000 gallons of lube oil each. This zone is protected by 4 foot high curbs and an automatic water suppression system. No separate detection is provided.

5.3.5 Conclusions

Based on this analysis, an exemption is requested for the Eastern Zone Group of the Dresden Units 2 and 3 turbine building from the requirements of Appendix R Section III.G.3 that detection and fixed suppression be provided throughout those zones for which an alternative shutdown method is utilized. The technical bases that justify the exemption request are summarized as follows:

1. All zones in the Eastern Zone Group are provided with some form of fixed fire protection - automatic detection, suppression, or a combination of both - as follows:

<u>FIRE ZONE</u>	<u>FIXED PROTECTION</u>
8.2.1.A	Suppression Throughout
8.2.2.A	Suppression Throughout
8.2.5.A	Suppression and/or Detection Throughout
8.2.5.B	Suppression Throughout
8.2.6.A	Suppression and/or Detection Throughout Most Sections
8.2.6.B	Suppression Throughout
8.2.7	Partial Detection
7.0.A	Detection Throughout
9.0.A	Suppression and Detection Throughout (No exemption requested.)
8.1	Suppression throughout

2. All major fire hazards are provided with a fire suppression or detection system, or both.
3. The zones within the Eastern Zone Group, though not separated from one another by 3-hour barriers, are separated in all instances by reinforced concrete walls, ceilings, or floors which would inhibit the spread of any fire effects.
4. The inadvertent operation of a fixed water suppression system in this area could result in fault or failure of major electrical equipment located in the area which would degrade plant safety.

5. The level of protection provided by the fire protection features ensures that damage from a fire in the Eastern Zone Group would be limited in extent and not adversely impact the capability to safely shut down the plant.
6. The installation of additional fire detection and/or suppression systems would not significantly enhance fire safety in this zone group.

TABLE 5.3-1

EASTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
8.2.1.A	Turbine Building - Basement Floor Elevation 469 feet 6 inches
8.2.2.A	Turbine Building - Basement Floor Elevation 495 feet 0 inch
8.2.5.A	Turbine Building - Ground Floor Elevation 517 feet 6 inches Eastern/Southern Area
8.2.5.B	Turbine Building - Ground Floor Elevation 517 feet 6 inches Condenser Area
8.2.6.A	Turbine Building - Mezzanine Elevations 534 feet 0 inch and 538 feet 0 inch Eastern Area
8.2.6.B	Turbine Building - Mezzanine Elevations 534 feet 0 inch and 538 feet 0 inch Condenser Area
8.2.7	Turbine Building - Mezzanine Elevation 549 feet 0 inch
7.0.A	Turbine Building - Station Battery Rooms Elevation 549 feet 0 inch
9.0.A	Unit 2 Diesel Generator Room Elevation 517 feet 6 inches
8.1	Clean and Dirty Oil Tank Room Elevation 517 feet 6 inches

TABLE 5.3-2

APPENDIX R HOT SHUTDOWN EQUIPMENTLOCATED IN THE EASTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>EQUIPMENT</u>	<u>SHUTDOWN PATH(S) FOR WHICH EQUIPMENT IS UTILIZED</u>
8.2.1.A	None	Not Applicable
8.2.2.A	CCSW Pump 2C	C
	CCSW Pump 2D	C
	CCSW Pump Room Cooler 2C	C
	CCSW Pump Room Cooler 2D	C
	CRD Pump 2A	A, A1, A2
	CRD Pump 2B	E
8.2.5.A	480-V MCC 29-2	C, E
	Condensate Transfer Pump 2A	A, A1, A2
	Condensate Transfer Pump 2B	E
	HPCI Valve M02-2301-8	C
8.2.5.B	None	Not Applicable
8.2.6.A	480-V MCC 28-2	A, A1, A2, C, E
	480-V MCC 28-3	A, A1, A2
	4-kV Swgr 23	A, A1, A2
	4-kV Swgr 24	C, E
8.2.6.B	None	Not Applicable
8.2.7	None	Not Applicable
7.0.A	125-Vdc Battery Charger 2	C, E
	125-Vdc Battery Charger 2A	A, A1, A2
	125-Vdc Main Bus 2	A, A1, A2, B, C, D, E, F
	125-Vdc Reserve Bus 2	A, C, E
	120-Vdc MCC 2	B, D, F
	125-Vdc Batteries	A, A1, A2, B, C, D, E, F
	250-Vdc Batteries	B, D, F
9.0.A	Diesel Generator 2	C, E
	DG 2 Oil Transfer Pump	C, E
	DG2 Vent Fan	C, E
8.1	None	Not Applicable

5.4 JUSTIFICATION FOR LACK OF COMPLETE SUPPRESSION AND DETECTION IN THE WESTERN ZONE GROUP

5.4.1 Introduction

The Western Zone Group of the turbine building is composed of ten fire zones. These fire zones are listed and briefly described in Table 5.4-1. The boundaries of this zone group are described in Section 5.2.

Because alternative shutdown is utilized for the Western Zone Group, Appendix R, requires that fire detection and fixed fire suppression be present throughout. As seen in Figures B-8, B-10, and B-13, only detection or suppression is present in most portions of this zone group. However, these fire protection features provide a level of protection which ensure that any fire will be quickly detected and controlled. Any additional detection or suppression systems would not significantly enhance the level of safety at Dresden.

5.4.2 Fire Protection System

All ten fire zones of the Western Zone Group are provided with some form of automatic fire protection system - detection, suppression or a combination of both - as shown on Figures B-8, B-10, and B-13. These systems were selected and designed to match the specific fire hazards in and safety and operational concerns associated with the particular zone. In addition, fire hose stations and portable extinguishers are available for manual fire fighting throughout the zone group.

The specific fire protection systems in these ten fire zones are as follows:

5.4.2.1 Fire Zone 8.2.1.B (Elevation 469 feet 6 inches)

This fire zone is protected throughout by an automatic wet pipe sprinkler system. No separate detection is provided.

5.4.2.2 Fire Zone 8.2.2.B (Elevation 495 feet 0 inch)

This fire zone is protected throughout by an automatic wet pipe sprinkler system. No separate detection is provided.

5.4.2.3 Fire Zone 8.2.4 (Elevation 502 feet 6 inches)

This fire zone, the Unit 3 Cable Tunnel, is provided with a closed head fixed water spray suppression system for the cable trays and fire detection throughout.

5.4.2.4 Fire Zone 8.2.5.E (Elevation 517 feet 6 inches)

Major fire hazards in this fire zone are protected by automatic water suppression systems. Detection and sprinkler protection is provided throughout the corridor which connects Fire Zones 8.2.5.C and 8.2.5.E to Fire Zone 8.2.5.A. In addition, detection is provided in the zone where suppression is not provided.

5.4.2.5 Fire Zone 8.2.5.D (Elevation 517 feet 6 inches)

This fire zone is protected throughout by a wet pipe sprinkler automatic suppression system except in the low pressure heater pull region and the region where the main condenser is located. No separate detection is provided.

5.4.2.6 Fire Zone 8.2.6.E (Elevation 538 feet 0 inch)

Smoke detection is provided throughout this zone. This fire zone is also provided with automatic fire suppression systems. Specifically, a wet pipe sprinkler system protects the area bounded by column/rows 52-54/F where the hydrogen seal oil unit and hydrogen station cooling cabinets are located. Switchgears 33 and 34 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.4.2.7 Fire Zone 8.2.6.D (Elevation 534 feet 0 inch)

This fire zone is protected throughout by an automatic wet pipe sprinkler system except in the Unit 3 low pressure heater pull region and the region where the main condenser is located. No separate detection is provided.

5.4.2.8 Fire Zone 6.1 (Elevation 538 feet 0 inch)

This fire zone is provided throughout with a smoke detection system. No automatic suppression system is provided because maloperation of such a system could affect the electrical equipment located in this zone. 125 volt dc main bus 3 and reserve bus 3 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.4.2.9 Fire Zone 7.0.B (Elevation 551 feet 0 inch)

This fire zone is provided with a smoke detection system throughout. No automatic suppression is provided.

5.4.2.10 Fire Zone 9.0.B (Elevation 517 feet 6 inches)

This fire zone is provided throughout with a total flooding CO₂ fire suppression system and a thermal detection system.

5.4.3 Safe Shutdown Equipment

Safe shutdown equipment located in the Western Zone Group and the shutdown path(s) which employ the equipment are listed in Table 5.4-2.

No cabling or equipment required by the alternate shutdown path A1 which could be used for shutdown after a fire in the Western Zone Group is located in this zone group.

5.4.4 Fire Hazards Analysis

5.4.4.1 Fire Zone 8.2.1.B (Elevation 469 feet 6 inches)

This fire zone has a floor area of approximately 3,500 ft² and a ceiling height of approximately 25 feet. The total fire loading in this zone from in-situ combustibles is less than 4,000 Btu/ft². The four condensate/condensate booster pump units in the zone contain 6 gallons of lubricating oil each and there are approximately 5000 feet of cable insulation associated with cable routed in cable trays through the zone.

The zone is protected throughout by automatic wet pipe sprinklers and the addition of separate fire detection is not warranted considering the small combustible loading. This zone contains no equipment or cabling required by the A1 shutdown path.

5.4.4.2 Fire Zone 8.2.2.B (Elevation 495 feet 0 inch)

This fire zone has a floor area of approximately 3,200 ft² and a ceiling height of approximately 22 feet. The total fire loading from fixed combustibles in this zone is approximately 12,000 Btu/ft². Major sources of combustibles are the four containment cooling service water pumps each of which contains 10 gallons of lubricating oil and 1 pound of grease, the two control rod drive water pumps each holding approximately 11 gallons of lubricating oil, and of cable insulation associated with electrical panels and cables in cable trays. The zone is protected throughout by an automatic wet pipe sprinkler system and the addition of fire detection would not significantly increase the level of protection in this zone. This zone is separated from TB-II by substantial concrete floor with penetrations sealed with non-combustible seals. This fire zone contains a stairwell leading to TB-II. This zone contains no equipment or cables required by the A1 shutdown path.

5.4.4.3 Fire Zone 8.2.4 (Elevation 502 feet 6 inches)

This fire zone, the Unit 3 Cable Tunnel, is provided with both water suppression and detection throughout. No exemption is required in regard to this fire zone.

5.4.4.4 Fire Zone 8.2.5.E (Elevation 517 feet 6 inches)

This fire zone has a total floor area of approximately 15,800 ft² and a ceiling height of approximately 16 feet. The total fire load from in-situ combustibles is less than 23,000 Btu/ft². The major hazards in this zone are the three reactor feed pumps and electrical equipment and cabling. The feed pumps are protected with an automatic wet pipe sprinkler system. Suppression is also provided over the high pressure heaters, the Unit 3 turbine trackway in the

southwestern part of the zone, and in the corridor which leads to the common area of the turbine building. Detection is provided throughout those parts of the zone which are not covered by automatic suppression. This combination of suppression and detection systems ensures that, were a fire to start in this zone, it would be quickly detected and controlled. Therefore, the installation of additional fire protection systems is unwarranted. No equipment or cabling required for the A1 shutdown path is located in this zone.

5.4.4.5 Fire Zone 8.2.5.D (Elevation 517 feet 6 inches)

This fire zone has a floor area of approximately $14,300 \text{ ft}^2$ and a total fire loading of less than 1000 Btu/ft^2 . The only significant combustible material in this zone is the cable insulation on cables routed through this zone. The zone is protected throughout (except where the main condenser is located and the low pressure heater pull space) by a wet pipe sprinkler system. In light of the extremely low combustible loading in this zone and the fixed suppression system, the installation of a detection system is unwarranted. No equipment or cabling required for the A1 shutdown path is located in this zone.

5.4.4.6 Fire Zone 8.2.6.E (Elevation 538 feet 0 inch)

This fire zone has a total floor area of approximately $8,700 \text{ ft}^2$ and a ceiling height of approximately 26 feet. The total fire loading from fixed combustibles is less than $17,000 \text{ Btu/ft}^2$. The hydrogen seal oil unit, which contains 425 gallons of lubricating oil, and cable insulation, associated with electrical panels and cabling, are the major sources of combustibles in the fire zone. The hydrogen seal oil unit is protected by a water suppression system. Detection is provided throughout the zone wherever suppression is not provided. No equipment or cabling required for the A1 shutdown path is located in this zone. Switchgears 33 and 34 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area.

5.4.4.7 Fire Zone 8.2.6.D (Elevation 534 feet 0 inch)

This fire zone has a total floor area of approximately $8,500 \text{ ft}^2$ and a ceiling height of approximately 26 feet. The only significant fixed combustible material

present is cable insulation associated with cabling in cable trays. There are approximately 10,200 pounds of cable insulation which results in a total fire loading of approximately 18,000 Btu/ft². This zone is protected throughout (except where the main condenser is located) by a wet pipe sprinkler system. Installation of a detection system in this zone is not justified due to the low fire loading, the lack of major fire hazards, and the existing suppression system in this zone. No equipment or cabling required for the A1 shutdown path is located in this zone.

5.4.4.8 Fire Zone 6.1 (Elevation 538 feet 0 inch)

This fire zone, the Unit 3 DC Panel Room, has a floor area of approximately 500 ft² and a ceiling height of 13 feet. The only significant in-situ combustible material in this zone is the cable insulation associated with electrical panels and cabling. The resulting fire load is approximately 23,000 Btu/ft². This zone is provided with an ionization-type detection system throughout. No automatic suppression is provided in this zone as the maloperation of such a system could damage the electrical equipment in the zone. 125 volt dc main bus 3 and reserve bus 3 are located in this fire zone. An inadvertent actuation of any fixed fire suppression system could result in failure of this equipment. Also the installation of any other fixed suppression such as cardox, halon or foam would be ineffective or inappropriate in this area. No equipment or cabling required for the A1 shutdown path is located in this zone.

5.4.4.9 Fire Zone 7.0.B (Elevation 551 feet 0 inch)

This fire zone, the Unit 3 Battery Room, has a total floor area of approximately 500 ft² and a ceiling height of approximately 10 feet. The total fire loading of this zone is less than 54,000 Btu/ft². The only significant source of combustibles in this zone are the battery cell casings which are made of acrylonitrile styrene co-polymer plastic. Detection is provided throughout the zone.

5.4.4.10 Fire Zone 9.0.B (Elevation 517 feet 6 inches)

This fire zone, the Unit 3 Emergency Diesel Generator Room, has a total floor area of approximately 1,000 ft² and a ceiling height of approximately 20 feet. The total fire loading in this zone due to fixed combustibles is approximately

162,000 Btu/ft². The major fire hazards in this zone are the diesel itself, which contains 350 gallons of lubricating oil, and the diesel fuel oil day tank, which contains 750 gallons of diesel fuel. This zone is protected throughout by a total flooding CO₂ fire suppression system and thermal detection system, and no exemption is required in regard to this zone.

5.4.5 Conclusions

Based on the preceding analysis, an exemption is requested for the Western Zone Group of the Dresden Units 2 and 3 turbine building from the requirements of Appendix R Section III.G.3 that detection and fixed suppression be provided throughout those zones for which an alternative shutdown method is utilized. The technical bases that justify the exemption request are summarized as follows.

1. All zones in the Western Zone Group are provided with some form of fixed fire protection - automatic detection, suppression, or a combination of both - as follows:

<u>FIRE ZONE</u>	<u>FIXED PROTECTION</u>
8.2.1.B	Suppression Throughout
8.2.2.B	Suppression Throughout
8.2.4	Suppression and Detection Throughout (No exemption requested)
8.2.5.E	Suppression and/or Detection Throughout
8.2.5.D	Suppression Throughout Most Sections
8.2.6.E	Suppression or Detection Throughout Most Sections
8.2.6.D	Suppression Throughout
6.1	Detection Throughout
7.0.B	Detection Throughout
9.0.B	Suppression and Detection Throughout (No exemption requested).

2. All major fire hazards are provided with a suppression and/or detection system.

3. The zones within the Western Zone Group, although not separated from one another by complete fire barriers, are separated in all instances by reinforced concrete walls, ceilings, or floors which would inhibit the spread of any fire effects.
4. The inadvertent operation of a fixed water suppression system in this area could result in fault or failure of major electrical equipment located in the area which would degrade plant safety.
5. The level of protection provided by the fire protection features ensures that damage from a fire in the Western Zone Group would be limited in extent and not adversely impact the capability to safely shut down the plant.
6. The installation of additional fire detection and/or suppression systems would not significantly enhance fire safety in the zone group.

TABLE 5.4-1
WESTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
8.2.1.B	Turbine Building - Basement Floor Elevation 469 feet 6 inches
8.2.2.B	Turbine Building - Basement Floor Elevation 495 feet 0 inch
8.2.4	Unit 3 Cable Tunnel Elevation 502 feet 6 inches
8.2.5.D	Turbine Building - Ground Floor Elevation 517 feet 6 inches Condenser Area
8.2.5.E	Turbine Building - Ground Floor Elevation 517 feet 6 inches Western/Southern Area
8.2.6.D	Turbine Building - Mezzanine Elevations 534 feet 0 inch and 538 feet 0 inch Condenser Area
8.2.6.E	Turbine Building - Mezzanine Elevation 534 feet 0 inch and 538 feet 0 inch Western Area
6.1	DC Panel Room Elevation 538 feet 0 inch
7.0.B	Turbine Building - Station Battery Room Elevation 551 feet 0 inch
9.0.B	Unit 3 Diesel Generator Room Elevation 517 feet 6 inches

TABLE 5.4-2

APPENDIX R HOT SHUTDOWN EQUIPMENT
LOCATED IN THE WESTERN ZONE GROUP

<u>FIRE ZONE</u>	<u>EQUIPMENT</u>	<u>SHUTDOWN PATH(S) FOR WHICH EQUIPMENT IS UTILIZED</u>
8.2.1.B	None	Not Applicable
8.2.2.B	CCSW Pump 3C CCSW Pump 3D CCSW Pump Room Cooler 3C CCSW Pump Room Cooler 3D CRD Pump 3A CRD Pump 3B	D D D D B, B1, B2 F
8.2.4	None	Not Applicable
8.2.5.D	None	Not Applicable
8.2.5.E	Condensate Transfer Pump 3A Condensate Transfer Pump 3B HPCI Valve MO3-2301-8	B, B1, B2 F D
8.2.6.D	None	Not Applicable
8.2.6.E	480-V MCC 38-2 480-V MCC 38-3 4-kV SWGR 33 4-kV SWRG 34	B, B1, B2, D, F B, B1, B2 B, B1, B2 D, F
6.1	125-Vdc Battery Charger 3 125-Vdc Battery Charger 3A 125-Vdc Main Bus 3 125-Vdc Reserve Bus 3 250-Vdc MCC 3	D, F B, B1, B2 A, B, B1, B2, C, D, E, F B, D, F A, C, E
7.0.B	125-Vdc Batteries 250-Vdc Batteries	A, B, B1, B2, C, D, E, F A, C, E
9.0.B	Diesel Generator 3 DG 3 Oil Transfer Pump DG 3 Vent Fan	D, F D, F D, F

5.5 JUSTIFICATION FOR LACK OF COMPLETE SUPPRESSION AND DETECTION IN THE CENTRAL ZONE GROUP

5.5.1 Introduction

The Central Zone Group of the turbine building is composed of two fire zones:

<u>FIRE ZONE</u>	<u>DESCRIPTION</u>
8.2.5.C	Turbine Building - Ground Floor Elevation 517 feet 6 inches Common Area
8.2.6.C	Turbine Building - Mezzanine Elevation 534 feet 0 inch Common Area

Each zone contains equipment and cabling associated with both Units 2 and 3. The boundaries of this zone group are described in Section 5.2.

Because alternative shutdown is utilized for the Central Zone Group, Appendix R requires that fire detection and fixed fire suppression be present throughout. As seen in Figures B-9, B-10, B-12 and B-13, only suppression or detection is present in most portions of this zone group. However, these fire protection features provide a level of protection which ensures that any fire in this zone group will be quickly detected and controlled. Any additional detection and suppression systems would not significantly enhance the level of safety at Dresden.

5.5.2 Fire Protection System

5.5.2.1 Fire Zone 8.2.5.C (Elevation 517 feet 6 inches)

Fixed fire detection and water suppression systems protect all portions of this fire zone south of column/row E. Fire detection alone is provided in the portions of the zone between column/rows 43-45/C-E. The Unit 2 low pressure

heater pull region on elevation 517 feet 6 inches, used as an oil storage area, is provided with a fixed water suppression system. This zone also contains equipment for use in manual fire fighting.

5.5.2.2 Fire Zone 8.2.6.C (Elevation 534 feet 0 inch)

This fire zone is provided with a wet pipe sprinkler system at the ceiling throughout the zone. The two turbine oil reservoirs are protected by open head water spray actuated by thermal detection systems. Fire detection is provided in the zone south of column/row G. This zone is provided with equipment for manual fire fighting.

5.5.3 Safe Shutdown Equipment

The only Appendix R hot shutdown equipment in the Central Zone Group is the 480-V MCC 39-2 and the mechanical CRD cross-tie valving between units which are located in Fire Zone 8.2.6.C. MCC 39-2 is used only for alternate shutdown paths D and F. The CRD cross-tie valving is used only for alternative shutdown paths A1 and B1.

No cabling or equipment required for shutdown paths A2 and B2, which could be used for a fire in the Central Zone Group, is located in Fire Zone 8.2.6.C.

Fire Zone 8.2.5.C contains no Appendix R hot shutdown equipment but it does contain electrical cables associated with the various alternate shutdown paths, including cables for path B2 which could be used to shut down Unit 3 for a fire in the Central Zone Group. There are no cables associated with shutdown path A2 located in TB-II. The protection of these cables is discussed in Subsection 5.5.4.1.

5.5.4 Fire Hazards Analysis

5.5.4.1 Fire Zone 8.2.5.C (Elevation 517 feet 6 inches)

This fire zone has a floor area of approximately 15,900 ft² and a ceiling height of approximately 17 feet. The total fire loading due to in-situ combustibles is less than 18,000 Btu/ft² with the major combustible material being cable insulation associated with electrical panels and cabling. Fire retardant electro-

hydraulic control (EHC) fluid is also located in this zone. It has not been included in the fire loading for this zone because of the high flash point and local water spray systems around the EHC units. Most of this fire zone is provided with either fixed suppression or detection or both. (Figures B-9 and B-10 illustrates the fire protection systems for this zone.) A wet pipe sprinkler system and an ionization smoke detection system protect the entire zone south of column line E and are augmented by a smoke detection system in the north-central portion of the zone between column/row 43-45/C-E. The Unit 2 low pressure heater pull region is also provided with a wet pipe sprinkler system. The northeast (between column/rows 40-43/C-E) and the northwest (between column/rows 45-48/C-E) sections of the zone do not contain any safe shutdown equipment or cabling and are primarily condensate water treatment areas. No suppression or detection is provided in these sections of the zone due to the low level of combustibles and lack of hot shutdown equipment. Installation of additional suppression and detection systems in the central portion of the zone is not warranted due to the low fire loading throughout the zone. The level of protection provided by the fire protection systems is sufficient to ensure that any fire in the zone would be quickly detected and contained within the Central Zone Group.

This fire zone does not contain any equipment required by alternate shutdown paths A2 and B2 which would be used to shut down Units 2 and 3, respectively, for a fire in the Central Zone Group. However, the zone does contain electrical cables which are part of the B2 shutdown path. These cables are routed in a common cable tray which runs through the southwestern portion of this zone. This cable tray will be protected with a 1-hour fire rated wrap from the Unit 3 reactor building (at column/row 45/H) to the western end of the ground floor access corridor (at column/row 47.5/G). The region of the ground floor through which the cable tray runs is protected by both wet pipe sprinkler protection and detection. These protection measures are adequate to ensure that a fire in the Central Zone Group would not damage these cables and, as a result, that they would be available for use with the B2 shutdown path.

5.5.4.2 Fire Zone 8.2.6.C (Elevation 534 feet 0 inch)

This fire zone has a total floor area of approximately 11,400 ft² and a ceiling height of approximately 27 feet. The total fire loading due to in-situ combustibles is approximately 328,000 Btu/ft². However, approximately 95% of this fire

loading is attributable to the two turbine oil reservoirs located in this zone, each of which contains a maximum of 11,450 gallons of lubricating oil. The oil reservoirs are each protected by an open head water spray system and thermal detectors. Also, open gratings around the reservoirs, which empty into a drain system prevent any oil spill from affecting other parts of the zone. Therefore, any fire originating from the reservoirs would be contained. The remaining combustibles in the zone give a fire loading of less than 16,000 Btu/ft². The rest of Fire Zone 8.2.6.C (Figures B-12 and B-13 illustrates the fire protection systems in this zone) is provided with a wet pipe sprinkler system at the ceiling with the exception of the Unit 2 low pressure heater pull region on elevation 531 feet 0 inch. This region is separated from the rest of the zone by a concrete wall and contains a negligible amount of combustibles. Installation of a suppression system is, thus, not warranted. The addition of a separate detection system throughout the zone is not warranted due to the low fire loading (excluding the oil reservoirs discussed previously). Fire detection is provided over the major fire hazards in the zone. Administrative control of transient combustibles is provided throughout the zone. The level of protection provided is sufficient to ensure that any fire would be quickly detected and contained. Installation of additional detection would not substantially enhance the level of safety at Dresden. No equipment or cabling required for the A2 and B2 shutdown paths is located in this zone.

5.5.5 Conclusions

Based on this analysis, an exemption is requested for the Central Zone Group of the Dresden Units 2 and 3 turbine building from the requirements of 10 CFR 50, Appendix R Section III.G.3 that detection and fixed suppression be provided throughout those zones for which an alternative shutdown method is utilized. The technical bases that justify the exemption request are as follows.

1. Each of the two zones in the Central Zone Group are provided with extensive suppression and detection systems. The only portion of Fire Zone 8.2.6.C (see Figure B-12) not covered by detection or suppression is the Unit 2 LP heater pull area which contains no safe shutdown-related equipment or cabling. The only portions of Fire Zone 8.2.5.C (see Figures B-9 and B-10)

not provided with suppression or detection are in the northeastern and northwestern sections of the zone. These areas contain primarily equipment associated with condensate water treatment systems.

2. The southern portion of Fire Zone 8.2.5.C (see Figures B-9 and B-10) is protected by fixed fire detection and suppression. The only cables associated with the shutdown paths utilized for this zone group are routed through this portion of 8.2.5.C and are protected with a 1-hour fire rated wrap, providing a level of protection in the Central Zone Group equivalent to that prescribed in Appendix R Section III.6.2.
3. Neither fire zone in the Central Zone Group contains any equipment of cables required for shutdown paths A2 or B2, the paths utilized for a fire in this zone group except for cables which are protected by a 1-hour fire rated wrap and suppression and detection.
4. All major fire hazards are protected with a water suppression and/or detection system.
5. The two zones comprising the zone group are separated by a reinforced concrete barrier which would inhibit the spread of any fire in the area.
6. The two zones of the zone group have low fire loadings (excluding the turbine oil reservoirs) and additional suppression and detection systems are unwarranted.
7. The level of protection provided by the fire protection features ensures that damage from a fire in the Central Zone Group would be limited in extent and not adversely impact the capability to safely shut down the plant.

6.0 CRIB HOUSE EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Commonwealth Edison Company requests exemption from the specific requirements of 10 CFR 50, Appendix R Section III.G.2, for separation of redundant trains of equipment located in the Dresden 2 and 3 crib house fire area. CECO specifically requests exemption from:

1. The separation requirements of Section III.G.2 as they apply to the redundant service water pumps, and
2. The separation requirements of Section III.G.2 as they apply to the redundant diesel generator cooling water pumps.

Justification for these exemption requests is provided in Section 6.2.

6.1 SUMMARY

This fire area is shown on Figure B-17. The crib house is north of the Dresden Unit 2 turbine building and is physically separated from the main plant buildings. The crib house walls are 11-5/8-inch concrete block construction with exposed structural steel and, therefore, have no fire rating. The crib house consists of two primary floor levels. The 517-foot 6-inch and 509-foot 6-inch elevations are considered together as the upper level. The lower level is the area from column/rows A to B directly below the 517-foot 6-inch elevation. The floor separating these levels is an unrated interior floor of reinforced concrete slab with stair openings, unsealed pipe penetrations, and floor drains. The building is approximately 180 feet in length.

The five service water pumps and associated cabling are located on the upper level. Fire protection is provided in the form of automatic sprinklers throughout the upper building level. Curbs are also provided to prevent any combustible liquid from spreading beyond the center of the floor. In-situ combustibles are limited and consist of oil contained in a total of six separate circulating water pump motors and five service water pumps, diesel fuel oil from diesel-driven fire pump and diked day tank and limited amount of cable.

Cabling to the service water pumps and the diesel generator cooling water pumps is located on the lower building level. Area fire detection is provided for the basement level. The essential cabling at this level is protected with automatic water spray so that at least two service water pumps and two diesel generator cooling water pumps will remain operable. Curbing and automatic water spray for the diesel generator 2/3 cooling water pump prevent any fire on this level outside the curbing from damaging the pump. A 1-hour rated cable wrap on cable from the trays to the pump will ensure pump operability. A fire will also be prevented from travelling along cabling from one side of the lower level to the other by the water suppression system provided. These same protective features will prevent a fire initiated at the DG-2/3 cooling water pump from endangering the other two diesel generator cooling water pumps which are widely separated from it.

6.2 JUSTIFICATION FOR SEPARATION BETWEEN SERVICE WATER AND DG COOLING WATER PUMPS

6.2.1 Introduction

The only equipment on the upper level necessary for safe shutdown are the five service water pumps. The Unit 2 and Unit 3 service water pumps and associated cables are separated by a minimum of 40 feet. Only one pump is needed to support safe hot shutdown of both units. However, two pumps are necessary for cold shutdown. The subsequent analysis demonstrates that spatial separation and curbs compensate for lack of 1-hour barriers and complete automatic wet pipe sprinkler coverage compensates for lack of complete detection.

The lower building level houses the diesel generator cooling water pumps and cabling for the service water pumps needed to support safe shutdown. Only one diesel generator cooling water pump is needed for hot shutdown. However, two pumps are needed for cold shutdown. The subsequent analysis demonstrates that local water spray and spot sprinkler protection, curbs, and partial 1-hour barriers compensate for lack of a complete 1-hour barrier separating the two units cables and that local suppression for major hazards and area detection compensate for complete suppression coverage.

6.2.2 Fire Protection System

6.2.2.1 Upper Level

The fire protection for the crib house upper level is shown on Figure B-17. Automatic sprinklers are provided throughout the upper building level. Curbs along column/row 3.7 and column/row B and a curb around the diesel fire pump day tank prevent any combustible liquid from spreading beyond an acceptable level. The curb area around the diesel day tank has a drain line tied to the yard drain system. The diesel fire pump and associated day tank are provided with local open head automatic water spray system and thermal detection.

A curb along the entire column/row B at the 517-foot 6-inch level prevents exposure of the service water pumps at elevation 509 feet 6 inches to combustible liquid spills in the area of the circulating water pump on the higher elevation.

6.2.2.2 Lower Level

The fire protection for the crib house lower level is shown in Figure B-17.

An open head water spray system activated by linear thermal detectors protects all cable trays and conduits along the north, east, and west basement walls which contain power cables for the service water pumps and the diesel generator 2/3 cooling water pump. The conduits from both units' cable trays to the diesel generator 2/3 cooling water pump automatic transfer switch and from the switch to the pump are enclosed in a 1-hour rated barrier. Fire detection is provided throughout this level. Ceiling level sprinklers are provided between column/rows 3.5 and 4.5 to separate the cables from each unit at opposite ends of the building along the south wall. Additionally, the diesel generator 2/3 cooling water pump is specifically protected by a curb and a thermally-actuated automatic open head water spray system.

6.2.3 Safe Shutdown Equipment

The safe hot shutdown equipment in this fire area consists of the five service water pumps on the upper elevation and the three diesel generator cooling water pumps on the lower elevation as shown on the F-drawings, (F-18-2 and F-18-3). Most of the safe shutdown cabling is located on the lower level. For a fire involving the diesel generator 2/3 cooling water pump, shutdown paths E and F are utilized which require one service water pump and the dedicated diesel generator 2&3 cooling water pumps to support shutdown. Paths A and B are used to shut down both units for a fire in any other portion of the crib house and require only one service water pump and the diesel generator 2/3 cooling water pump to be available. The majority of cabling in the crib house is located in the lower level cable trays. Short runs of cable leave these trays to power and control various components.

6.2.4 Fire Hazards Analysis

6.2.4.1 Upper Level

The upper level of the building is approximately 180 feet in length. There are two Unit 2 service water pumps, two Unit 3 service water pumps, and a 2/3 service water pump. The Unit 2 and Unit 3 pumps are on opposite ends of the floor. See Figure B-17. All the service water pumps discharge to a common header. See Figure A-10. As long as a fire does not damage the service water pumps and cables on opposite sides of the floor, safe shutdown is not impacted since only one pump is needed to support safe hot shutdown of both units, while two pumps are needed to support cold shutdown. The 3A service water pump is separated from the 2/3 service water pump by greater than 20 feet with the diesel driven fire pump between them. No credit is taken for the availability of the 2/3 service water pump. The 3A service water pump is separate from the 2B service pump by greater than 40 feet. This is the minimum distance the Unit 2 and Unit 3 pumps are separated. The outer service water pumps are separated by more than 100 feet.

In-situ combustibles are limited and consist of oil contained in six circulating water pump motors and five service water pumps and diesel fuel oil in the diesel fire pump and day tank. Cabling is very limited in this area. Cabling to the individual service water pumps is routed from the lower elevation with only very short cable sections exposed at the pumps themselves, as shown on the F-drawings, (F-18-2 and F-18-3).

Automatic sprinklers are provided throughout the upper building level as shown on Figure B-17. Curbs are also provided across the building near column/row 3.7 to prevent any unlikely combustible liquid spill from spreading beyond the center of the floor. Another curb is provided along column/row B at the 517-foot 6-inch elevation to prevent any oil spill at that elevation from exposing the service water pumps at lower elevation 509 feet 6 inches. In addition, the diesel fire pump day tank is enclosed in a curb with a drain line to the yard drain system to prevent diesel fuel oil from exposing the service water pumps. The diesel fire pump and day tank are specifically protected by a thermal detection system and local open head automatic water spray suppression system.

Approximately 10,000 Btu/ft² in-situ combustible loading is present on this floor further supporting the improbability of a major fire occurring. (The cabling represents 3,100 Btu/ft² of the combustible loading on this level.) Transient combustibles are controlled by an administrative procedures.

Therefore, even though the space between the Unit 2 and Unit 3 service water pumps is not completely free of intervening combustibles, the extensive active and passive fire protection measures, i.e., curbs, automatic suppression provided, the large separation distance (approximately 40 feet), and light combustible loading ensure that a fire can not damage both units service water pumps. Detection would be provided by the wet pipe sprinkler waterflow alarm. Therefore, additional detection is not warranted on the upper level due to the low fire loading, complete automatic suppression system, and curbs to prevent the spread of combustible liquids.

6.2.4.2 Lower Level

The three diesel generator cooling water pumps are located on this level as shown on the F-drawings (F-18-2 and F-18-3). Additionally, cable trays and conduit containing cable for the service water pumps and the diesel generator cooling water pumps are routed through the area along the north, east, and west walls. Cables from Unit 3 enter along the west wall and Unit 2 cable enters along the east wall.

Complete area-wide detection is provided that alarms locally and in the control room. Portable extinguishers and hose stations near the access stairs at the end of this level provide manual suppression capability. Ceiling level sprinklers in the area between column/rows 3.5 and 4.5 prevent the spread of fire from one end of the lower level to the other. This ensures that a fire will not involve cables of both units. The diesel generator 2/3 cooling water pump is electrically powered from either Unit 2 or Unit 3. An automatic isolation transfer switch is provided to select the undamaged feed.

All cable trays and conduit are protected along the north, west, and east walls of the crib house by an open head water spray system actuated by a linear thermal detector. The conduits from the cable trays of each unit to the diesel generator 2/3 cooling water pump transfer switch and then from the transfer switch to the

pump are protected by a 1-hour barrier. The diesel generator 2/3 cooling water pump is protected by an automatic open head water spray system.

The ceiling level sprinklers between column/rows 3.5 and 4.5 provide additional protection to the diesel generator 2/3 cooling water pump. A curb around the pump prevents direct exposure of the pump to any combustible liquid spill in the building. These protective features will prevent a fire from affecting more than one diesel generator cooling water pump.

Approximately 13,000 Btu/ft² of fixed combustibles is located on the lower crib house level. Of this, 5300 Btu/ft² is associated with cabling plus a total of 5700 Btu/ft² average distribution of the combustible loading related to the oil contained in all six of the separate circulating water pumps. Transient combustibles are controlled by administrative procedures.

Therefore, even though the diesel generator cooling water pumps and service water pump cabling do not meet the specific separation requirements prescribed in Appendix R Section III.G.2, the level of protection in the crib house lower level, provided by the extensive local suppression and complete area detection systems, ensures that a fire would not damage more than one of the three redundant diesel generator cooling water pumps or cabling for more than one units service water pumps.

6.2.5 Conclusions

Based on the preceding analysis, an exemption is requested for the Dresden 2/3 crib house from the separation requirements of 10 CFR 50, Appendix R Section III.G.2. The technical bases to justify this exemption request are summarized as follows.

6.2.5.1 Upper Level

1. Over 40-foot separation exists between Unit 2 and Unit 3 service water pumps and related cables. No credit is taken for use of 2/3 service water pump for safe shutdown.

2. Area-wide automatic sprinkler protection is provided.
3. In-situ combustible loading is light (10,000 Btu/ft²).
4. The major hazards, the diesel-driven fire pump and day tank, are provided with a local open head spray system actuated by a thermal detection system.
5. A curb area around the diesel-driven pump day tank with a drain contains any leakage of diesel fuel oil.
6. A curb across the building near column/row 3.7 prevents any combustible liquid from spreading beyond the center of the floor.
7. A curb along column/row B will contain any oil spill at the 517-foot 6-inch elevation thus preventing exposure of the service water pumps at elevation 509 feet 6 inches to a fire hazard.

6.2.5.2 Lower Level

1. An area-wide detection system is provided.
2. Ceiling level sprinklers in the area between column/rows 3.5 and 4.5 are provided.
3. An open head automatic water spray system actuated by a linear thermal detector provides protection to all cable trays and conduits containing safe shutdown cable.
4. Conduit from both units to the diesel generator 2/3 cooling water pump is protected by 1-hour fire wrap.
5. A local open head automatic water spray system is provided over diesel generator 2/3 cooling water pump.
6. A curb is provided around the diesel generator 2/3 cooling water pump.
7. The In-situ combustible loading is light (13,000 Btu/ft²).

DRESDEN 2&3

7.0 APPENDIX R EXEMPTION REQUEST FOR HOT SHUTDOWN REPAIRS

Per the provision of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirement of Section III.G.1 of Appendix R that one train of systems needed for hot shutdown be free of fire damage, in so far as this is interpreted as disallowing the use of repairs to implement hot shutdown (SECY-83-269, Section 1.2.1). CECo specifically requests that an exemption be granted.

- 1) To allow the pulling of fuses in order to place the condensate transfer pumps into local control.
- 2) To allow the pulling of closing fuses to defeat high impedance faults.
- 3) To allow the pulling and replacement of fuses on selected control circuits in lieu of redundant fusing as suggested by IEIN 85-09.
- 4) To allow the pulling of fuses to preclude spurious operation of the reactor relief valves.

<u>Section</u>	<u>Justification For</u>
7.1	Hot Shutdown Repair
7.2	Removal of Control Power To Defeat High Impedance Faults
7.3	Pulling and Replacement of Fuses in Lieu of Redundant Fusing
7.4	Fuse Pulling to Preclude Spurious Operation of Reactor Relief Valves

Justification for this exemption request is provided in the following sections.

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7.1 JUSTIFICATION FOR HOT SHUTDOWN REPAIR

Condensate transfer pumps 2A and 3A are located on the ground floor elevation of the Dresden 2&3 turbine building in Fire Zones 8.2.5.A and 8.2.5.E, respectively. Isolation condenser alternate shutdown path A2 utilizes condensate transfer pump 2A under local control. Isolation condenser alternate shutdown path B2 utilizes condensate transfer pump 3A under local control. The condensate transfer pumps are used to provide makeup water to the isolation condensers (see Section 2.2.1.2 of this enclosure). The service water pumps and fire pump are also available to provide makeup water to the isolation condenser.

To locally control the condensate transfer pumps, it is necessary to electrically isolate the pumps. This isolation is accomplished by pulling one fuse per pump located on the floor above the pumps at MCC 28-2 for pump 2A and MCC 38-2 for pump 3A. The condensate transfer pumps are not required for makeup water until at least 20 minutes after the initiation of the isolation condenser following a fire. This provides ample time to remove the required fuses and place the pumps into local control. Pulling of fuses is an accepted practice at Dresden and in the industry as a whole.

However, because the pulling of fuses is considered a repair for the purpose of Appendix R, an exemption to Appendix R is necessary for the use of this procedure to achieve and maintain hot shutdown.

7.2 JUSTIFICATION FOR REMOVAL OF CONTROL POWER TO DEFEAT HIGH IMPEDANCE FAULTS

7.2.1 Discussion

Common power source concerns were addressed in the safe shutdown analysis. All of the safe shutdown loads on a given bus are known to be free of fire-induced faults whenever that bus is called upon to power safe shutdown loads. The non-safe shutdown loads that are also connected to the essential buses were not analyzed to determine if a high impedance fault could cause a tripping of the feed breakers. The safe shutdown procedures address high impedance faults on non-safe shutdown loads by instructing the operator to trip all such loads. After tripping these loads an additional manual action of pulling the control power fuses is specified as a precaution against spurious closure of electrically-operated breakers.

When a breaker at a motor control center (MCC) is tripped, no further action is needed to prevent spurious closure. The same is true for manually-operated breakers at the 480V switchgear buses (28, 29, 38 and 39). When an electrically-operated breaker at 4kV or 480V switchgear bus is tripped, spurious closure remains possible until 125V dc control circuit fuses are pulled. These fuses are rated 15 amperes or less, and the actual load currents are considerably less therefore no personal safety equipment is needed.

In each of the 480V switchgear buses, the control circuit fuses for all breakers on the bus are housed in a single fuse compartment. Each breaker's fuses are mounted in a plug-in fuse block that is equipped with a handle for fast, safe removal.

The control circuit fuses for each 4kV breaker are mounted in similar plug-in blocks, and are located in the relay compartment directly above the affected

breaker. Separate fuses are used for the closing circuit and the tripping circuit; only the closing circuit fuse block needs to be removed.

The operators routinely rack out 480V and 4kV buses prior to working on the equipment. The first step in racking out a breakers is the removal of the closing fuse. Removal of the fuses precludes spurious closure and makes it unnecessary to rack out the breakers. The time necessary for removal of these fuses is being considered in the manpower requirements for the safe shutdown procedures.

The tripping of unwanted 480V loads needs to be performed only for shutdown paths that use the affected unit's own power train. Two of the hot shutdown paths that will be used for fires in most fire areas, use equipment and cables in the unaffected unit, where the potential for fire-induced faults does not exist. Only two of the identified fire areas have the potential for fire induced faults which may affect 480V and 4kV non-safe shutdown loads.

The addition of an isolation switch on the non-safety shutdown loads would not increase the operator safety or decrease the time necessary to perform this operation. Some safety related equipment will be disabled by the removal of these fuses, however this operation as it is incorporated in the safe shutdown procedures follows the requirements set forth in 10 CFR 50.54(X).

The pulling of fuses is considered a repair for the purpose of Appendix R therefore an exemption to Appendix R is necessary for the use of this procedure to achieve and maintain hot shutdown.

7.2.2 Conclusion

Based on this analysis, the intent of Appendix R requirements are met also, the pulling of the closing fuses would not affect safe shutdown of the plant. The justification for removal of these fuse is summarized as follows:

- 1) The operation needs only to be done for electrically operated breakers at the 4kV and 480V essential switchgears.
- 2) This procedure will only be used to guard against possible high impedance faults for a fire involving two plant areas.
- 3) The fuses are easily identified and removed.
- 4) The operation is familiar to the operators.
- 5) All equipment necessary for these operations is in the proximity of the equipment of intended use and is kept under periodic surveillance.

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7.3 JUSTIFICATION FOR PULLING AND REPLACEMENT OF FUSES IN LIEU OF REDUNDANT FUSING

7.3.1 Discussion

Each safe shutdown equipment item for which local control is utilized was checked to determine whether a fault on the remote circuit (prior to isolation) can blow a fuse needed for local control. Several items were found to be deficient in this regard (Table 1).

Dresden Station does not use a remote shutdown panel in performing safe shutdown procedures. The shutdown procedures have identified manual operation of switchgear and local control of equipment. A majority of the required safe shutdown circuits protected by a single fuse, are 4-kV circuit breakers. These 4-kV breakers are equipped with local mechanical "TRIP" AND "CLOSE" buttons that are good for one close and one trip without the benefit of control power. This stored energy within the switchgear is equivalent to redundant fusing since both require a manual action.

Some of the remaining identified circuits are 480-V breakers on buses 28 and 38. These circuits feed the condensate transfer pumps 2A and 3A. These pumps are needed to provide shell side makeup to both isolation condenser. If the control circuit is found to be inoperable, then ^{then procedure} ~~isolation condenser~~ may be jacked close. These pumps are not needed until at least 20 minutes after isolation condenser initiation (Table 1).

The remaining circuits are associated with the inboard isolation condenser valves and the engine starting controls for the 2/3 diesel generator. For a fire in the reactor buildings where shutdown paths A1 and B1 are used, fuses (2) for the opposite unit's inboard isolation condenser valve isolation switches in the Unit 2 shutdown cooling pump room on the Unit 3 TIP room may need to be replaced. For a fire in the 2/3 diesel generator room where safe shutdown paths E and F are used, fuses (4) for both units' inboard isolation condenser valve isolation switches may have to be replaced. Procedures will require operators to be sent to these rooms to operate the isolation switches and replace fuses as necessary. Replacement fuses and fuse pullers will be

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maintained under surveillance in the proximity of these rooms and will be readily accessible if fuse replacement is necessary.

The remaining circuit for which fuse replacement (actually four fuses are replaced) will be the only available solution is the engine starting controls at the 2/3 diesel generator. The possibility of fuse replacement arises for a fire in the reactor buildings where safe shutdown paths A1 and B1 are used. Again, replacement fuses and fuse pullers will be maintained under surveillance in the proximity of these controls. An operator will be in the 2/3 diesel generator room to locally control the diesel generator and inboard isolation condenser valves for all paths which use the 2/3 diesel generator.

Because of the minimal number of possible fuse replacements (at most six for a fire in the reactor building), sufficient time is available to replace these fuses. The pulling and replacement of fuses is being considered in the manpower requirements for the safe shutdown procedures.

All of the proposed fuse replacements are in low-voltage circuits (120 Vac or 125-Vdc). The fuses are of the cartridge type and can be removed or inserted under load by means of a standard fuse puller. All are in control circuits (not power circuits) and are rated 15 amperes or less. Actual load currents are considerably less, therefore no personal safety equipment is needed. The operators have been trained at pulling and replacing similar fuses for routine testing and maintenance operations.

The fuses are presently connected at the point where control power enters the equipment, prior to any connections to switches, relays, lights, etc. The presence of a redundant fuse would leave certain terminals of the LOCAL-REMOTE selector switch hot if only the original fuse is pulled; in LOCA position the entire circuit could be hot. We maintain that the small quantity of required fuse replacements, combined with the small likelihood of a serious fire, does not warrant this personnel hazard.

Fuse pulling and replacement is considered a repair for the purpose of Appendix R; therefore, an exemption to Appendix R is necessary for the use of this operation in lieu of providing redundant fusing.

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7.3.2 Conclusion

Following is a summary of the justification for pulling and replacing fuses in safe shutdown control circuits.

- 1) Pulling and replacement of fuses is routine practice at Dresden Station and the station operators are familiar with this operation.
- 2) Replacement fuses and fuse pullers will be maintained in the proximity of the fuse replacement locations and kept under periodic surveillance.
- 3) The circuits that are involved in this procedure are low-voltage control circuits. The fuses are rated at 15 amperes or less, and are actually carrying currents that are considerably less.
- 4) The fuses in the equipment of concern can be easily located and replaced.

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TABLE 7.3-1

LIST OF CIRCUITS PER IEIN 85-09 CONCERNS
WHICH MAY REQUIRE MANUAL ACTION FOLLOWING A FIRE

		Time of Use (Minutes After Isolation <u>Condenser Initiation</u>)
I.	<u>480 V BREAKERS</u>	
	A. Bus 28 Main Feed	20
	B. Bus 38 Main Feed	20
		Time of Use (Minutes After Scram)
II.	OTHER	
	A. 2/3 Diesel Generator Local Controls (Engine Starting)	10
	B. Isolation Condenser Valve M02-1301-1 Isolation Switch	30
	C. Isolation Condenser Valve M02-1301-4 Isolation Switch	30
	D. Isolation Condenser Valve M03-1301-4 Isolation Switch	30
	E. Isolation Condenser Valve M03-1301-4 Isolation Switch	30

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7.4 JUSTIFICATION FOR FUSE PULLING TO PRECLUDE SPURIOUS OPERATION OF REACTOR RELIEF VALVES

7.4.1 Discussion

For fires occurring in Fire Areas RB2-I, RB2-II, RB3-I, RB3-II, TB-I, TB-III or TB-V, it is possible that damage to electrical circuits could occur, e.g., shorts in power or control cables, which would result in spurious operation of a Unit 2 and/or Unit 3 reactor relief valve (203-3A, 203-3B, 203-3C, 203-3D, or 203-3E). To ensure against such spurious operation, it will be necessary in some cases to manually disable the relief valve circuitry. Generally, this involves removing power to the valves and is commonly accomplished by opening breakers at electrical distribution panels. However, for a fire in Fire Area TB-I or TB-III, it will be necessary to remove control power fuses to deenergize the valve circuits. The removal of fuses to achieve or maintain hot shutdown is considered a repair for the purposes of Appendix R, and thus is not permissible without specific exemption.

There are 20 fuses per unit which will need to be removed in order to deenergize the circuits to each unit's five relief valves. The Unit 2 fuses are located in electrical panel 902-32 in Fire Zone 6.2 (Auxiliary Electric Equipment Room) in Fire Area TB-V. The Unit 3 fuses are located in electrical panel 2203-32 in Fire Zone 1.1.1.3 (Unit 3 Reactor Building Mezzanine Floor Level) in Fire Area RB3-II.

For a fire in Fire Area TB-I (Turbine Building Eastern Zone Group), only the Unit 2 fuses, located in Fire Area TB-V, will need to be removed, since such a fire will not affect the Unit 3 relief valve circuitry. A fire in Fire Area TB-I will not affect Fire Area TB-V, but access to Fire Zone 6.2, where the panel containing the fuses is located, must be gained through Fire Area TB-I. Access to Fire Zone 6.2 is available through either of two 3-hour fire rated doors which separate the zone from Fire Area TB-I. The two doors are separated by approximately 100 feet. Automatic suppression systems partially protect the area between these two doors. It is not credible to postulate that a fire in Fire Area TB-I would result in both such widely separated entrances being inaccessible. Emergency lighting is provided in the vicinity of each of the doors, facilitating operator access.

For a fire in Fire Area TB-III (Turbine Building Western Zone Group), only the Unit 3 fuses, located in Fire Area RB3-II, will need to be removed, since such a fire will not affect the Unit 2 relief valve circuitry. A fire in Fire Area TB-III will not affect Fire Area RB3-II and the panel containing the fuses will be readily accessible.

The 40 fuses (20 per unit) under consideration are cartridge-type fuses and are rated at 20 amperes. No personal safety equipment is needed for their removal and the station operators are trained and experienced in removing such fuses for routine testing and maintenance.

7.4.2 Conclusion

As demonstrated in the preceding discussion, the removal of fuses to prevent spurious operation of the reactor relief valves would not interfere with timely performance of safe shutdown operations. Justification for the acceptability of removing the fuses as part of postfire hot shutdown operation is summarized as follows:

1. The number of fuses under consideration is limited to 20 for each unit. All the fuses for a given unit are located on a single panel and fuse pullers are located in the vicinity of the panel.
2. Removal of the fuses will be incorporated into the plant Appendix R Safe Shutdown Procedures.
3. The fuses are located at panels in fire areas different from those fire areas in which the postulated fire occurs that requires removal of the fuses.
4. The fuses under consideration are easily identifiable, low amperage fuses, which are easily removed without threat to operator safety.

8.0 FIRE AREA TB-V (MAIN CONTROL ROOM AND AUXILIARY ELECTRIC EQUIPMENT ROOM)
APPENDIX R EXEMPTION REQUEST

Per the provision of 10 CFR 50.12 Commonwealth Edison Company (CECo) requests exemption from the requirements of Section III.G.3 of Appendix R that Fire Area TB-V, of the Dresden Units 2 and 3 turbine building, relying on alternate shut-down capability, be provided with fire detection and fixed area fire suppression.

Justification for this exemption is presented in Section 8.2.

8.1 FIRE AREA TB-V DESCRIPTION

Fire Area TB-V is composed of two fire zones as shown on Figure A-3. Fire Zone 2.0 is the main control room for Units 2 and 3. Fire Zone 6.2 is the Auxiliary Electric Equipment Room, (AEER) and is directly beneath the main control room. This fire area is separated from all other fire areas by complete 3-hour rated barriers. As seen on Figure A-3 two alternate shutdown paths are available, isolation condenser method A2 (to shutdown Unit 2) and B2 (to shutdown Unit 3). A fire in the control room or AEER has the potential for causing the loss of control for motor operated equipment associated with both units. Automatic halon suppression and complete fire detection are available in the Auxiliary Electric Equipment Room (Fire Zone 6.2). The control room (Fire Zone 2.0) has complete detection only.

8.2 JUSTIFICATION FOR LACK OF COMPLETE DETECTION AND SUPPRESSION IN FIRE AREA TB-V

8.2.1 Introduction

Fire Area TB-V is provided with complete fire detection and suppression with the exception of automatic suppression in the control room (Fire Zone 2.0). The subsequent analysis will justify the lack of automatic suppression throughout the control room.

8.2.2 Fire Protection System

Smoke detectors are present in HVAC ducts leaving the control room. This fire zone is also provided with complete ionization detection. Five fire extinguishers are located inside this fire zone and eight fire extinguishers are nearby in adjacent Fire Zone 8.2.5.A along with a manual hose station. The auxiliary electric equipment room is provided with complete cross zoned ionization detection and automatic halon suppression system. A manual CO₂ total flooding, suppression system is also provided in the AEER.

8.2.3 Safe Shutdown Equipment

The main control room and AEER contain main control boards, switchgear and cabling for a majority of safety related equipment in the plant. In the event of a fire in this zone hot shutdown can be achieved for both units using method A2 and B2. Repair procedures have been developed to accomplish cold shutdown with the shutdown cooling system.

8.2.4 Fire Hazards Analysis

Fire Area TB-V (Fire Zones 2.0 and 6.2) is surrounded by 3 hour rated fire barriers, therefore, an external fire would not damage equipment inside this area. The combustible loading is 41,500 Btu/ft² for the control room and

118,000 Btu/ft² for the AEER and consists mostly of cabling. Transient combustibles are limited by administrative procedures. The control room is continuously manned and has complete fire detection. This, in combination with available manual fire fighting equipment ensure that a fire would be quickly extinguished if it were to start in the control room.

The installation of an automatic suppression system in the control room would not increase the level of protection and inadvertent initiation of a such a system could render some safety related systems inoperable from the control room.

8.2.5 Conclusions

This analysis justifies the exemption from complete fire suppression in Fire Area TB-V, specifically in the control room. The technical basis for this justification is summarized as follows:

1. Fire Area TB-V is surrounded by 3 hour rated fire barriers.
2. The main control room is continuously manned.
3. Manual suppression is readily available in the control room and automatic suppression is provided in the AEER.
4. This fire area is provided with complete fire detection.
5. Inadvertent initiation of an automatic suppression system could render some safety related system inoperable from the control room.

9.0 APPENDIX R EXEMPTION REQUEST FOR 4kV BUS DUCT PENETRATIONS AND STANDBY
GAS TREATMENT SYSTEM PIPING PENETRATIONS

Per the provisions of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Sections III.G.3 and III.L of Appendix R to 10 CFR 50 to the extent that separation of cables and equipment and associated non-safety circuits of redundant trains would require a 3-hour rated fire barrier. CECo specifically request exemption from the requirement from Sections III.G.3 and III.L that the drywell, secondary containment and turbine building be separated from each other and other fire area zone groups by 3-hour rated barriers with respect to 4kV bus ducts and standby gas treatment system piping.

The justification for these exemptions are given in the following sections:

<u>SECTION</u>	<u>JUSTIFICATION FOR:</u>
9.1	4kV Bus Duct Penetrations
9.2	Standby Gas Treatment System Piping Penetrations

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 9.1, Justification for 4KV Bus Duct Penetrations). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECO has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

9.1 JUSTIFICATION FOR APPENDIX R EXEMPTION REQUEST FOR 4kV BUS
PENETRATIONS

Certain 4kV bus ducts penetrate fire barriers in the Dresden Station. These buses run from the emergency diesel generators to associated switchgear. The subsequent analysis will provide justification that the penetrations in the fire stops associated with these bus ducts provide an equivalent 3-hour level of protection against a fire.

Table 9.1-1 lists the 4kV bus duct penetrations in the plant, barriers through which the ducts penetrate and fire zones and areas associated with each penetration.

There has been no tests performed to ensure that the bus duct fire stops provide 3-hour fire resistance per ASTM E-119. There are, however, four basic reasons that these bus duct fire stops possess adequate fire resistance:

1. The bus duct collar is 1/4 inch thick steel at the wall attachment point and the bus duct itself is approximately 1/8 inch thick.
2. The bus duct is mechanically fastened to each side of the wall. If the bus duct were to fail on either side of the wall, no pathway for smoke or flame would result on the opposite side.
3. No combustibles are in contact with the bus duct near the fire barrier penetration.
4. There is no continuity of combustibles through the bus duct penetration.

Based on the analyses presented above, installation of 3-hour rated fire stops would not increase the level of protection and exemption from Appendix R Sections III.G.3 and III.L is justified.

4kV Bus Duct Penetrations

<u>Bus Duct Penetration</u>	<u>Barrier</u>	<u>Fire Zones</u>	<u>Fire Areas</u>
SWGR 33-1 Feed From DG-2/3	Unit 3 Reactor Building South Wall	9.0.C / 1.1.1.2	DG-2/3 / RB3-II
SWGR 23-1 Feed From DG-2/3	Unit 3 Reactor Building South Wall	9.0.C / 1.1.1.2	DG-2/3 / RB3-II
	Unit 2/Unit 3 Barrier Reactor Building	1.1.2.2 / 1.1.1.2	RB2-II / RB3-II
SWGR 34-1 Feed From DG-3	Turbine Building South Wall	8.2.5.E / 1.1.1.2	TB-III / RB3-II
SWGR 24-1 Feed From DG-2	Turbine Building South Wall	8.2.5.A / 1.1.2.2	TB-I / RB2-II
SWGR 24-1 Tie with SWGR 34-1	Unit 2/Unit 3 Barrier Reactor Building	1.1.2.3 / 1.1.1.3	RB2-II / RB3-II

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECO) has withdrawn the following exemption request (Section 9.2, Justification for Standby Gas Treatment System Piping Penetrations). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECO has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. Denton. FPPDP Vol. 3 Book 2 Tab IV)

9.2 JUSTIFICATION FOR APPENDIX R EXEMPTION REQUEST FOR STANDBY GAS TREATMENT SYSTEM PIPING PENETRATIONS

The standby gas treatment system consists of piping which runs from the Unit 2 and 3 reactor buildings and the drywells through the turbine building and out through the stack. The following analysis will provide justification that the penetrations in the fire barriers associated with this system provide an equivalent 3-hour level of protection.

Table 9.2-1 lists the penetrations associated with the system, size of penetration fire area and zones associated with each penetration. The following reasons show that these penetrations possess an adequate resistance to fire:

1. There are no combustibles inside the piping and no continuity of combustibles through the penetrations.
2. There are no concentrations of combustibles near any of the SGBT system penetrations.
3. Each fire area with the exception of the inerted drywell has fire suppression or detection available.
4. Manual hose stations are available in all fire areas with the exception of the inerted drywell.

Based on the analysis presented above, installation of rated fire dampers in the SGBT system piping at fire area boundaries would not increase the level of protection and if installed dampers were to fail closed a degradation of the system would occur which could increase the likelihood of a radioactive release following an accident. Therefore an exemption from Appendix R Sections III.G.3 and III.L is justified.

TABLE 9.2-1

STANDBY GAS TREATMENT SYSTEM PENETRATIONS

<u>SBGT System Penetration</u>	<u>Size</u>	<u>Fire Zone</u>	<u>Fire Areas</u>
Unit 3 Drywell Suction	6 inch	1.1.1.2/8.2.6.C	TB-II / RB3-II
Unit 2 Drywell Suction	6 inch	1.1.2.2/8.2.6.C	TB-II / RB2-II
Unit 3 HPCI Gland Seal Condenser	3 inch	1.1.1.1/11.1.3	RB3-II / RB-2/3
Unit 2 HPCI Gland Seal Condenser	3 inch	1.1.2.1/11.2.3	RB2-II / RB-2/3

10.0 APPENDIX R STRUCTURAL STEEL EXEMPTION REQUEST

Per the provision of 10 CFR 50.12 Commonwealth Edison Company (CECo) requests exemption from the requirements of Sections III.G.3 and III.L of Appendix R that structural steel supporting a 3-hour barrier be protected **equivalent** to the rating of the barrier. Specifically the ceiling of the control room.

Justification for this exemption is provided in Section 10.1.

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption request (Section 10.1, Justification for Appendix R Structural Steel Request). However, since no definitive criteria for establishing independence of an alternative safe shutdown system from the area, room, or zone under consideration exists, CECo has requested that the NRR review this exemption request with regard to the independence of alternate safe shutdown systems that it references. (See May 30, 1986 letter from J. R. Wojnarowski to H. R. denton. FPPDP Vol. 3 Book 2 Tab IV)

10.1 JUSTIFICATION FOR APPENDIX R STRUCTURAL STEEL EXEMPTION REQUEST

The control room at Dresden Station is part of Fire Area TB-V and is separated from other fire areas by floor and walls which are 3-hour rated. The ceiling of the control room is not rated only due to exposed structural steel supporting it although the concrete slab and related penetration seals passes a 3 hour rating. An analysis was performed to determine the fire resistance of the structural steel using the methodology presented in Appendix D (Section III.A) specifically for ventilation limited fires. Localized exposure to the steel was not evaluated.

The ventilation limited fire is valid for the control room since it is a confined area. The doors allowing access to or egress from the control room are electronically controlled to allow only approved personal access. These doors are provided with a self closing device to provide unattended closure. The HVAC ducts in the control room are provided with 3-hour rated dampers. Because of these provisions, a significantly limited flow of combustion air is available for fire in the control room. A summary of the results of the ventilation controlled analysis is provided in Table 10.1-1. A maximum temperature of 613 F is still well below the failure point of steel (see Appendix D).

The control room has a complete ceiling level fire detection system and is continuously manned. These provide for early detection of any incipient fire.

Based on the above analysis an exemption is requested from the requirements of Appendix R Sections III.G.3 and III.L that structural steel supporting a 3-hour barrier be protected equivalent to the rating of the barrier.

SUMMARY TABLE FOR FIRE DURATION VS. ROOM AIR TEMPERATURE
FOR VENTILATION CONTROLLED FIRE IN THE CONTROL ROOM

<u>FIRE DURATION</u>		<u>GAS TEMPERATURE</u>
(Minutes)	(Hours)	(F)
60	1	181
120	2	189
180	3	195
240	4	200
300	5	205
600	10	223
900	15	238
1200	20	251
1500	25	262
3000	50	310
4500	75	347
6000	100	380
7500	125	409
9000	150	436
12000	200	485
15000	250	528
18000	300	568
21000	350	604
21707	361.8	613

11.0 APPENDIX R DRYWELL EXPANSION GAP EXEMPTION REQUEST

Per the provisions of 10 CFR 50.12, Commonwealth Edison Company (CECo) requests exemption from the requirements of Section III.G.3 of Appendix R to 10 CFR 50 that the drywell expansion gap, relying on alternative shutdown capability, be provided with fire detection and fixed fire suppression.

Justification for this exemption is presented in Section 11.2.

11.1 DRYWELL EXPANSION GAP DESCRIPTION

The drywell consists of a steel containment shell surrounded by a concrete shield structure. The steel containment is a pressure vessel with a spherical lower portion and a cylindrical upper portion. Thermal expansion, as a result of normal reactor operation or postulated accidents, will cause the steel shell to expand both radially and vertically. To accommodate this expansion, space has been provided between the concrete shield structure and the steel shell above the foundation transition zone. This space is a gap of approximately 2 inches and precludes any restrained thermal expansion load on the steel containment or the concrete shield. At the foundation level, a sand pocket was used to soften the transition between the foundation and the containment vessel.

To facilitate the pouring of the concrete without reducing the required gap space during construction, prefabricated crushable polyurethane foam sheets were installed over the exterior surface of the steel containment. Epoxy impregnated fiberglass tape was applied over all joints in the polyurethane foam, and 1/4 to 3/8-inch thick fiberglass-epoxy prefabricated cover panels were then installed over the polyurethane foam. Once the concrete has hardened, the materials in the annular space do not serve any design function and are no longer required.

11.2 JUSTIFICATION FOR LACK OF COMPLETE DETECTION AND SUPPRESSION IN THE EXPANSION GAP

11.2.1 Introduction

There is no detection or suppression provided in the expansion gap and it would be difficult if not impossible to provide it due to the physical constraints. The subsequent analysis will justify the lack of detection and automatic suppression throughout the gap.

11.2.2 Fire Protection Systems

While no detection or suppression systems are present in the gap, fire detectors and manual hose stations are located in the reactor building fire zones adjacent to the electrical and mechanical drywell penetrations. A fire in the gap can be detected by these detection systems and the fire can be extinguished by applying water through the annular gap around the penetrations using the manual hose stations. Portable fire extinguishers are located throughout the reactor building.

11.2.3 Safe Shutdown Equipment

The only safe shutdown components located in the expansion gap are electrical conductors inside the electrical penetration assembly canisters. Tables 11.2-1 and 11.2-2 list the safe shutdown equipment operated or associated with cables that pass through these penetrations for Units 2 and 3, respectively.

The taps for reactor level indicators 2(3)-263-106A and 2(3)-263-106B are also routed through the gap in mechanical penetrations on both units.

11.2.4 Fire Hazards Analysis

The 2-inch gap is filled with polyurethane sheets that are covered with a fiberglass cover panel. Polyurethane is a polyester base material with a heat of combustion of 12,000 Btu/lb, an auto-ignition temperature of 1000⁰ F, and a piloted ignition temperature of 500⁰ F to 700⁰ F.

The 2-inch gap is separated from the inerted drywell fire area by the steel containment shell. Separation of the expansion gap from the rest of the reactor building is by minimum 4-feet 0-inch thick structural concrete that is penetrated by mechanical and electrical penetrations.

In Unit 3, the concrete wall separates the expansion gap from two separate fire areas (Fire Areas RB3-I and RB3-II). In Unit 2, the concrete wall also separates the expansion gap from two fire areas. These are Fire Areas RB2-I and RB2-II.

Also providing a barrier to fire spread are the electrical cable penetration assemblies and the mechanical penetrations. There are three standard types of electrical penetration assemblies present; Low Voltage Power and Control Cable Penetration, High Voltage Power Cable Penetration, and the Shielded Cable Penetration. Each type of electrical penetration has the same basic configuration shown in Figure E-1. An assembly is sized to be inserted in the penetration nozzles which are 12-inch schedule 80 steel pipe (wall thickness of 0.688 inches). They are furnished as part of the containment structure and the design and fabrication of each assembly is in accordance with the requirements of the ASME Boiler & Pressure Code, Section III, Class B Vessel. The assembly extends approximately 1 foot beyond the drywell wall on both sides of the penetrations. The drywell wall, in the vicinity of the electrical penetrations, is at least 6 feet thick.

The mechanical penetrations are of two types; those which accommodate thermal movement (hot) and those which experience relatively little thermal stress (cold). The hot fluid line penetrations have a guard pipe between the hot

line and the penetration nozzle in addition to a double-seal arrangement (see Figure E-2, Sheet 1). This permits the penetration to be vented to the drywell should a rupture of the hot line occur within the penetration. The guard pipes are designed to the same pressure and temperature as the fluid line and is attached to a multiple flued head fitting, a one-piece forging with integral flues or nozzles. This fitting was designed to the ASME Pressure Vessel Code, Section VIII. The penetration sleeve is welded to the drywell and extends through the biological shield where it is welded to a bellows which in turn is welded to the guard pipe. The bellows accommodates the thermal expansion of the steam pipe and drywell relative to the steam pipe. A double bellows arrangement permits remote leak testing of the penetration seal. The lines have been constrained at each end of the penetration assembly to limit the movement of the line relative to the containment, yet will permit pipe movement parallel to the penetration.

The penetration details of cold piping lines are shown on Figure E-2, Sheet 2. These penetrations have a double-seal arrangement, however, the guard pipe provided for the hot piping line penetrations is not provided.

The annular space around the electrical and mechanical penetrations is unsealed.

There are two major concerns for a fire in the expansion gap.

1. Can a fire starting in the gap or in a specific fire area adjacent to a gap spread to another fire area via the gap where safe shutdown components of an alternate or redundant shutdown path are located?
2. Can the reactor be shut down if a fire occurs inside the gap during operation?

In addressing the first concern, it should be noted that the drywell is inerted during normal operation. Thus, spread of the fire from the expansion gap to the drywell is impossible. Since the concrete is a minimum 4-feet 0-

inches thick, the discussion is limited to justifying that the electrical and mechanical penetration assemblies provide a barrier to fire spread from the gap to Fire Areas RB2-I and RB2-II in Unit 2 and Fire Areas RB3-I and RB3-II in Unit 3.

Since the polyurethane foam is located on the drywell side of the concrete wall, the only mechanism for fire spread from the expansion gap through electrical penetration assemblies to the fire areas outside the drywell or vice versa is by conduction of sufficient heat through the penetration assembly to reach the autoignition temperature of the cables (600°F) or the foam (1000°F). This is an unlikely event due to the construction of the assembly. As can be seen in Figure E-1, the penetration assembly is a metal canister into which a sleeve, two header plates and cable support plates have been inserted. Electrical conductors are contained within the sleeve and are passed through the sleeve through openings in the header plates. A potting compound has been applied at each end of the penetration to seal between the header plates and cable. The highest temperatures of the drywell side of the steel shell during the January 20, 1986 polyurethane fire was 500°F (see Reference 1). An analysis has shown that at a distance of 3 feet from a hot spot on the steel shell, the maximum temperature was 94°F (see Figure E-3). Thus, if the hot spot was next to a penetration, the temperature at the outside of the penetration, which is about 6 feet away, would be very low. Furthermore, conservative calculations indicate that if an 1800° exposure (i.e., flame impingement) were to occur in either the polyurethane foam or the reactor building, it would take at least 24 hours to conduct sufficient heat through the stainless steel penetration to threaten ignition of combustible materials on the outside surface of the drywell wall. Therefore, it is unlikely that a fire would spread through an electrical penetration assembly into another fire area or from the fire area into the gap.

For mechanical penetrations, as is the case with the electrical penetration assemblies, the polyurethane foam is located on the drywell side of the concrete wall, thus, the only mechanism for fire spread from the expansion gap to the fire areas outside the drywell is by heat transmission through the

annulus around the pipe or conduction through the pipe penetration. Since there are no combustible materials in contact with the pipes in the vicinity of the penetrations, it is unlikely that a fire would spread out of the gap. This conclusion is supported by an analysis of the January 20, 1986 fire. Analysis of the January 20, 1986 fire shows that on the steel shell at a distance of 3 feet from any hot spot, the temperature was 94°F. Therefore, at the outside end of the penetrations, the temperatures of the penetration could not have been high enough to ignite any combustible material in the vicinity of the penetration. (The calculations previously referenced are sufficiently conservative to also account for thermal radiation effects through the annulus around mechanical penetrations.)

The concrete wall and the electrical and mechanical penetration also act as a barrier to the spread of fire from the reactor building into the expansion gap. The justification for this statement is the same as that given above for why a fire cannot spread from the expansion gap into another fire area.

As discussed above, a fire in the expansion gap cannot spread into bounding Unit 2 Fire Areas RB2-I or RB2-II or into bounding Unit 3 Fire Areas RB3-I or RB3-II via the electrical and mechanical penetrations. Attention is now turned to the second concern which is whether the reactor can be shut down if a fire occurs inside the gap during operation.

The construction of the assembly and the analysis of the January 20, 1986 fire makes it unlikely that a fire in the expansion gap could prevent the electrical penetration assemblies from performing their function. However, Tables 11.2-3 and 11.2-4 conservatively address the situation where the assemblies are affected. As can be seen in the tables, shutdown is not affected because of the following:

1. The affected safe shutdown valve is normally in the proper safe shutdown position and a fault in the cable will not change that position,

2. The mechanical function of the Target Rock valve and the safety valves is not affected by an expansion gap fire, thus RPV pressure control will remain available,
3. Instruments are available to monitor reactor vessel level that have their essential and associated circuits routed independent of the expansion gap, and
4. Manual actions can be performed to open valves required for cold shutdown or close valves in lines that are not used as fluid paths for hot shutdown.

The results of the analysis of these possible effects indicate that a fire that spreads throughout the entire gap area would not prevent achieving a safe shutdown. For a fire in the Unit 2 expansion gap, hot shutdown of Unit 2 can be achieved and maintained using shutdown path C and in the event of a fire in the Unit 3 expansion gap, hot shutdown of Unit 3 can be achieved and maintained using shutdown path D.

One final explanation is required. As pointed out above, the taps for reactor level indicators 2(3)-263-106A and 2(3)-263-106B are routed through the gap. A fire in the gap should not affect these instruments for two reasons:

1. The amount of polyurethane around the penetration is limited. That is, once the material has been burned away the temperature of the penetration and that of the fluid inside will return to their ambient level, and
2. The taps for the two instruments are separated by a distance of 45 feet. Thus, at worst only one of the instruments will be unaffected by a fire at any given time. This is supported by the events of the January 20, 1986 fire where the fire traveled less than 30 feet in 6 hours.

11.2.5 Conclusions

This analysis justifies the exemption from complete fire detection and fixed fire suppression in the drywell steel containment expansion gaps in Units 2 and 3. The technical basis for this justification is summarized as follows:

1. The expansion gap is separated by barriers that will prevent the fire from spreading to other fire areas.
2. The fire detection systems in the reactor building will alert the plant to a fire condition in the gap.
3. Manual suppression is readily available near the mechanical and electrical penetrations.
4. A safe shutdown path will be available to achieve and maintain hot and cold shutdown.

11.2.6 References

1. "Evaluation for the Effects of the Dresden Unit 3 Polyurethane Fire," May 1986.

TABLE 11.2-1

SAFE SHUTDOWN EQUIPMENT OPERATED BY CABLES
THAT PASS THROUGH UNIT 2DRYWELL PENETRATIONS

<u>PENETRATION NO.</u>	<u>SAFE SHUTDOWN EQUIPMENT</u>
X-205E	M02-1301-1 2-203-3C 2-203-3D 2-203-3E LI2-263-106A&B LI2-263-116 LI2-263-117 A02-1301-17 A02-1301-20 M02-1001-1B M02-0202-4A
X-200B	M02-1301-4 2-203-3A 2-203-3B A02-1301-17 A02-1301-20 M02-1001-1B
X-204S	M02-1301-1 M02-1301-2 M02-1301-3 M02-1301-4 A02-1301-17 A02-1301-20 M02-0202-4B

TABLE 11.2-2

SAFE SHUTDOWN EQUIPMENT OPERATED BY
CABLES THAT PASS THROUGH UNIT 3DRYWELL PENETRATIONS

<u>PENETRATION NO.</u>	<u>SAFE SHUTDOWN EQUIPMENT</u>
X-204M	M02-1301-1 3-203-3C 3-203-3D 3-203-3E M03-0202-4A A03-1301-17 A03-1301-20 M03-1001-18
X-204S	M03-1301-4 3-203-3A 3-203-3B A03-1301-17 A03-1301-20 M03-1001-1A
X-200C	M03-2301-4 M03-0202-4B

TABLE 11.2-3

POSSIBLE EFFECTS OF A FIRE ON
UNIT 2 SAFE SHUTDOWN EQUIPMENT

<u>EQUIPMENT</u>	<u>EFFECT</u>
M02-1301-1	No effect. This valve is normally open and must remain open for hot shutdown. The cables passing through the penetration supply power to the valve motor and control a limit switch. A fault in these cables or a loss of these cables will not change the valve position.
M02-1301-4	No effect. This valve is normally open and must remain open for hot shutdown. The cables passing through the penetration supply power to the valve motor and control a limit switch. A fault in these cables will not change the valve position.
2-203-3A	A fire that affects these cables could disable the Target Rock valve. However, the mechanical function of the valve and the safety valves will be available for RPV pressure control.
2-203-3B 2-203-3C 2-203-3D 2-203-3E	A fire that affects these cables could disable these electromatic valves. However, the mechanical function of the Target Rock valve and the safety valves will be available for RPV pressure control.
LI2-263-106A&B LI2-263-116 LI2-263-117	A fire in the gap that affected these cables could disable these indicators. However, other indicators are available to monitor reactor level that have their essential and associated circuits routed independent of the gap.
M02-1301-1 M02-1301-2 M02-1301-3 M02-1301-4 A02-1301-17 A02-1301-20	In the event that a fault in these cables affects valves A02-1301-17 and A02-1301-20, valve A02-1301-16 can be manually closed. A fault due to a fire could close valves M02-1301-1, M02-1301-2, M02-1301-3, and M02-1301-4. This will not prevent achieving a safe shutdown, since a fault in the HPCI cables routed in the same penetration will not change the HPCI valve position.

TABLE 11.2-3 (Cont'd)

<u>EQUIPMENT</u>	<u>EFFECT</u>
A02-1301-17 A02-1301-20	In the event that a fault in one of these cables affects these valves, valve 2-1301-16 can be manually closed.
M02-2301-4	No effect. This valve is normally open and must remain open for hot shutdown. The cables passing through the penetration supply power to the valve motor and control a limit switch. A fault in these cables will not change the valve position.
M02-1001-1A	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be opened. After the drywell is made accessible, these valves can be manually opened.
M02-1001-1B	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be opened. After the drywell is made accessible, these valves can be manually opened.
M02-0202-4A	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be closed. After the drywell is made accessible, these valves can be manually opened.
M02-0202-4B	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be closed. After the drywell is made accessible, these valves can be manually opened.

TABLE 11.2-4

POSSIBLE EFFECTS OF A FIRE ON UNIT 3SAFE SHUTDOWN EQUIPMENT

<u>EQUIPMENT</u>	<u>EFFECT</u>
M03-1301-1	No effect. This valve is normally open and must remain open for hot shutdown. The cables passing through the penetration supply power to the valve motor and control a limit switch. A fault in these cables or a loss of the cables will not change the valve position.
M03-1301-4	No effect. This valve is normally open and must remain open for hot shutdown. The cables passing through the penetration supply power to the valve motor and control a limit switch. A fault in these cables or a loss of the cables will not change the valve position.
M03-2301-4	No effect. This valve is normally open and must remain open for hot shutdown. The cables passing through the penetration supply power to the valve motor and control a limit switch. A fault in these cables or a loss of the cables will not change the valve position.
3-203-3A	A fire that affects these cables could disable the Target Rock valve. However, the mechanical function of this valve and the safety valves will be available for RPV pressure control.
3-203-3D 3-203-3E	A fire that affects these cables could disable these electromatic valves. However, the mechanical function of the Target Rock valve and the safety valves will be available for RPV pressure control.
A03-1301-17 A03-1301-20	In the event that a fault in one of these cables affects these valves, valve 3-1301-16 can be manually closed.
M03-1001-1A	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be opened. After the drywell is made accessible, these valves can be manually opened.

TABLE 11.2-4 (Cont'd)

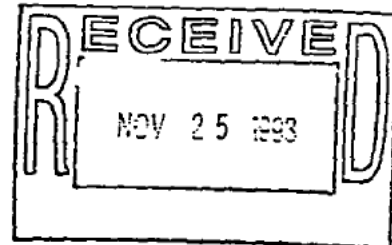
<u>EQUIPMENT</u>	<u>EFFECT</u>
M03-1001-1B	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be opened. After the drywell is made accessible, these valves can be manually opened.
M03-0202-4A	The power feeds to this valve are routed through the penetration. In order to get to cold shutdown, the valve must be closed. After the drywell is made accessible, these valves can be manually opened.
M03-0202-4B	The proper feeds to this valve are routed through the penetration. In order to get to cold shutdown, this valve must be closed. After the drywell is made accessible, these valves can be manually opened.

ComEd

November 19, 1998

JMHLTR: #98-0292

U. S. Nuclear Regulatory Commission
Attn.: Document Control Desk
Washington, DC 20555



Dresden Nuclear Power Station Unit(s) [2] and [3]
Facility Operating Licenses DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Application for Exemption From the Requirements of Title 10,
Code of Federal Regulation (CFR), Section 50 Appendix R, Section III J

Pursuant to 10 CFR 50.12(a), we are requesting an exemption from the requirements of 10 CFR 50 Appendix R, Section III.J, to allow the use of portable hand-held lighting units with an 8-hour battery power for specific areas in the plant as depicted in the attached exemption request. 10 CFR 50 Appendix R, Section III.J specifies the following requirement:

"(J) Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto."

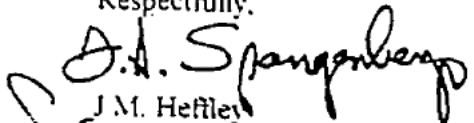
We have concluded that, if approved, implementation of the proposed alternative will not hinder operator manual actions of safe shutdown equipment should a fire in the main plant occur and operator actions become necessary.

November 19, 1998
US Nuclear Regulatory Commission
Page 2

AMENDMENT 12

Please direct any questions you may have concerning this submittal to Frank Spangenberg
at (815) 942-2920, extension 3800.

Respectfully,


J.M. Heffley
Site Vice President
Dresden Nuclear Power Station

Attachment

cc Regional Administrator - Region III
Dresden Nuclear Power Station Senior Resident Inspector

Attachment

Exemption Request For Outside Plant Areas

Requirement

In accordance with Unit 2 DPR-19 operating license condition 2D and Unit 3 DPR-25 operating license condition 3G, Dresden Nuclear Power Station Units 2 and 3 are required to comply with the emergency lighting requirements of Section III. J of 10 CFR 50 Appendix R, which states that:

"Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto."

Exemption Requested

An exemption is requested from Section III.J of Appendix R to 10 CFR 50 to allow hand-held portable lighting units to be used as the emergency lighting units for access and egress routes between the main power block and the exterior support buildings, and to periodically monitor water level in the Clean Demineralized Water Storage Tank.

Discussion

In accordance with the current Appendix R safe shutdown analysis, manual actions may be required in the following areas outside the main power block, dependent upon the location of the fire in the main plant and the plant systems required for safe shutdown:

- Isolation Condenser Pumphouse
- 2/3 Cribhouse
- Clean Demineralized Water Storage Tank (CDST).

With respect to the access and egress routes to these exterior areas, the plant design has not provided fixed eight-hour battery powered emergency lights. In the first two locations, this lighting would only be required for access and egress. Once inside the respective buildings, safe shutdown function lighting already exists. Additionally, fixed emergency lighting for periodic monitoring of the CDST level was not provided. Although fixed emergency lighting is not provided, portable hand-held lighting units are available to operators performing post fire shutdown tasks to illuminate the access/egress routes to these structures, as well as, the level indication for the CDST.

These hand-held units are administratively controlled and maintained near the Main Control Room. They are readily accessible for the operators who may be

assigned to perform tasks outside of the main power block. In the event that sufficient daylight, normal or security lighting are not available, these hand-held lighting units are specifically dedicated for operator use to perform required safe shutdown activities during and following plant fires. An inventory check is performed quarterly to ensure the hand-held portable lights are functional. As demonstrated in the evaluation below, there is reasonable basis for an exemption to this requirement.

Evaluation

The Commonwealth Edison (ComEd) Company has evaluated the use of hand-held portable lighting units for periodic monitoring of CDST, as well as, the access and egress routes to the exterior plant buildings/structures. The evaluation has determined that these measures provide an adequate level of lighting which is equivalent to that required by Section III.J of 10 CFR 50 Appendix R. The exterior structures where manual actions may be required for certain Appendix R fire scenarios include:

- Isolation Condenser Pumphouse
- 2/3 Cribhouse
- Clean Demineralized Water Storage Tank (CDST).

Lighting for the access and egress routes to these exterior structures from the power block will be supplied by hand-held portable lighting units rather than fixed eight hour battery powered emergency lights, as well as, periodic monitoring of the CDST level.

The transit routes have been walked down and there are no obstructions or tripping hazards in the route of travel that might not be revealed with the beam of a hand-held portable light. The CDST level instrument is located in close proximity to the Isolation Condenser Pumphouse. The transit routes are along normally traveled and paved plant roadways surrounding the power block. These roadways are maintained clear of obstructions and snow removal is provided.

The isolation condenser is assumed to be used to control reactor pressure during the safe shutdown fire. The CDST is used to provide makeup water to the isolation condenser shell. Although the Fire Hazards Analysis assumes that the CDST water supply is available until after the eight-hour time frame, the CDST level is periodically monitored to ensure that CDST level does not decrease below approximately 12 percent tank level. Upon the CDST level reaching 12 percent, operator personnel are required to place the backup water supply in service. This ensures that adequate water supply is available for operation of the isolation condenser.

The portable hand-held lighting units designated for use in outside areas can provide a adequate level of lighting equivalent the requirements of Section III.J

of 10 CFR 50 Appendix R. Additionally, the use of the portable lights unit will not hamper completion of operator actions.

Outdoor lighting powered by an offsite source, security lighting, or sufficient daylight may be available in the event of a fire in the power block. In the event that these lights source are not available, the portable lights are available for use by personnel to perform safe shutdown activities.

Portable hand-held lighting units are available to the operators performing the post fire shutdown tasks. These portable hand-held lighting units are part of a periodic surveillance program to ensure equipment required for safe shutdown is available. These hand-held units are dedicated for operator use and are maintained readily accessible to the main control room operators who may be required to transit to exterior buildings.

It is therefore, our position that a level of lighting equivalent to Section III.J of Appendix R to 10 CFR 50 is provided by the hand-held portable units for outdoor areas. The addition of eight-hour battery powered lighting units would not significantly enhance the level of safety.

Applicable Special Circumstances

We have determined that the requested exemption conforms to the applicable exemption criteria of 10 CFR 50.12 (a). There are no prohibitions of law to preclude the activities that would be authorized by the requested exemption, and the requested exemption, if granted, would have no impact on the common defense and security. Additionally, the requested exemption does not present an undue risk to the public health and safety since an equivalent level of lighting as required by Section III.J of Appendix R is provided as described above.

Special circumstances are applicable to the requested exemption in accordance with 10 CFR 50.12 (a) (2) (ii) in that application of the regulation for these particular circumstances is not necessary to achieve the underlying purpose of the rule. Section III.J of 10 CFR 50, Appendix R specifies self-contained emergency lighting units with at least eight-hour battery power supply to provide lighting for access and egress routes and operation of safe shutdown equipment. The underlying purpose of the rule is satisfied by the requested exemption since use of hand-held portable lighting units for outside use as described above provides a level of lighting that is equivalent to that required by Section III.J of 10 CFR 50, Appendix R. Thus, the completion of a design change to satisfy the method specified by Appendix R would not provide additional benefit.

Additional special circumstances are applicable to the requested exemption in accordance with 10 CFR 50.12 (a) (2)(iii) in that the application of the regulation would represent an unwarranted burden on our resources and the cost may be in excess of those incurred by other utilities similarly situated as Dresden. The implementation of outdoor battery powered lighting units would result in expenditure of engineering, construction, and plant resources for their installation, maintenance, and operation. The associated costs would include engineering and installation additional lighting units and supporting structures, and increased surveillance and maintenance of the additional lighting units. The costs associated with the design change to provide additional battery powered lighting units would represent an unwarranted burden on our resources considering the negligible safety benefit and the alternative lighting method as described above. Additionally, other nuclear plants, which we believe are similarly situated as Dresden, have been granted comparable exemptions by the NRC. These exemptions included:

Point Beach Nuclear Plant, Units 1 and 2, exemption dated May 7, 1998.

H.B. Robinson Steam Electric Plant, Unit 2, exemption dated October 8, 1992.

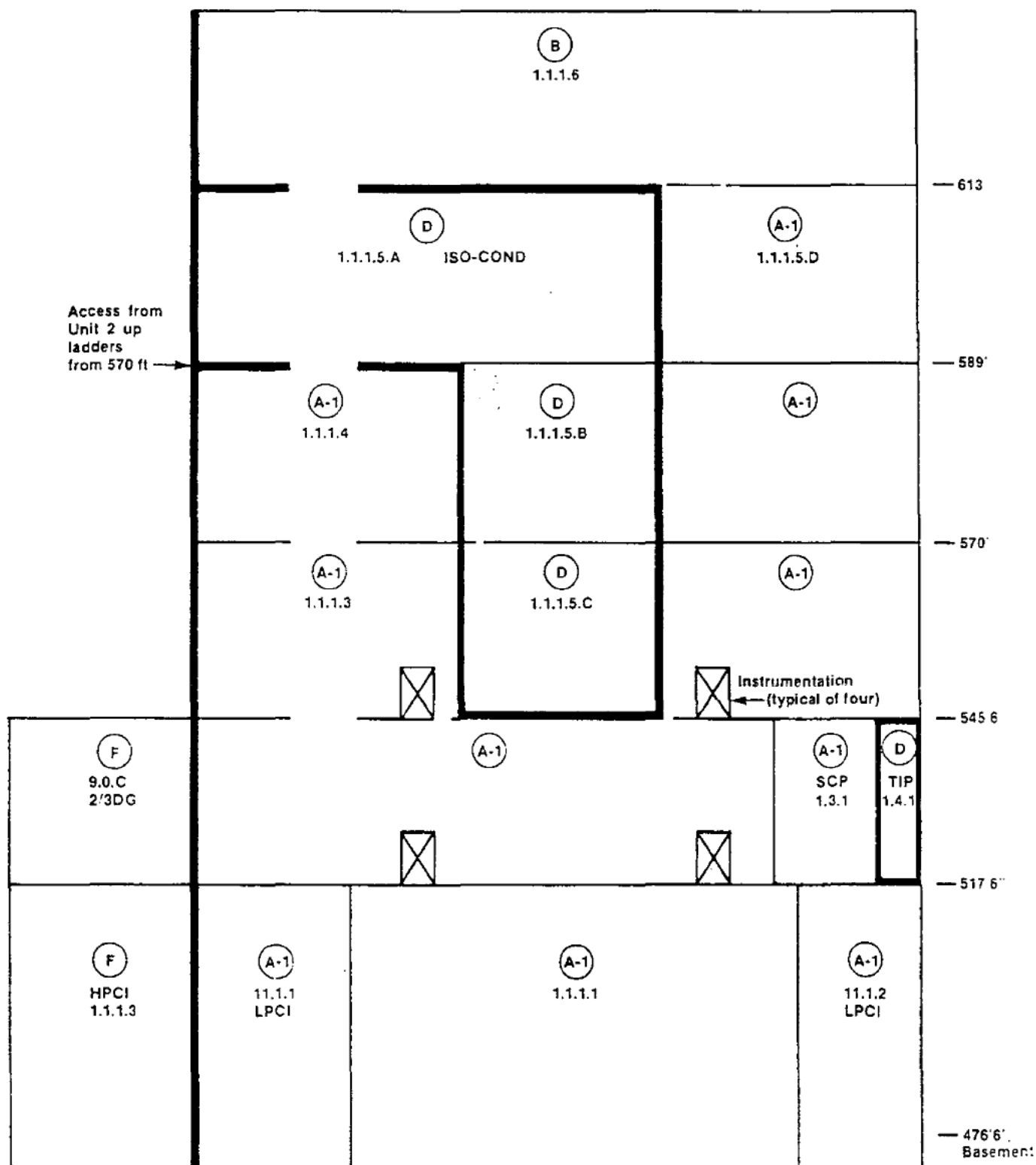
Calvert Cliffs Nuclear Power Plant, Units 1 and 2, exemption dated August 22, 1990

Beaver Valley Power Station, Unit 1, exemption dated July 27, 1987

In conclusion, we believe that special circumstances in accordance with 10 CFR 50.12 (a) (2) (ii) are present to justify the requested exemption. The completion of an additional design change to satisfy the emergency lighting requirements for the areas presented in this request is not necessary to satisfy the underlying purpose of the rule. The hand-held portable lighting units in the outside areas provide sufficient light to complete manual actions required for post fire safe shutdown as required by Section III.J of 10 CFR 50, Appendix R. Additionally the completion of design changes to satisfy the requirements of Appendix R of 10 CFR 50 in these areas represents an unwarranted burden on our resources while providing negligible safety benefit.

A

Part 3

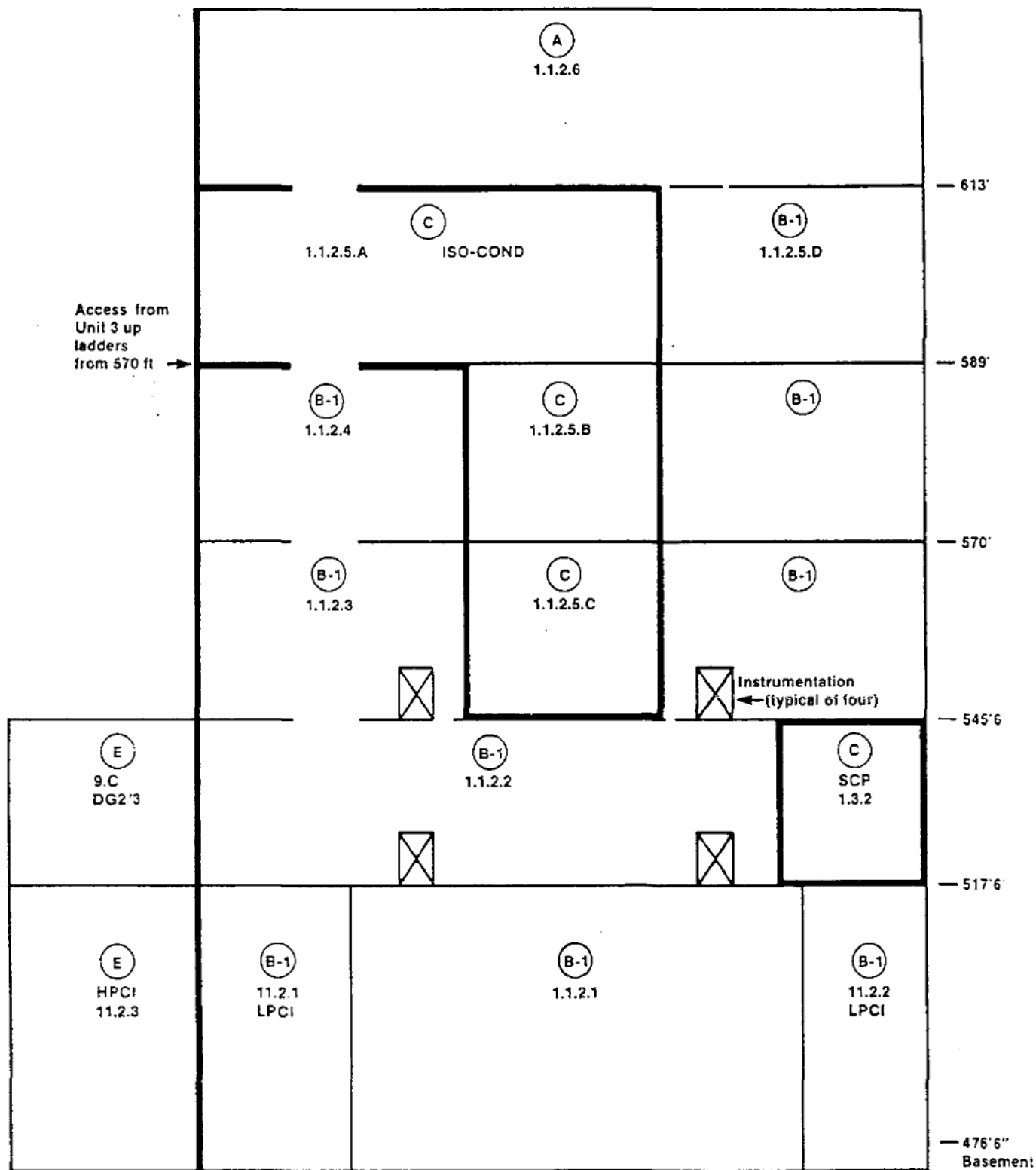


1. Heavy lines identify fire area boundaries
2. Alphanumeric code in circle identifies hot shutdown path

DRESDEN STATION Units 2 & 3

FIGURE A-1

APPENDIX R
SHUTDOWN PATHS FOR
DRESDEN UNIT 3 REACTOR BUILDING

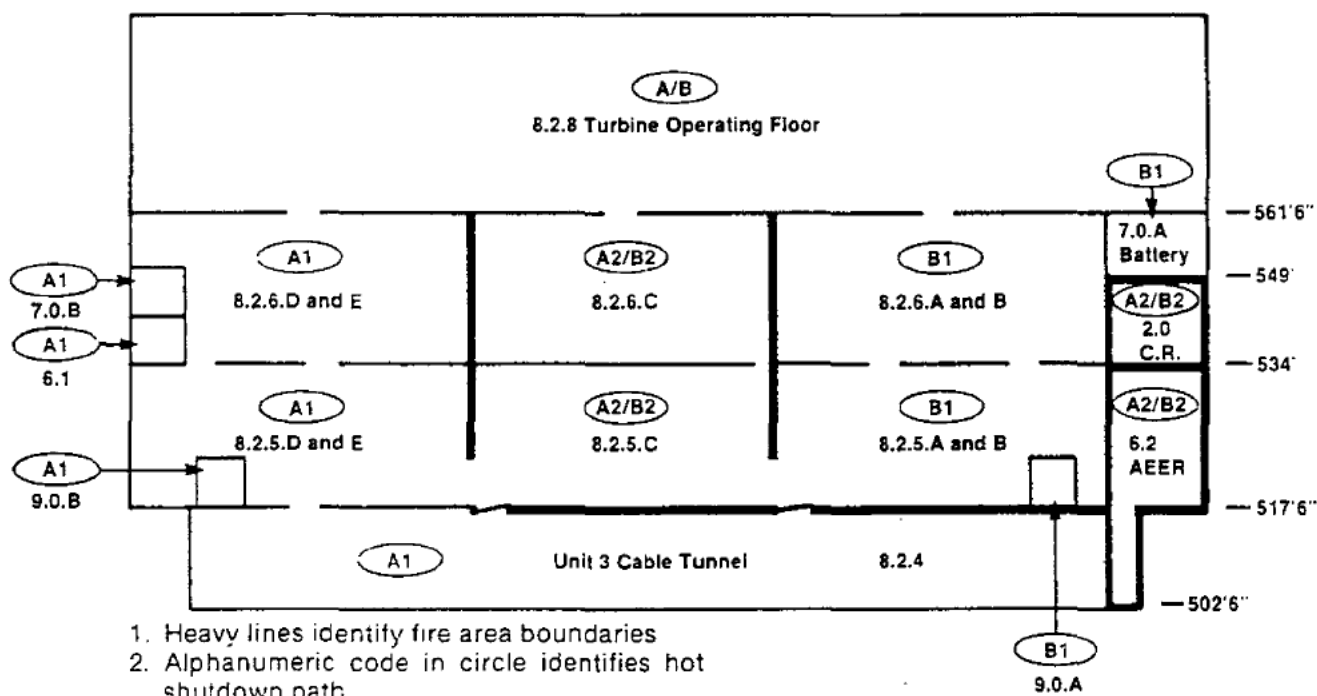


1. Heavy lines identify fire area boundaries.
2. Alphanumeric code in circle identifies hot shutdown path.

DRESDEN STATION Units 2 & 3

FIGURE A-2

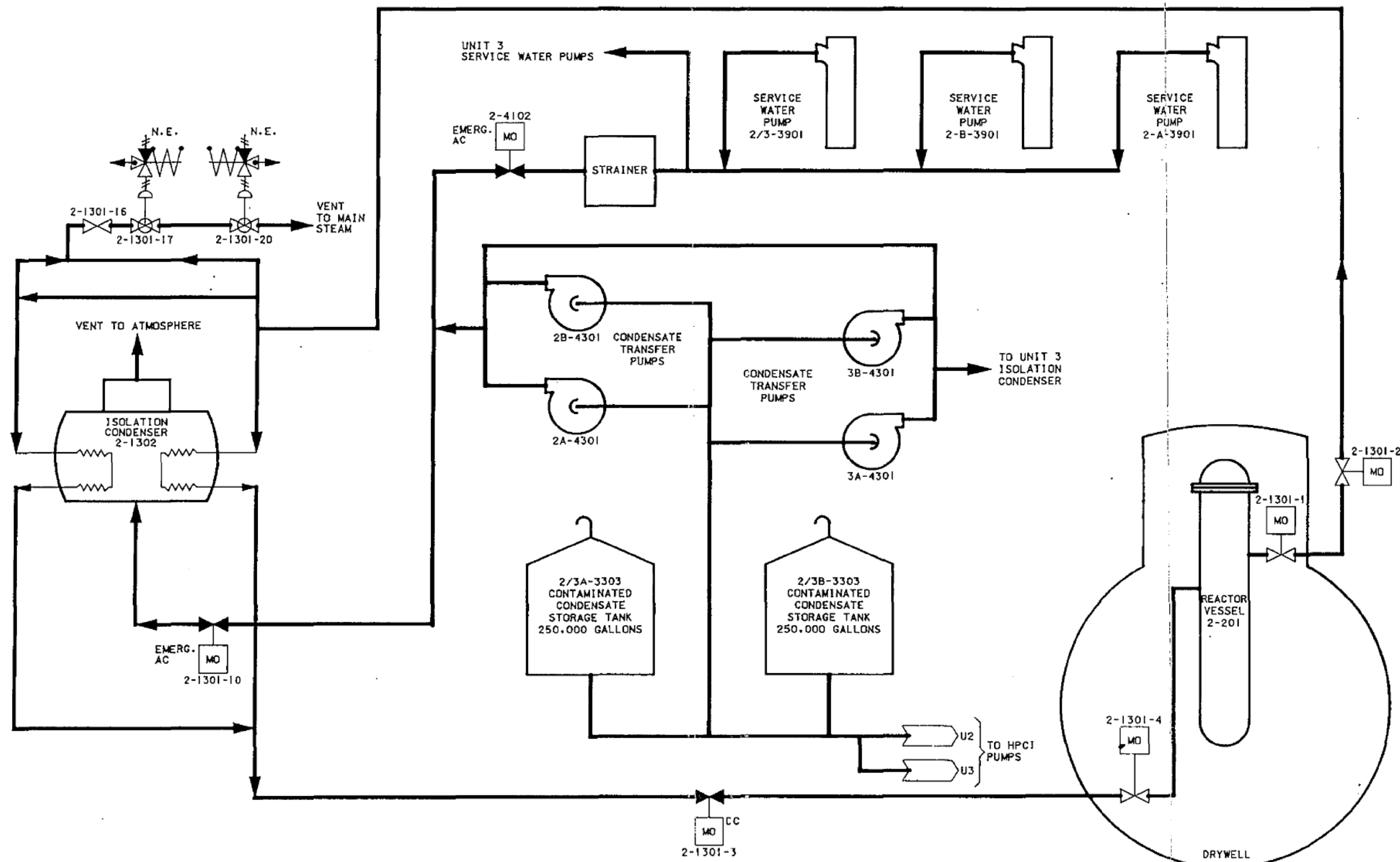
APPENDIX R
SHUTDOWN PATHS FOR
DRESDEN UNIT 2 REACTOR BUILDING



DRESDEN STATION
Units 2 & 3

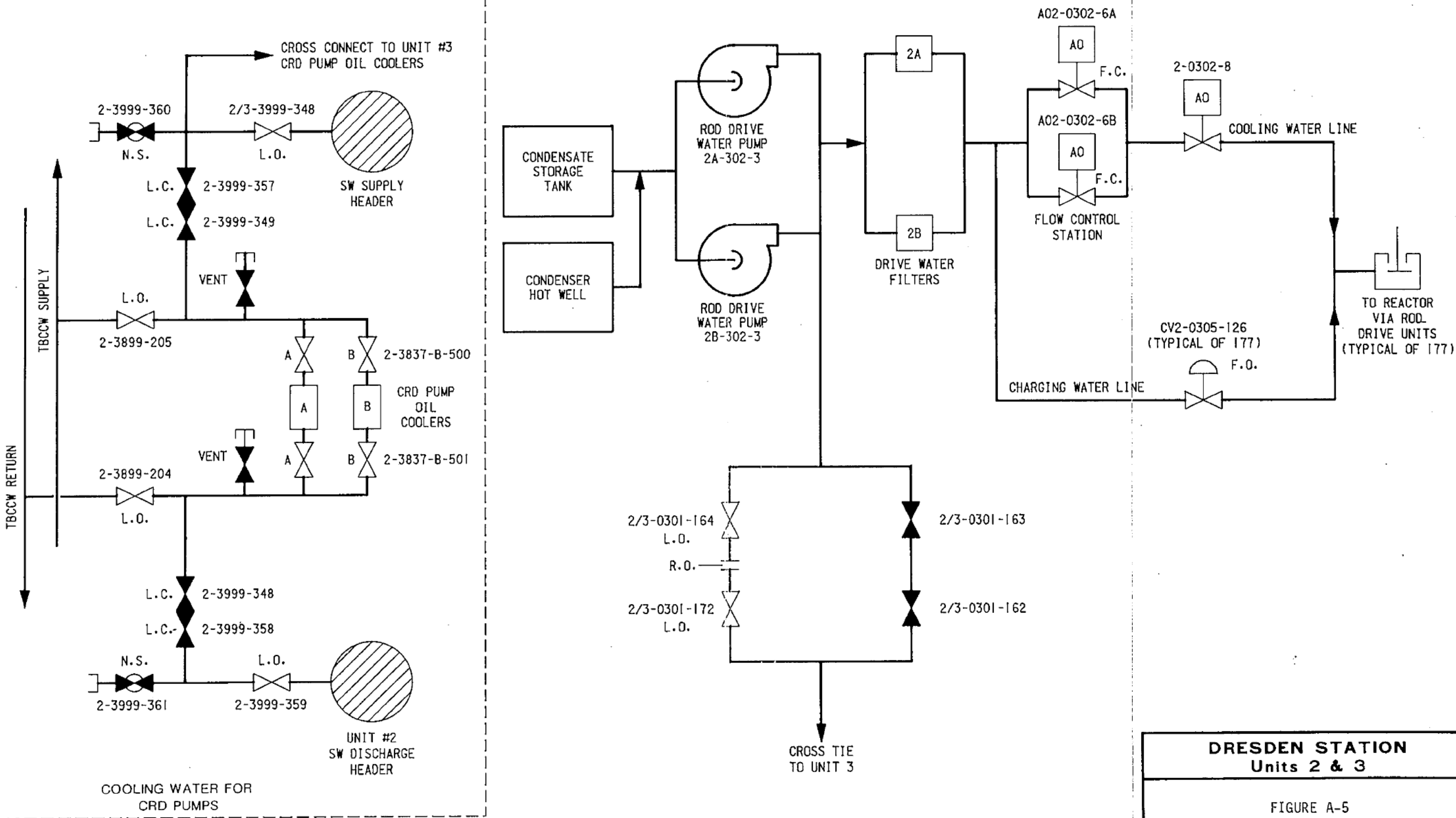
FIGURE A-3

APPENDIX R
 SHUTDOWN PATHS FOR
 DRESDEN UNITS 2 & 3 TURBINE BUILDING



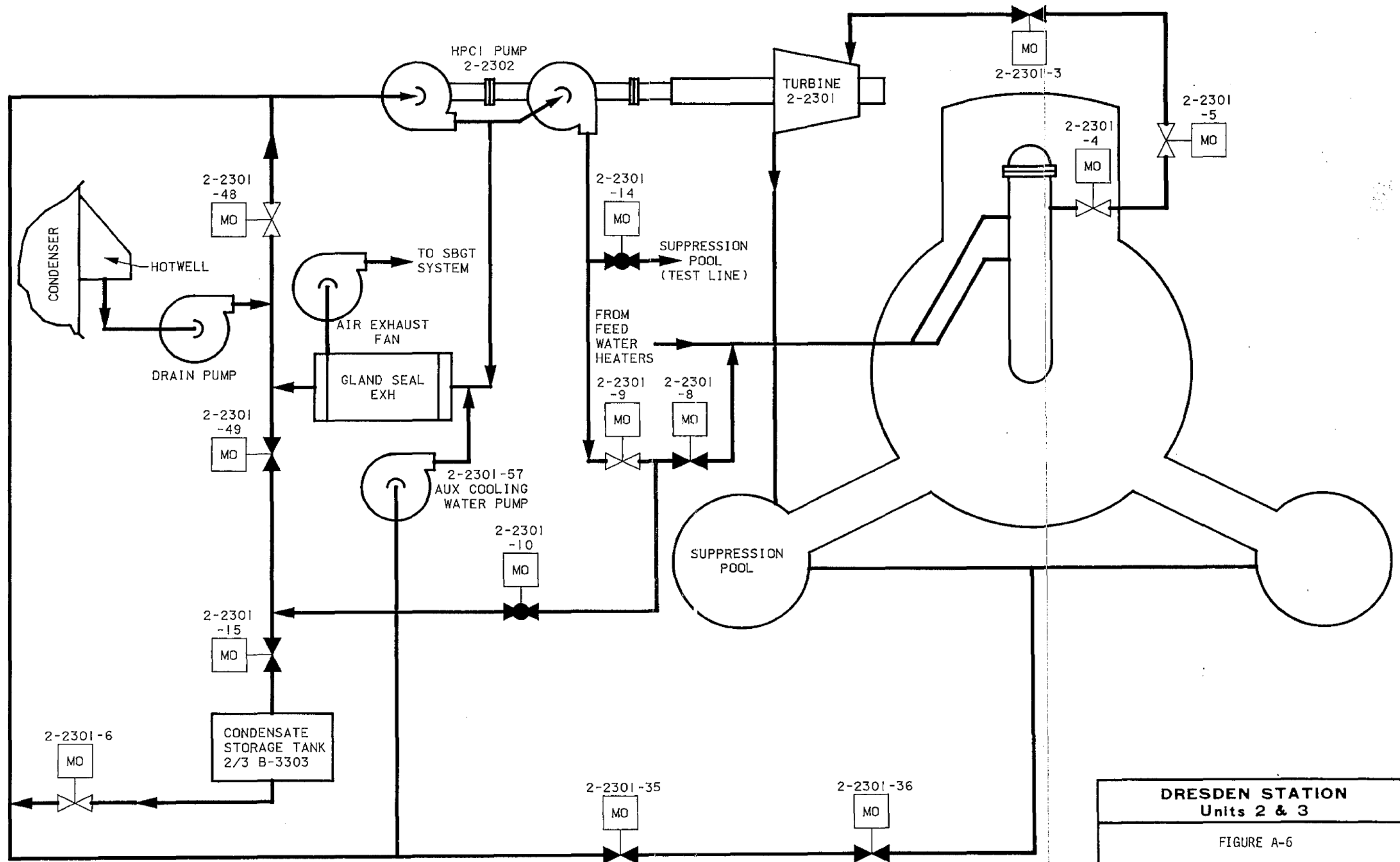
DRESDEN STATION
Units 2 & 3

FIGURE A-4
UNIT 2 ISOLATION CONDENSER



DRESDEN STATION
Units 2 & 3

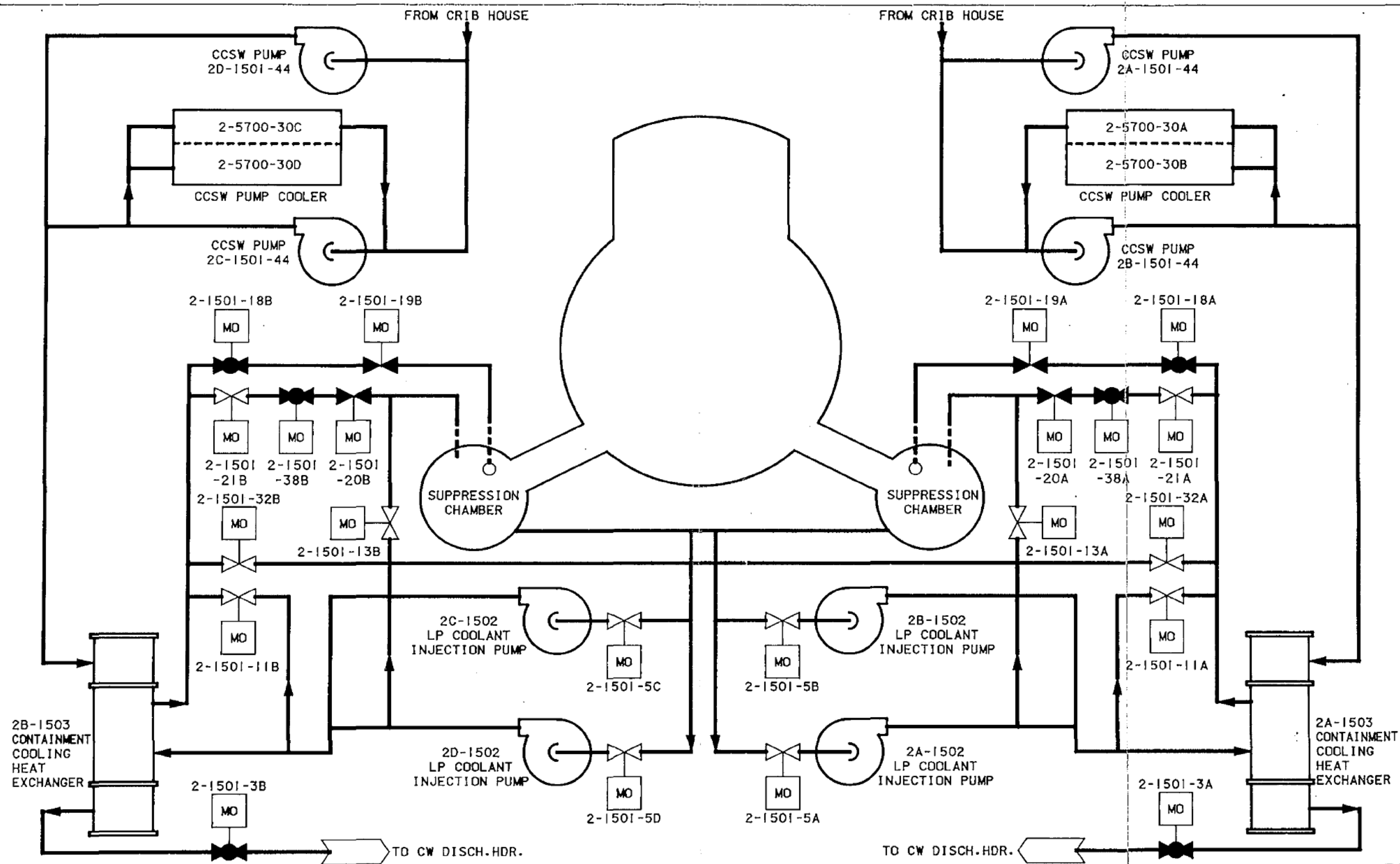
FIGURE A-5
CONTROL ROD DRIVE SYSTEM



DRESDEN STATION
Units 2 & 3

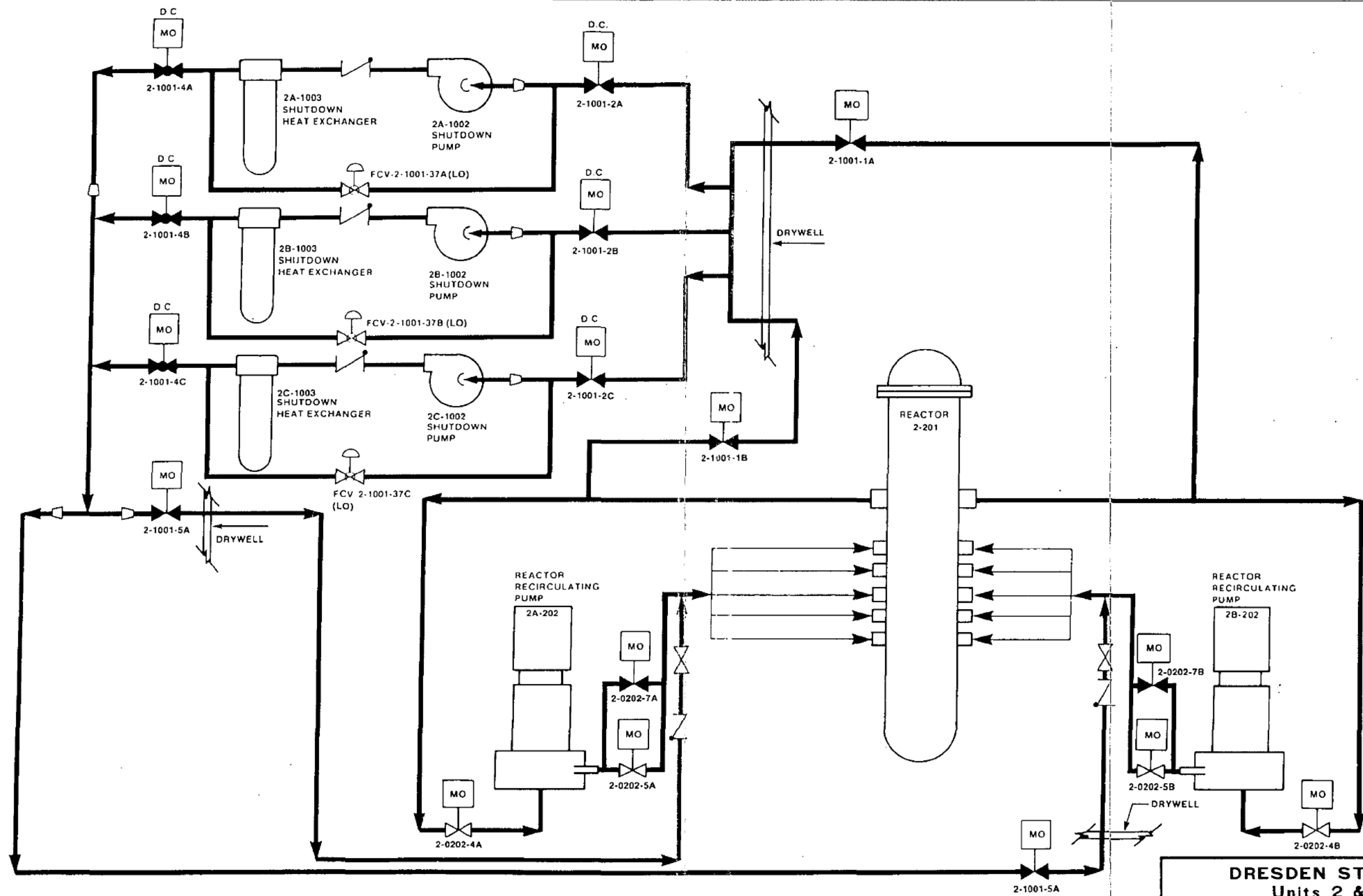
FIGURE A-6

UNIT 2 HIGH PRESSURE
COOLANT INJECTION



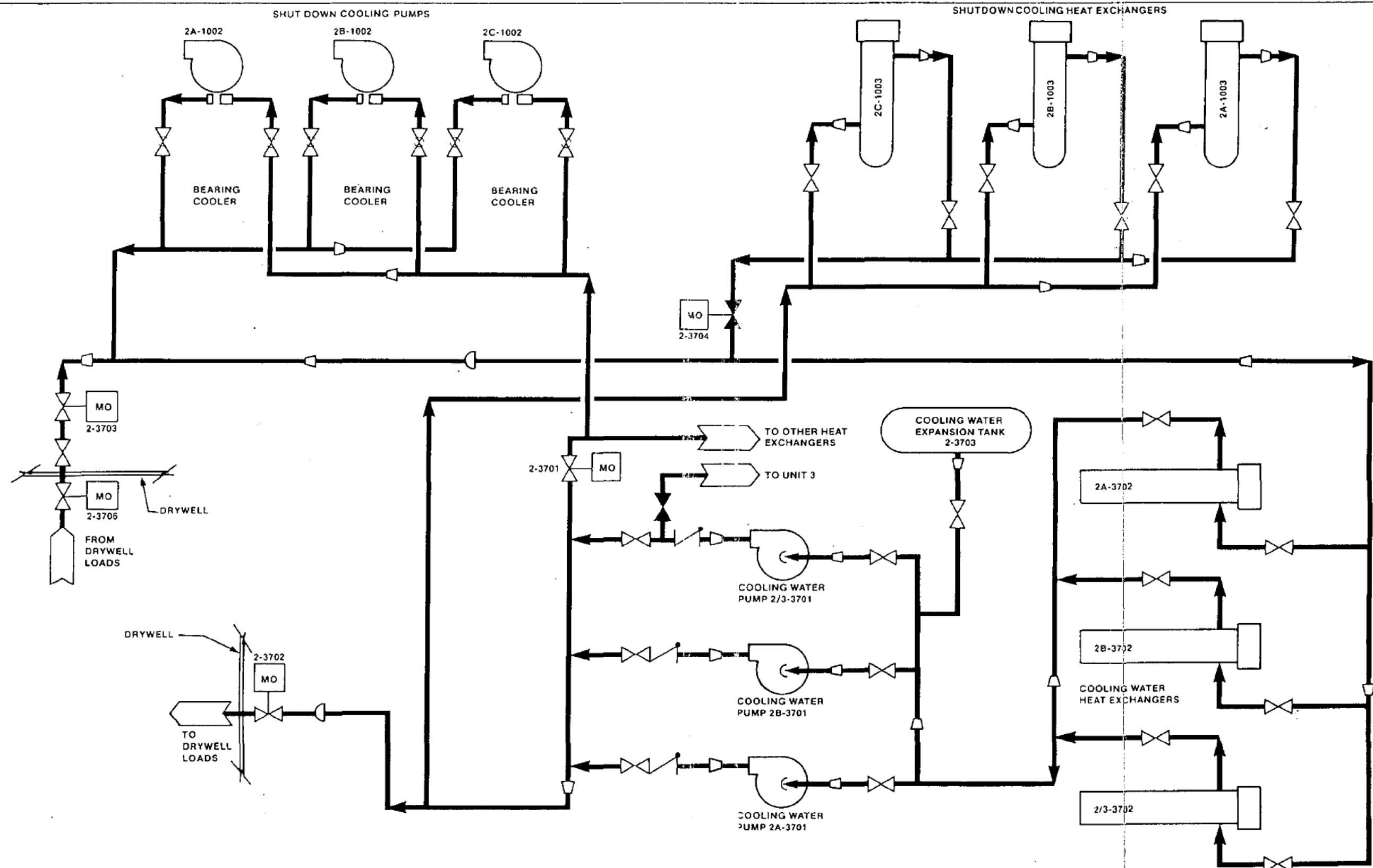
DRESDEN STATION
Units 2 & 3

FIGURE A-7
UNIT 2 LPCI-TORUS COOLING MODE



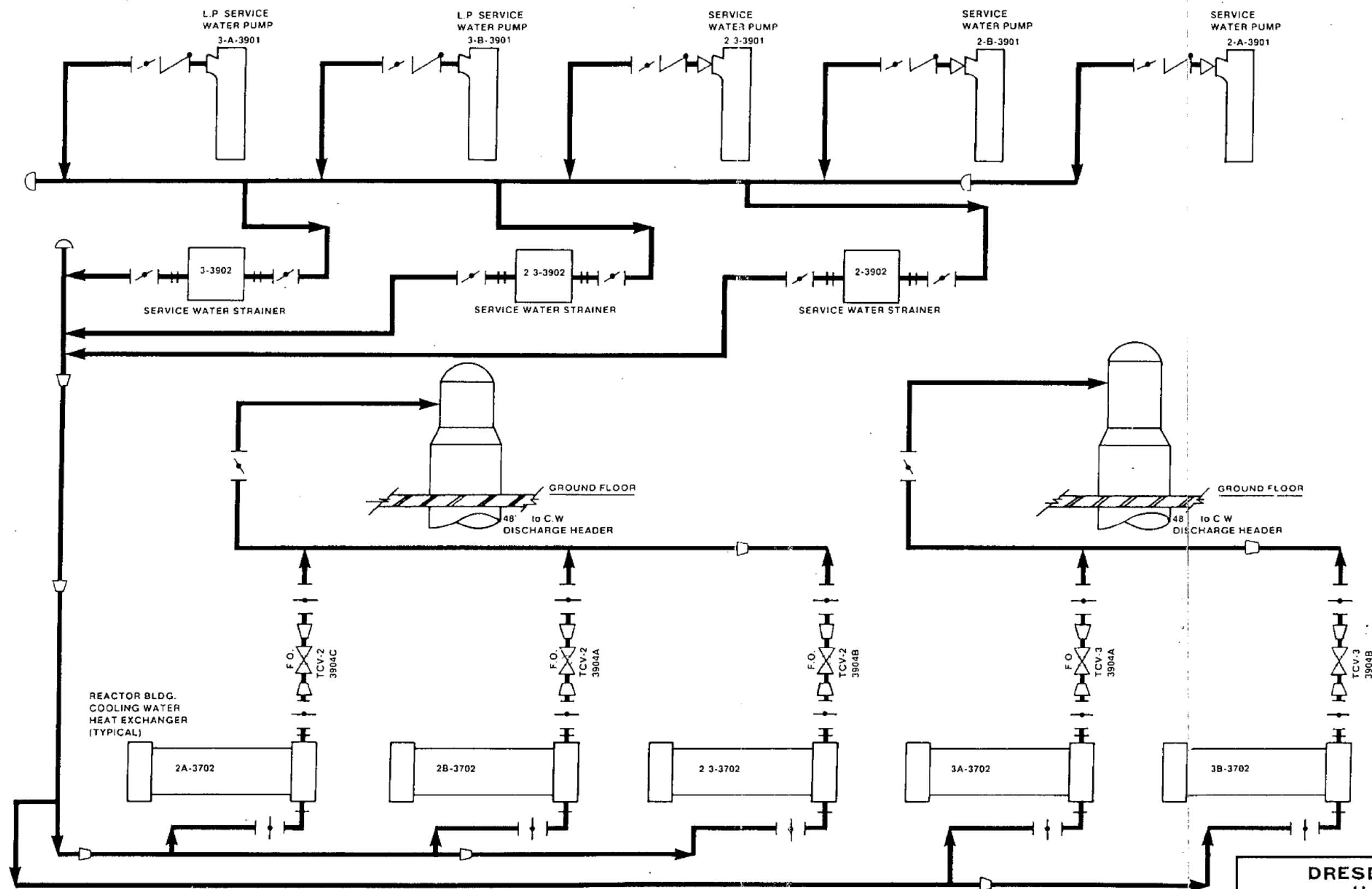
DRESDEN STATION
Units 2 & 3

FIGURE A-8
UNIT 2 SHUTDOWN COOLING



DRESDEN STATION
Units 2 & 3

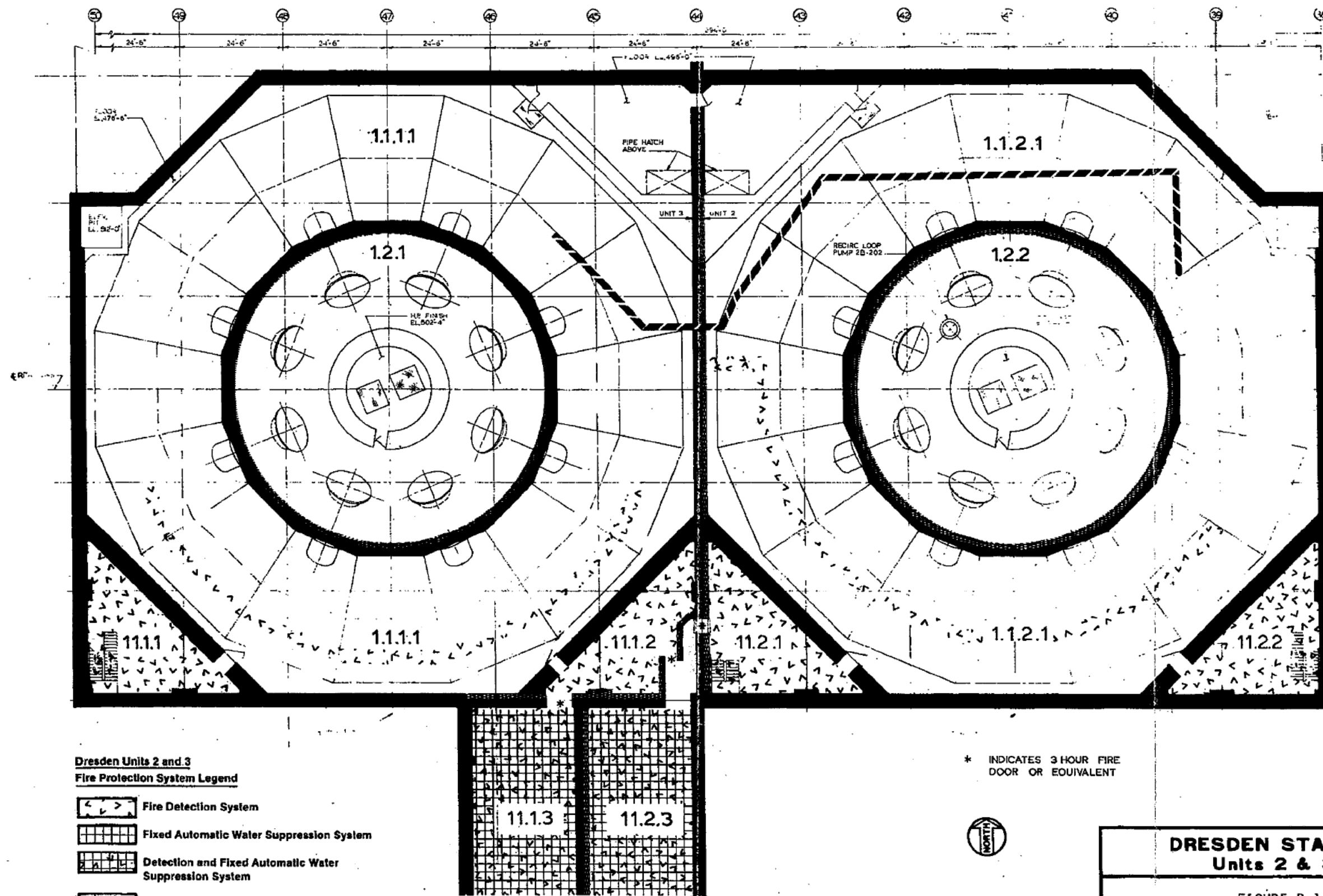
FIGURE A-9
UNIT 2 RBCCW SYSTEM



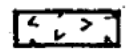
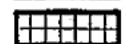
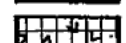
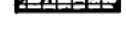
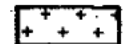


DRESDEN STATION
Units 2 & 3

FIGURE A-10
SERVICE WATER SYSTEM

B



**Dresden Units 2 and 3
Fire Protection System Legend**

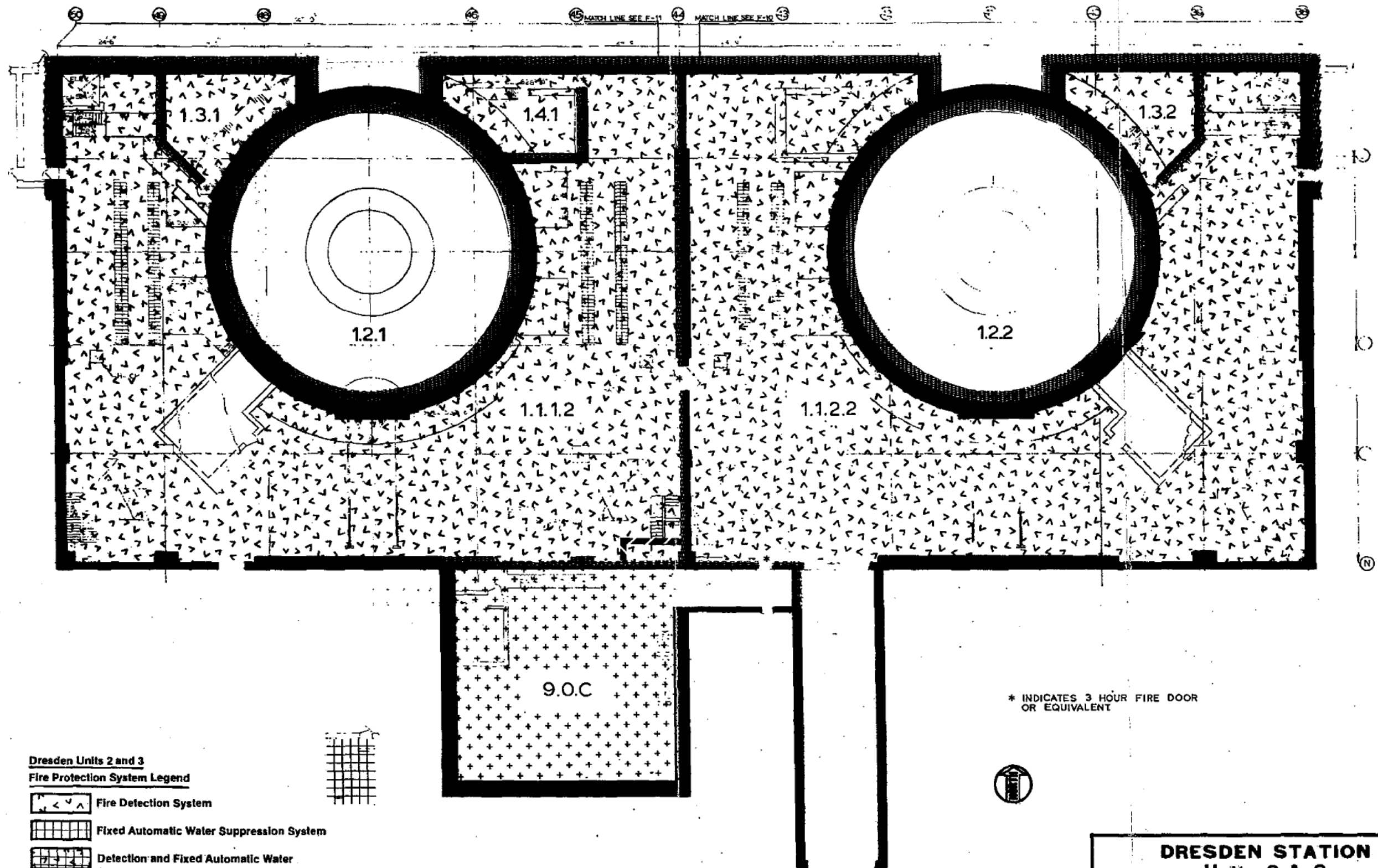
-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable-Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

* INDICATES 3 HOUR FIRE DOOR OR EQUIVALENT

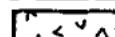
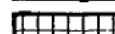
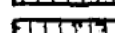
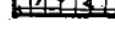
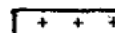
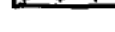



**DRESDEN STATION
Units 2 & 3**

FIGURE B-1
REACTOR BUILDING ELEV 476'-6"

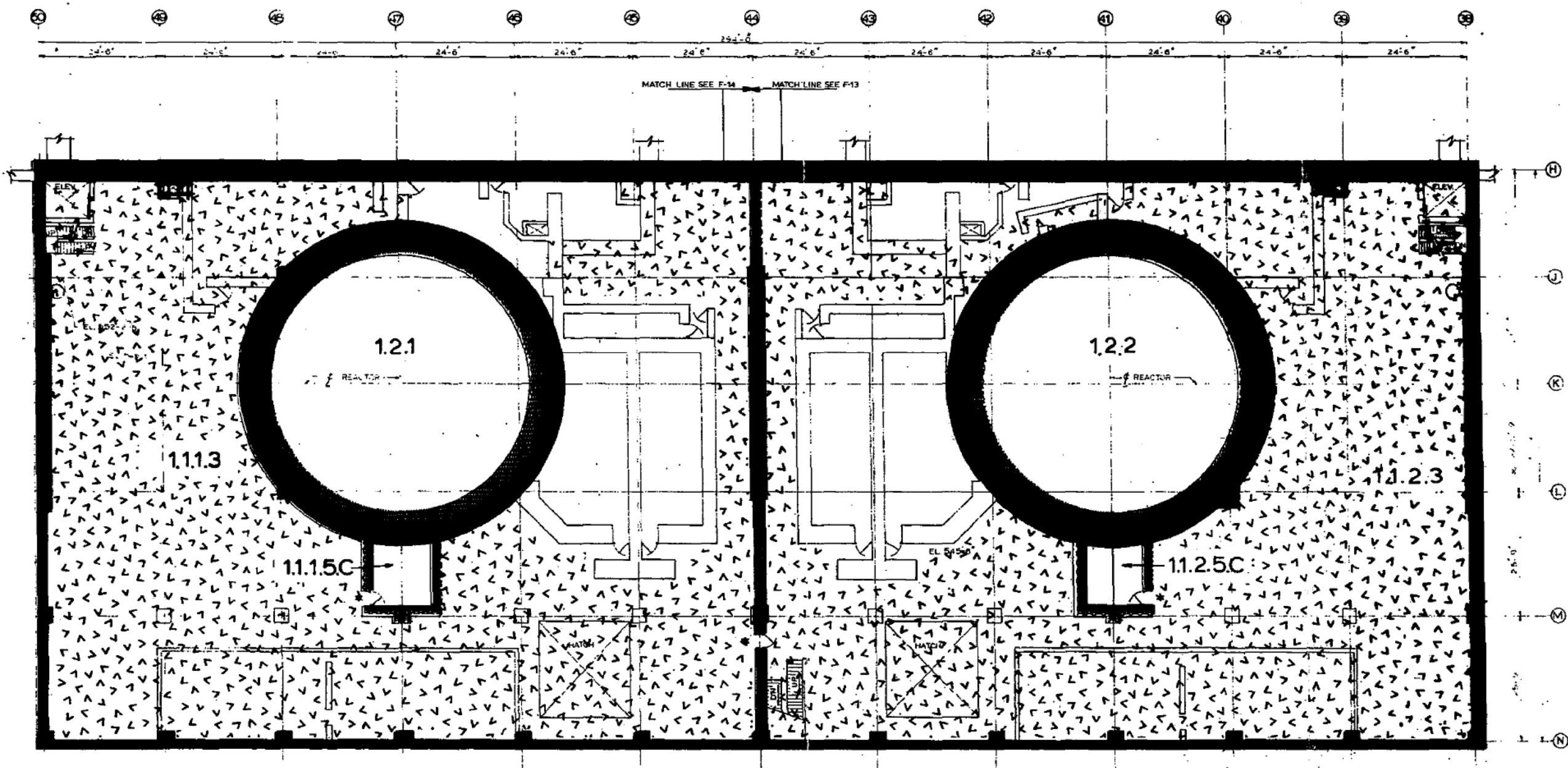


**Dresden Units 2 and 3
Fire Protection System Legend**

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

**DRESDEN STATION
Units 2 & 3**

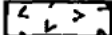
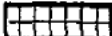
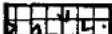
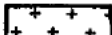



FIGURE B-2
REACTOR BUILDING ELEV 517'-6"



* INDICATES 3 HOUR FIRE DOOR
OR EQUIVALENT

Dresden Units 2 and 3

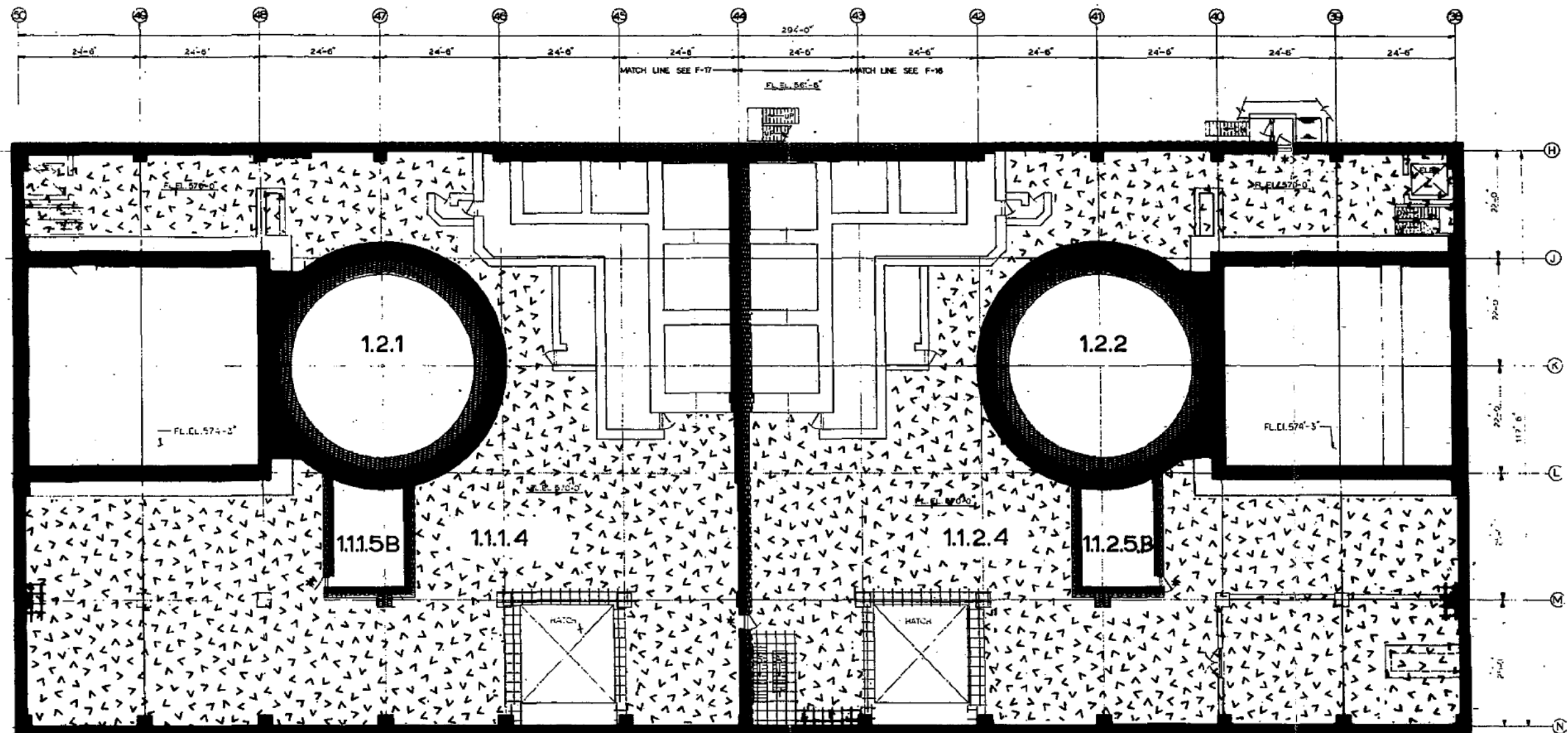
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

DRESDEN STATION Units 2 & 3

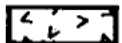


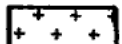



FIGURE B-3

REACTOR BUILDING ELEV 545'-6"



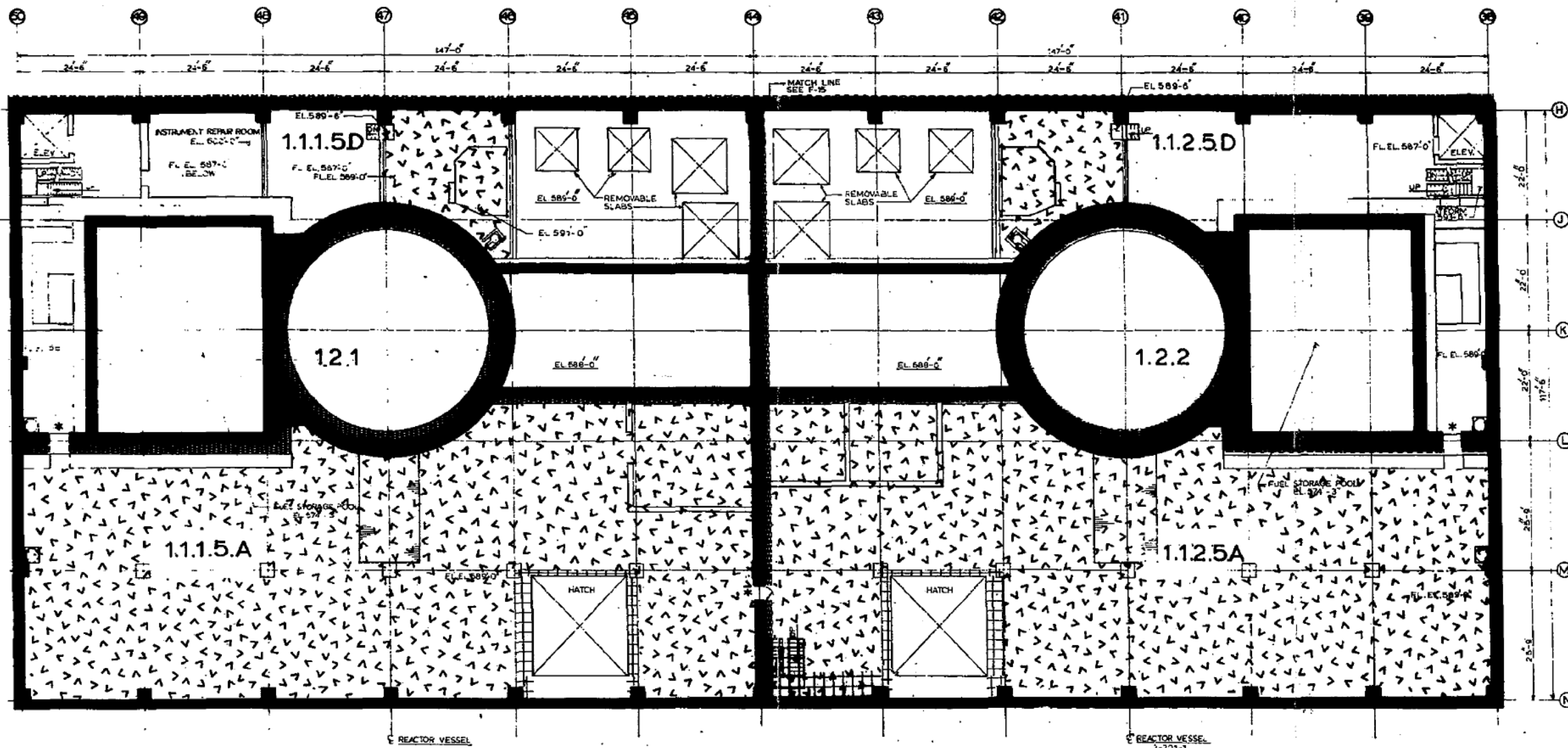
* INDICATES 3 HOUR FIRE DOOR OR EQUIVALENT.

**Dresden Units 2 and 3
Fire Protection System Legend**

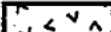
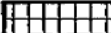

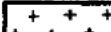



-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

**DRESDEN STATION
Units 2 & 3**

FIGURE B-4
REACTOR BUILDING ELEV 570'-0"



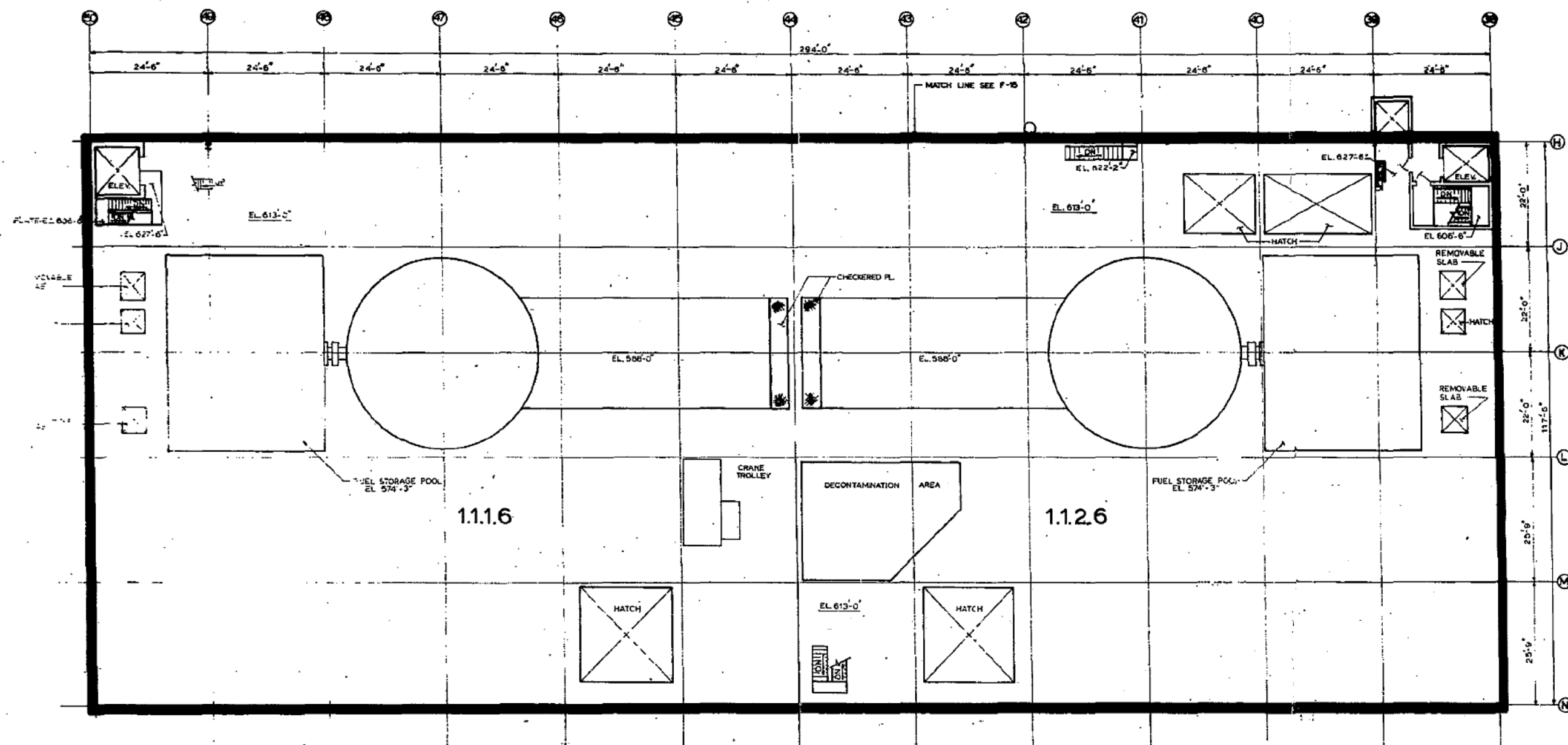
Dresden Units 2 and 3
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

* INDICATES 3 HOUR FIRE DOOR OR EQUIVALENT

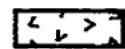
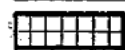
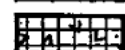
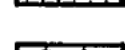
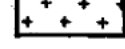


DRESDEN STATION
Units 2 & 3

FIGURE B-5
 REACTOR BUILDING ELEV 589'-0"



Dresden Units 2 and 3

Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

REACTOR BUILDING UNIT 3

REACTOR BUILDING UNIT 2

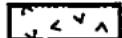


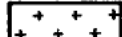



DRESDEN STATION Units 2 & 3

FIGURE B-6

REACTOR BUILDING ELEV 613'-0"



Dresden Units 2 and 3
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

* INDICATES 3 HOUR FIRE WALL OR EQUIVALENT


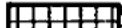



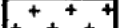



DRESDEN STATION Units 2 & 3
FIGURE B-7 CONTROL ROOM & MISC. TURBINE BUILDING FLOORS



Dresden Units 2 and 3

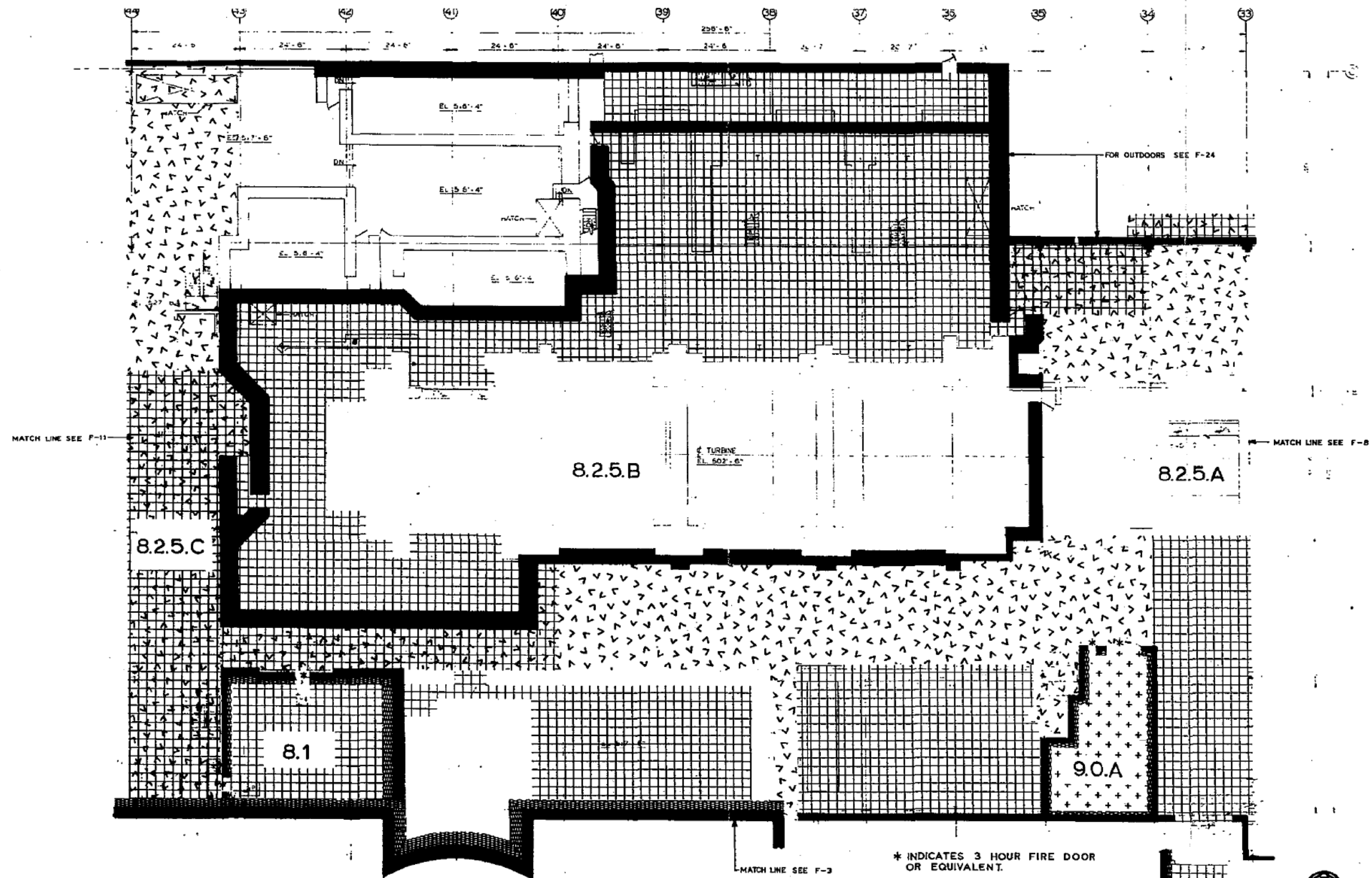
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System

-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

DRESDEN STATION
Units 2 & 3

FIGURE B-8
TURBINE BUILDING BASEMENT FLOOR

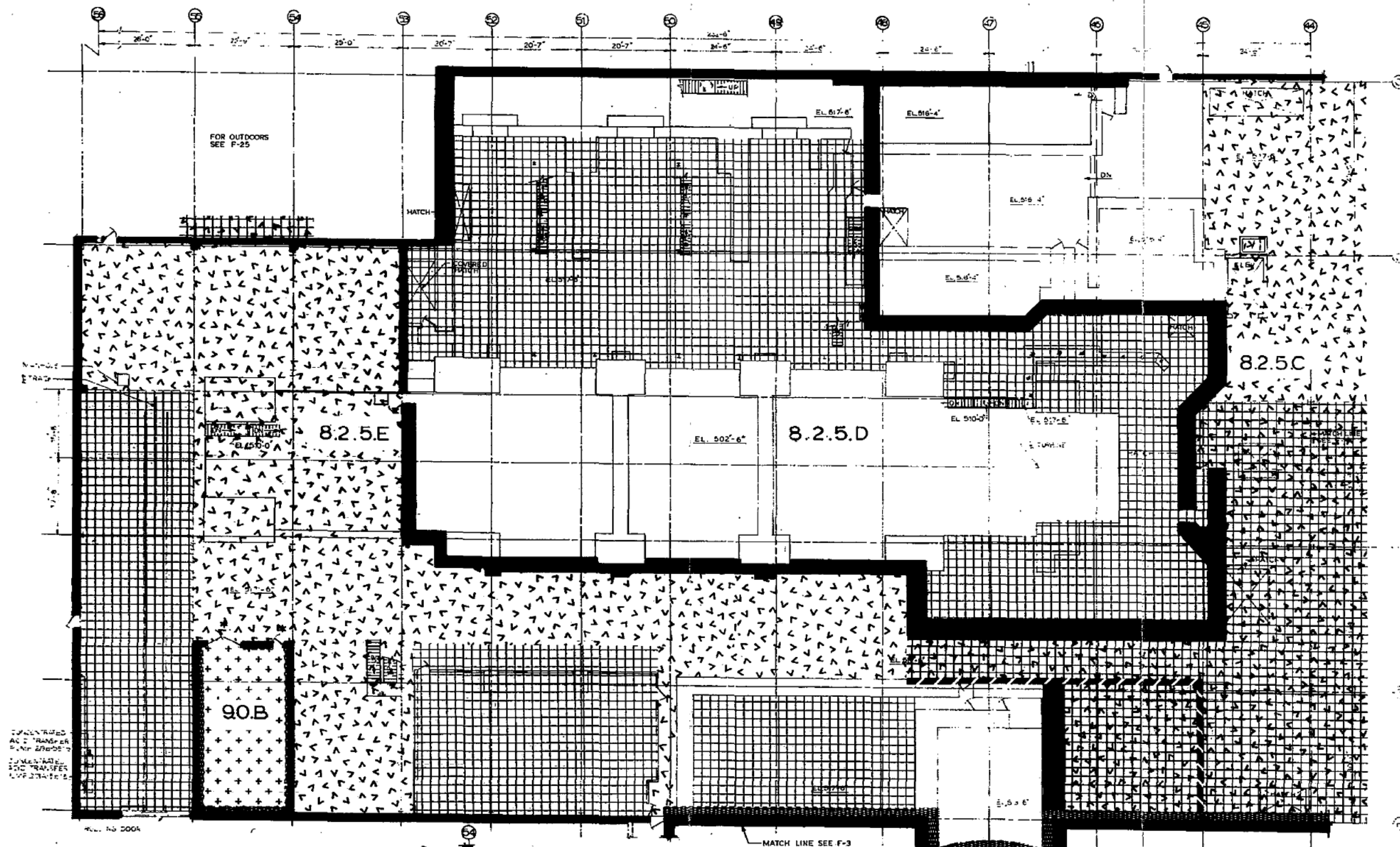


Dresden Units 2 and 3
Fire Protection System Legend

- | | | | |
|--|--|--|---|
| | Fire Detection System | | Gaseous Fire Suppression System |
| | Fixed Automatic Water Suppression System | | 1-Hour Fire Barrier Cable Protection |
| | Detection and Fixed Automatic Water Suppression System | | Curbs in the Crib House |
| | | | Zone/Area Boundaries in the Turbine and Reactor Buildings |

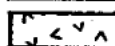
DRESDEN STATION
Units 2 & 3

FIGURE B-9
 TURBINE BUILDING GROUND FLOOR, UNIT 2



* INDICATES 3 HOUR FIRE DOOR OR EQUIVALENT.

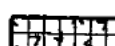
**Dresden Units 2 and 3
Fire Protection System Legend**



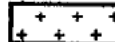
Fire Detection System



Fixed Automatic Water Suppression System



Detection and Fixed Automatic Water Suppression System



Gaseous Fire Suppression System

1-Hour Fire Barrier Cable Protection

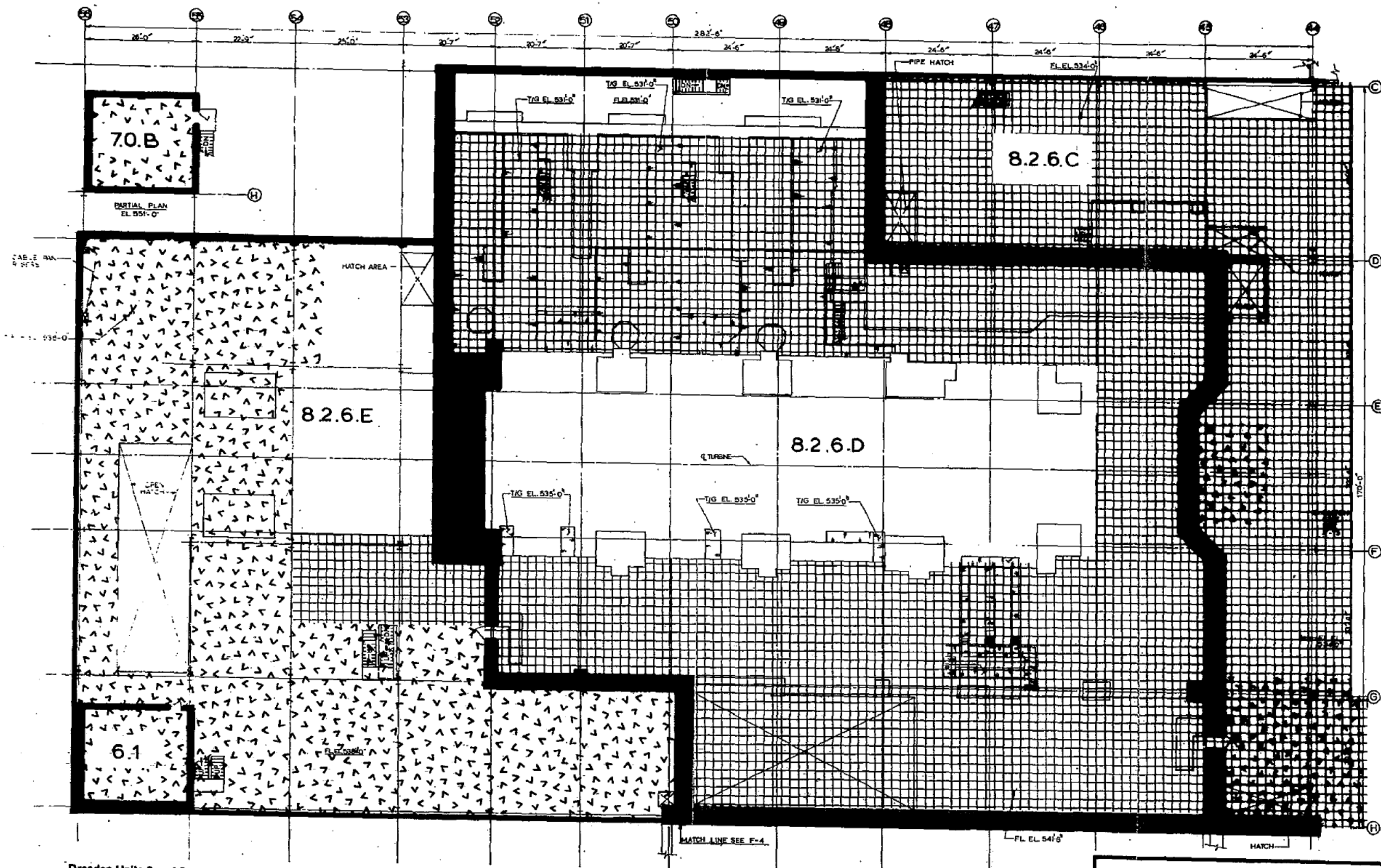
Curbs in the Crib House

Zone/Area Boundaries in the Turbine and Reactor Buildings

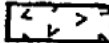

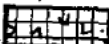
**DRESDEN STATION
Units 2 & 3**

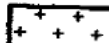



FIGURE B-10

TURBINE BUILDING GROUND FLOOR, UNIT 3



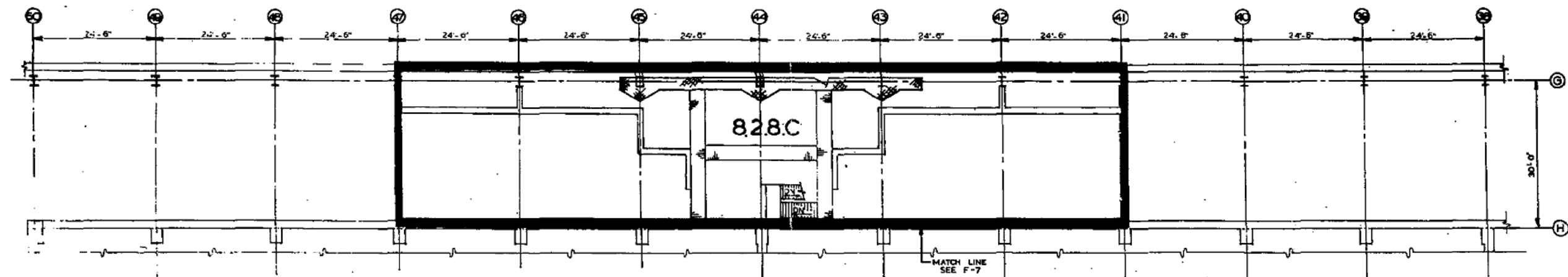
**Dresden Units 2 and 3
Fire Protection System Legend**

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System

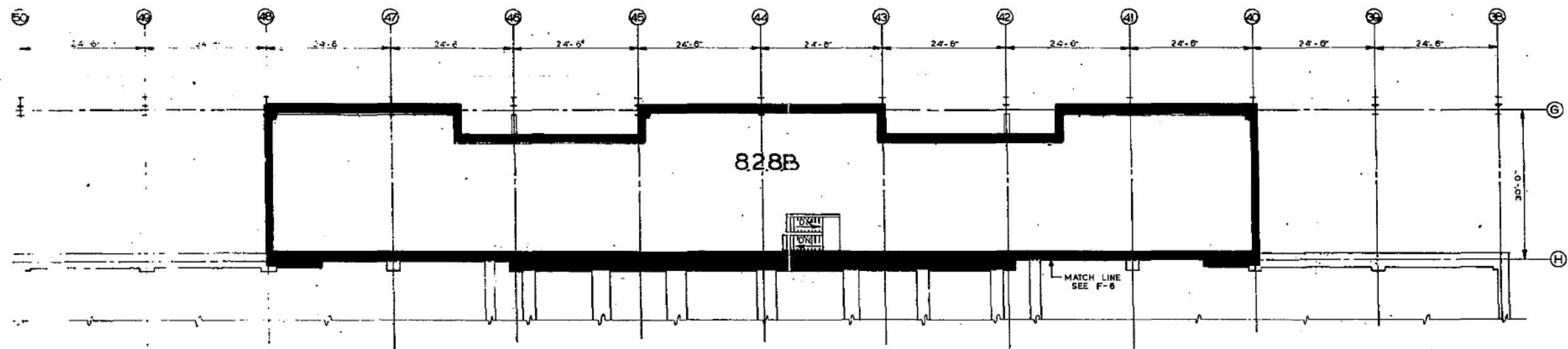
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

**DRESDEN STATION
Units 2 & 3**

FIGURE B-13
TURBINE BUILDING
MEZZANINE FLOOR, UNIT 3



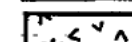
FLOOR EL. 601'-4"



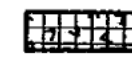
FLOOR EL. 581'-4"

Dresden Units 2 and 3

Fire Protection System Legend

 Fire Detection System

 Fixed Automatic Water Suppression System

 Detection and Fixed Automatic Water Suppression System

 Gaseous Fire Suppression System

 1-Hour Fire Barrier Cable Protection

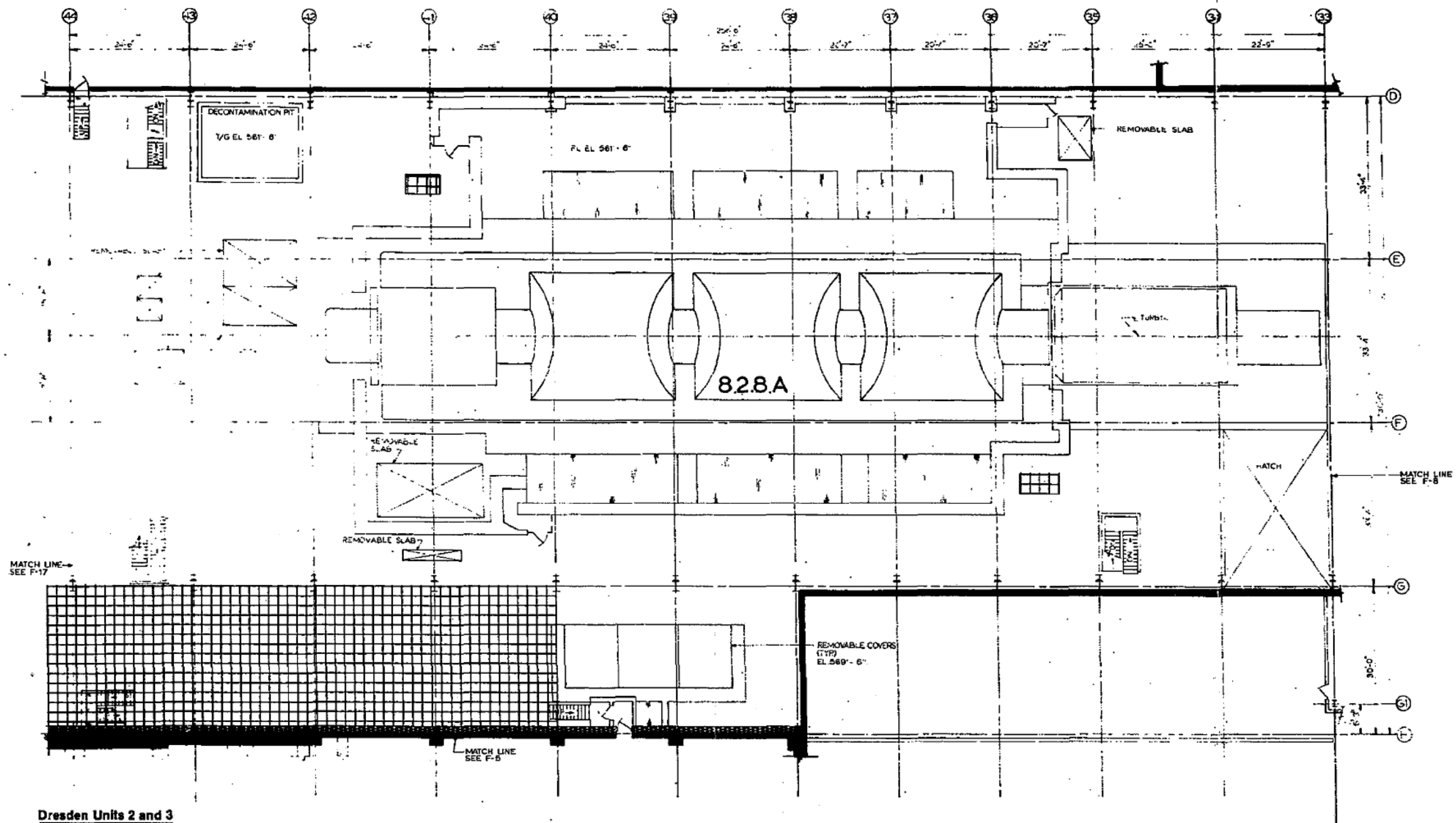
 Curbs in the Crib House

 Zone/Area Boundaries in the Turbine and Reactor Buildings




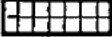
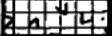
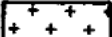



DRESDEN STATION Units 2 & 3

FIGURE B-14
VENT FLOOR ELEV. 581'-4" AND 601'-4"



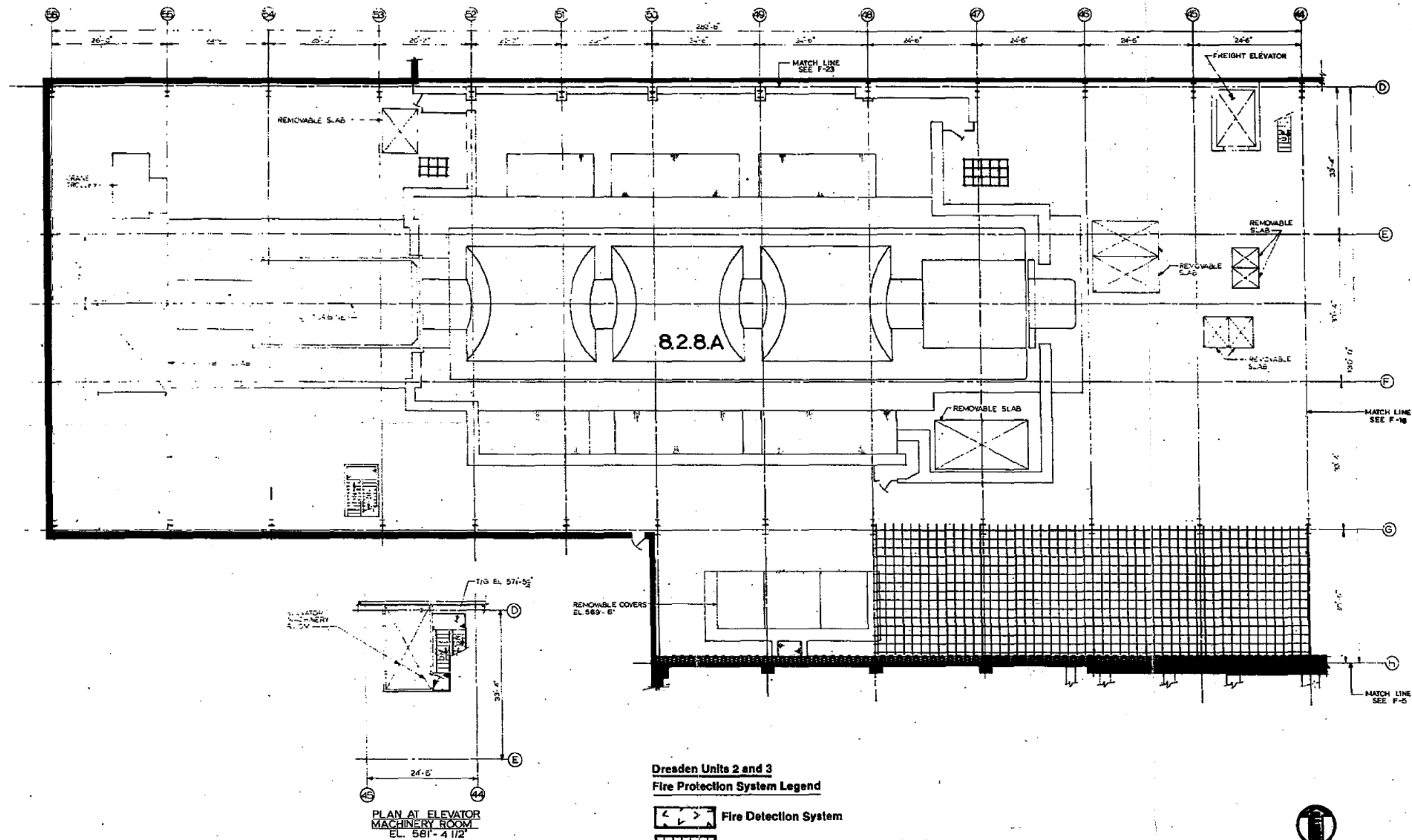
Dresden Units 2 and 3

Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

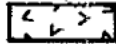

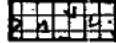
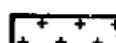



DRESDEN STATION **Units 2 & 3**

FIGURE B-15
TURBINE BUILDING MAIN FLOOR, UNIT 2



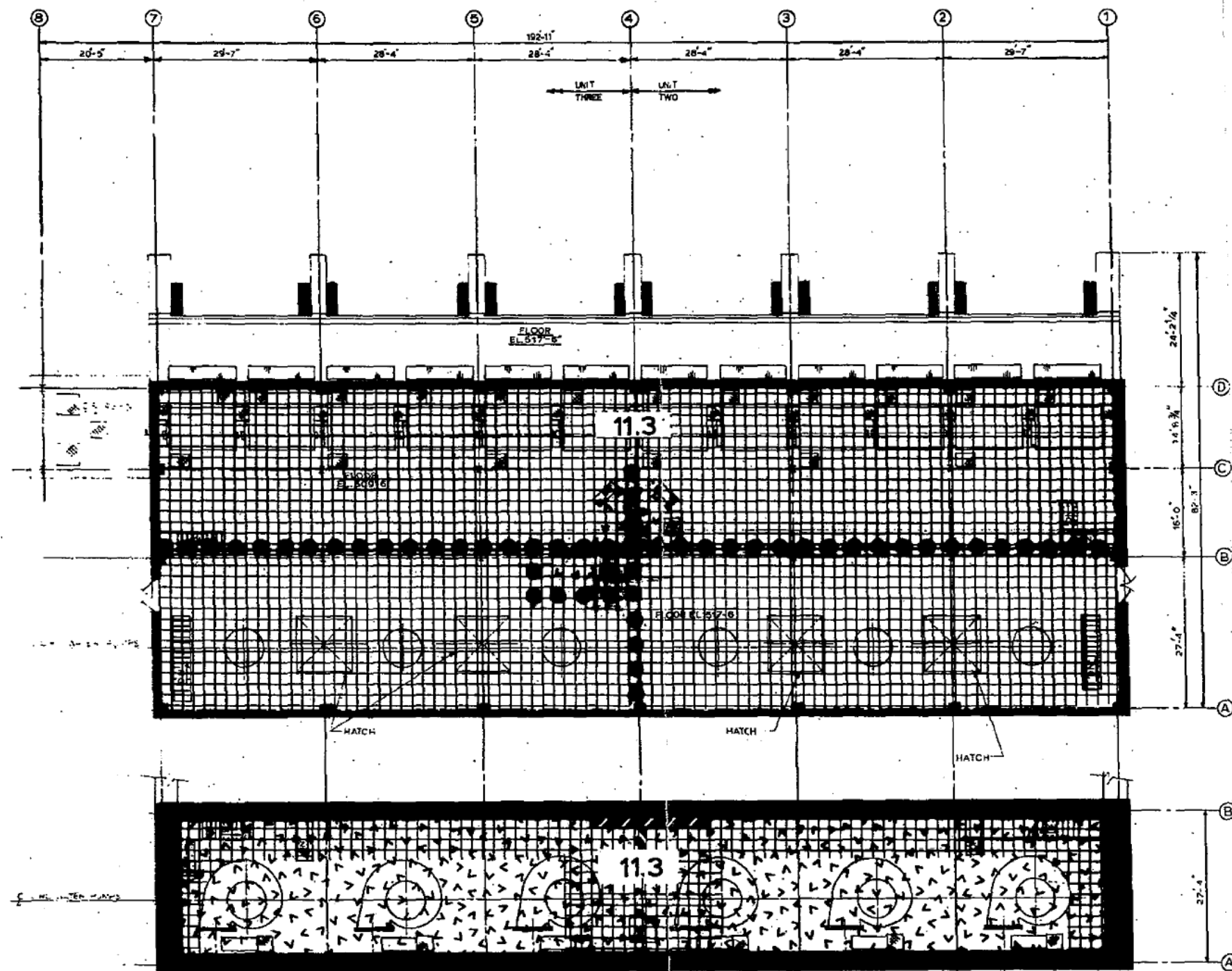
Dresden Units 2 and 3

Fire Protection System Legend

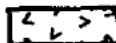

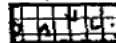
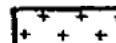



-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

DRESDEN STATION Units 2 & 3

FIGURE B-16
TURBINE BUILDING MAIN FLOOR, UNIT 3



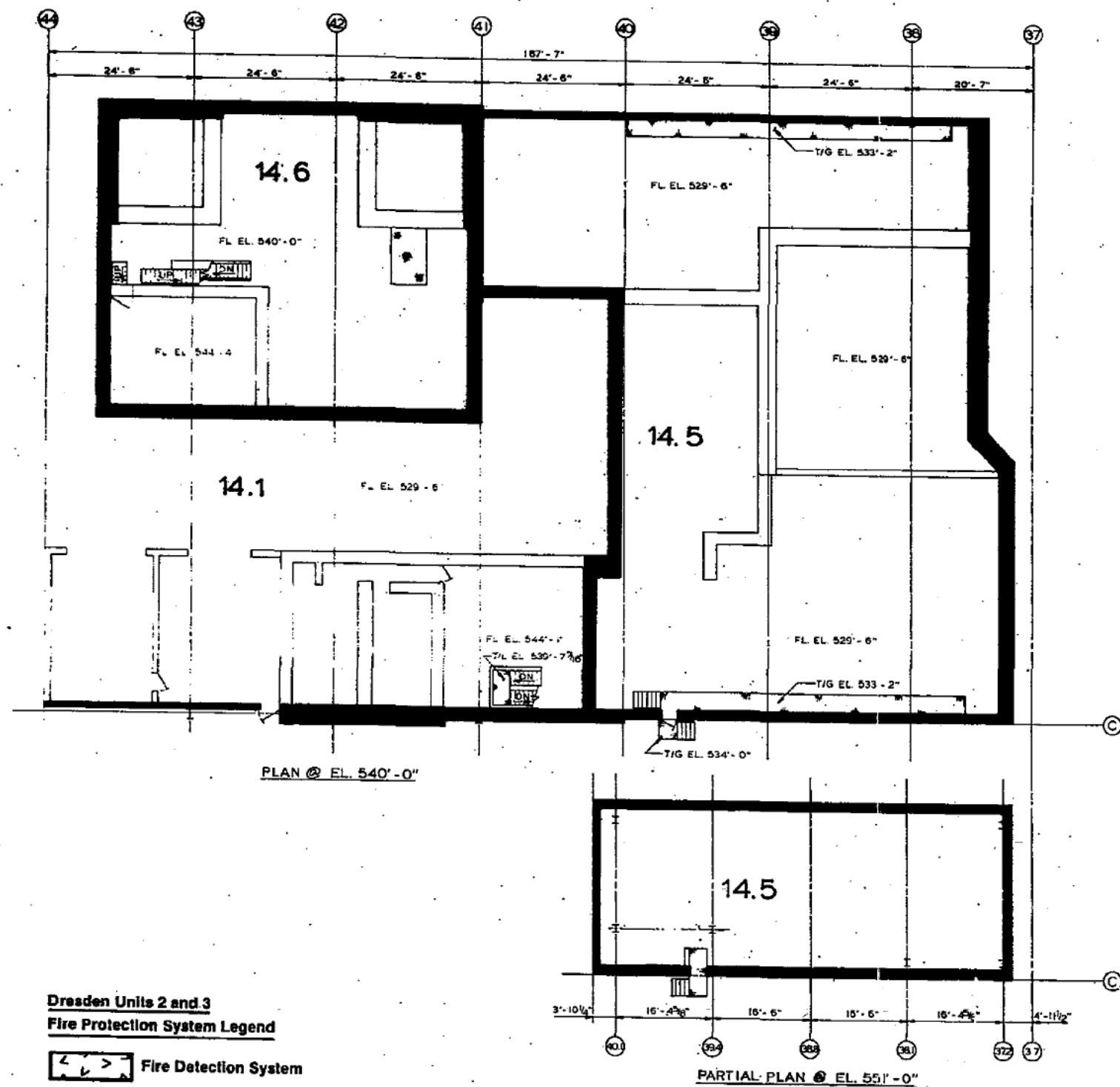
**Dresden Units 2 and 3
Fire Protection System Legend**

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

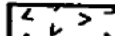
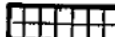
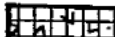






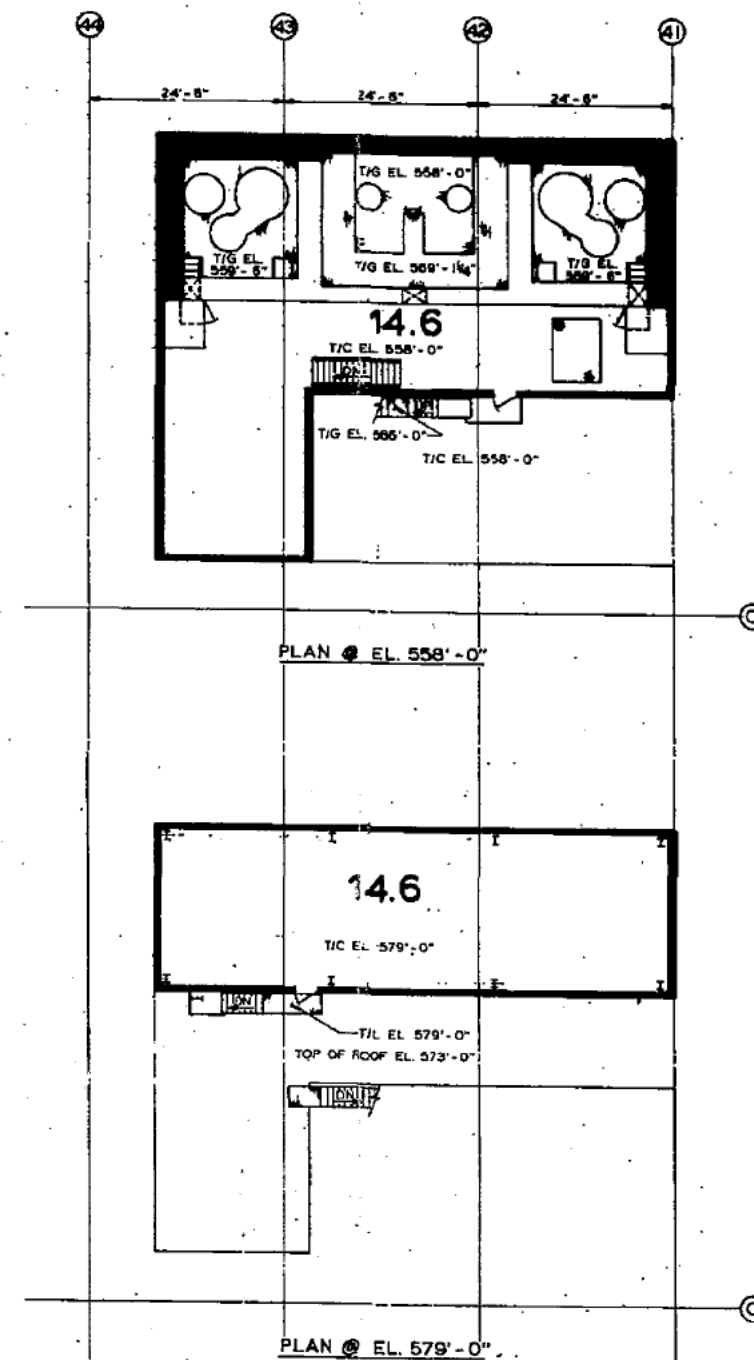
**DRESDEN STATION
Units 2 & 3**

FIGURE B-17
CRIB HOUSE



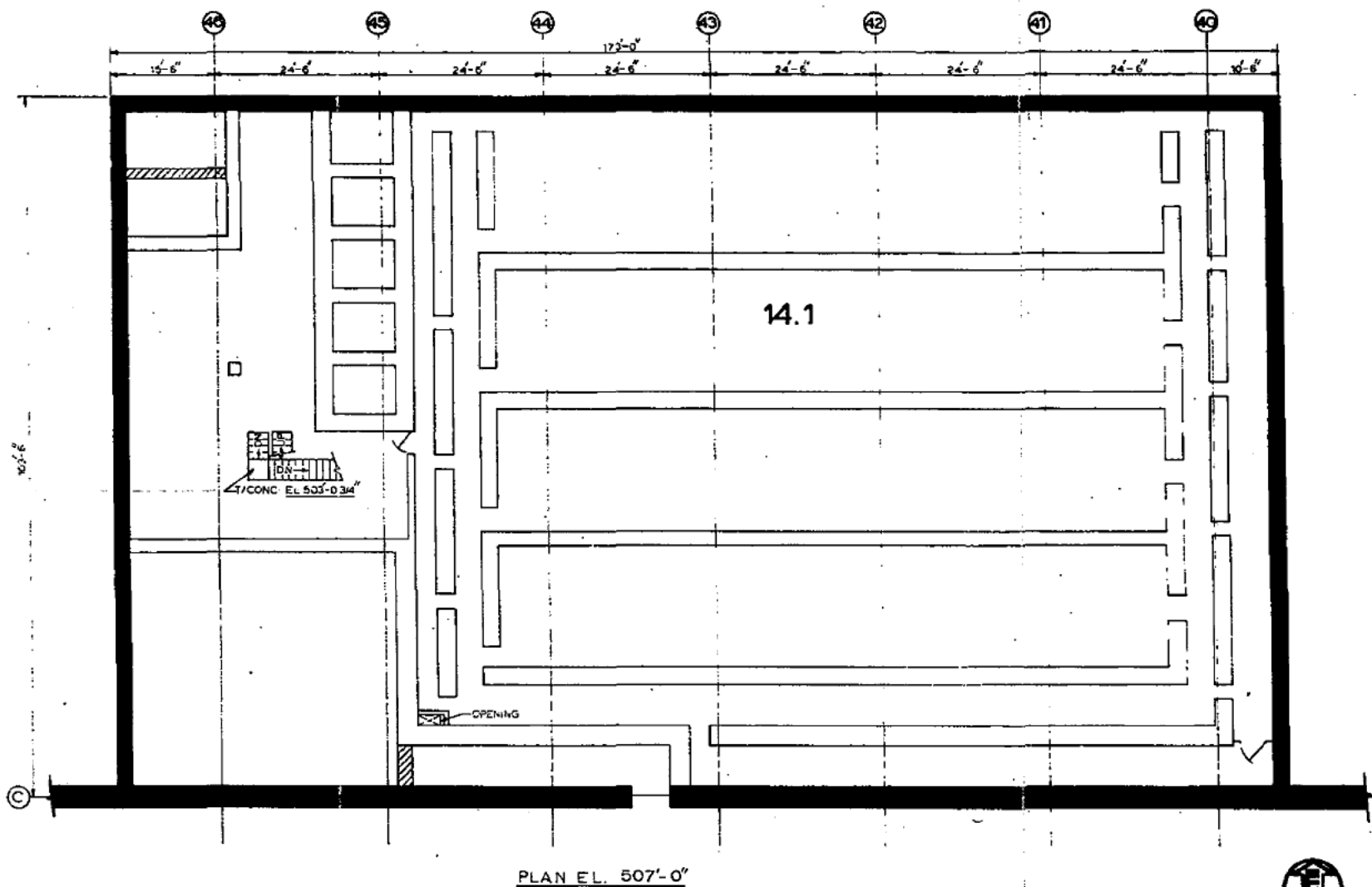
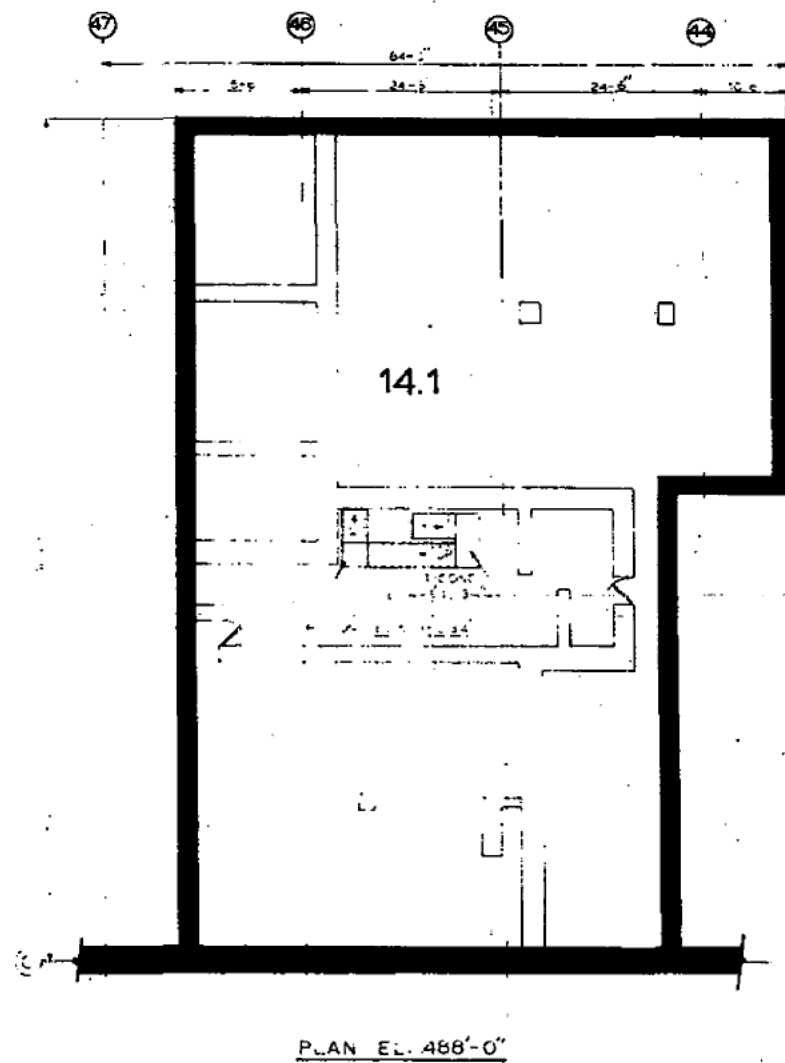
Dresden Units 2 and 3
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings



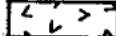

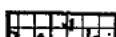
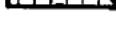



DRESDEN STATION
Units 2 & 3

FIGURE B-18
RADWASTE BUILDING
ELEV. 558'-0" AND 540'-0"



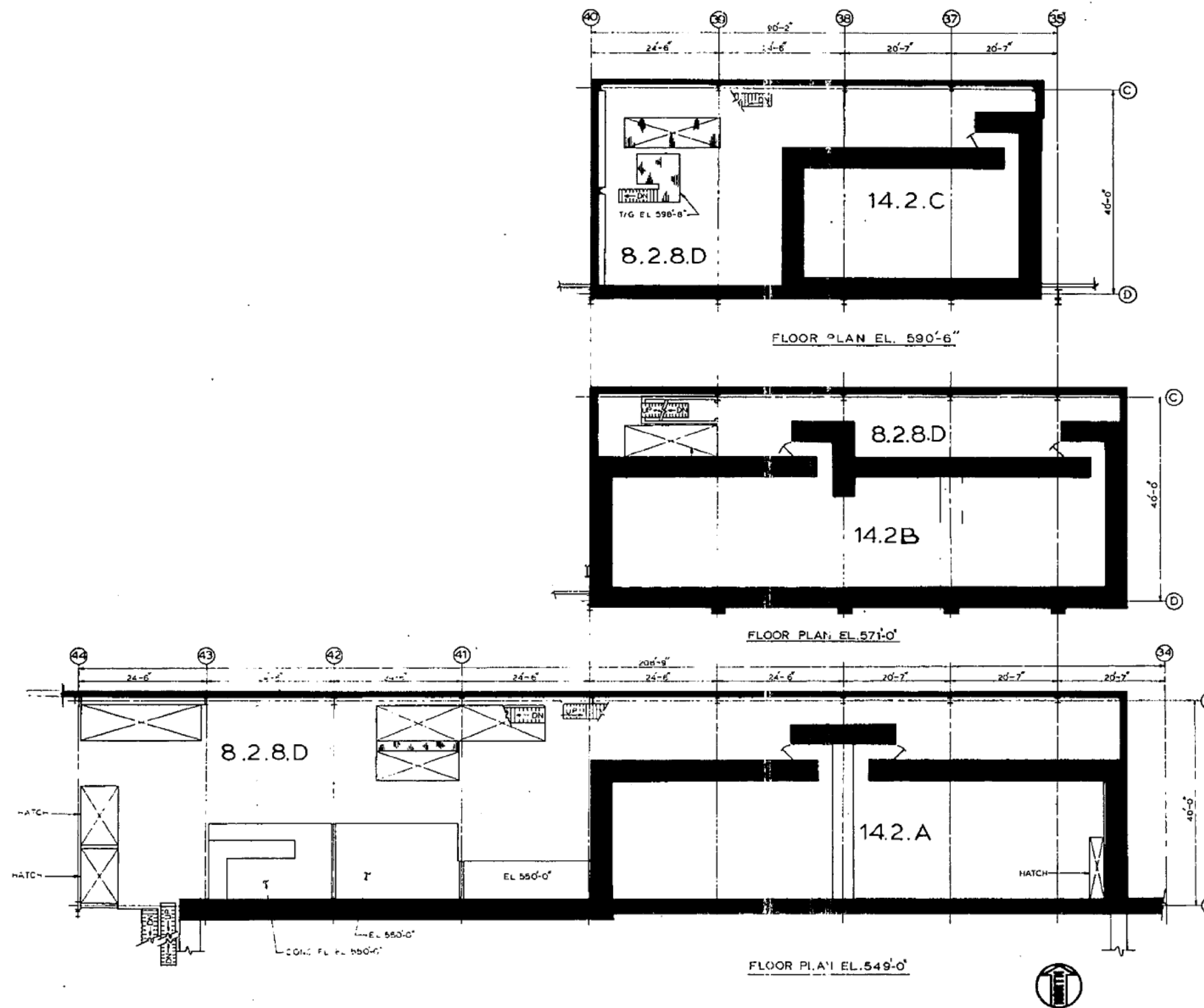
Dresden Units 2 and 3

Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

DRESDEN STATION **Units 2 & 3**

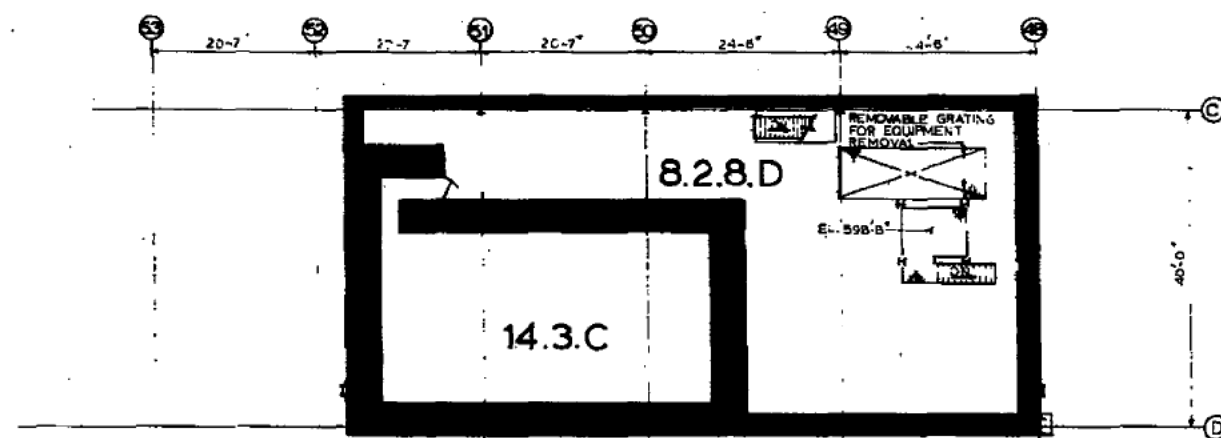
FIGURE B-20
RADWASTE BUILDING
ELEV. 507'-0" AND 488'-0"



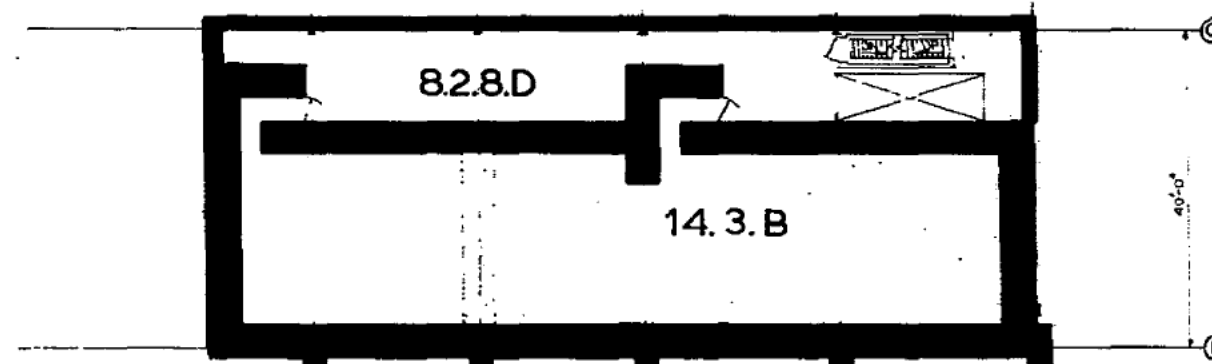
- Dresden Units 2 and 3**
Fire Protection System Legend
- Fire Detection System
 - Fixed Automatic Water Suppression System
 - Detection and Fixed Automatic Water Suppression System
 - Gaseous Fire Suppression System
 - 1-Hour Fire Barrier Cable Protection
 - Curbs in the Crib House
 - Zone/Area Boundaries in the Turbine and Reactor Buildings

DRESDEN STATION
Units 2 & 3

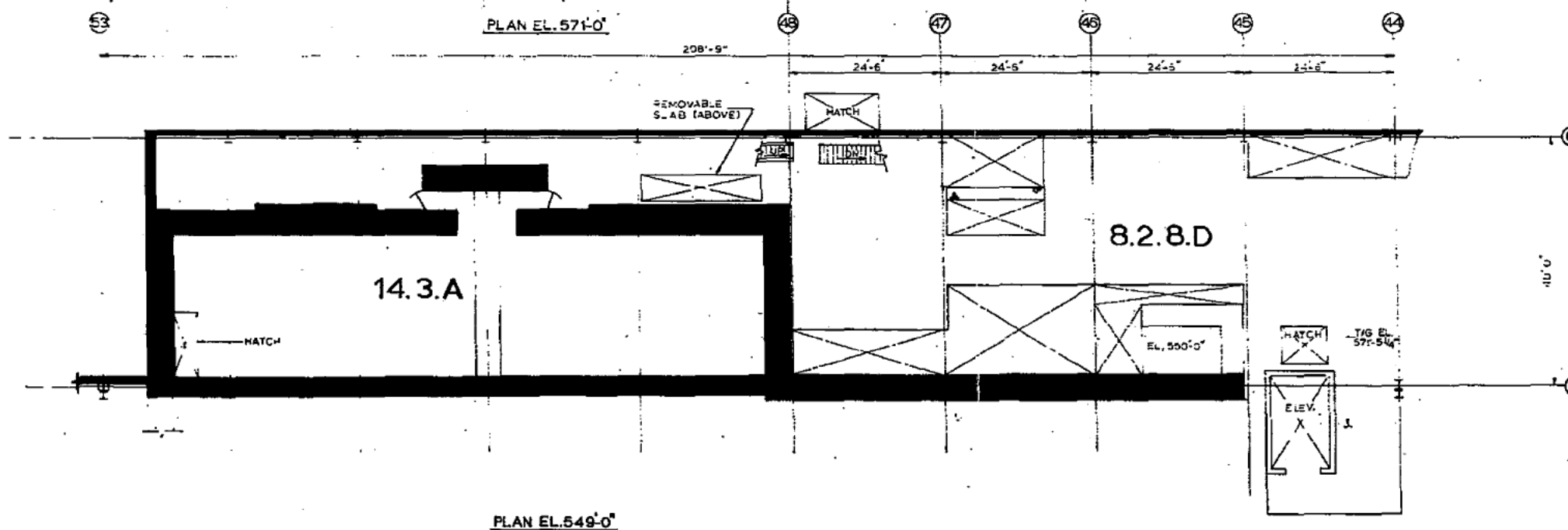
FIGURE B-21
 OFF GAS RECOMBINER ROOM, UNIT 2



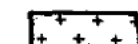
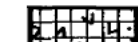
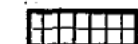
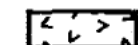
PLAN E.L. 590'-6"



PLAN EL. 571'-0"

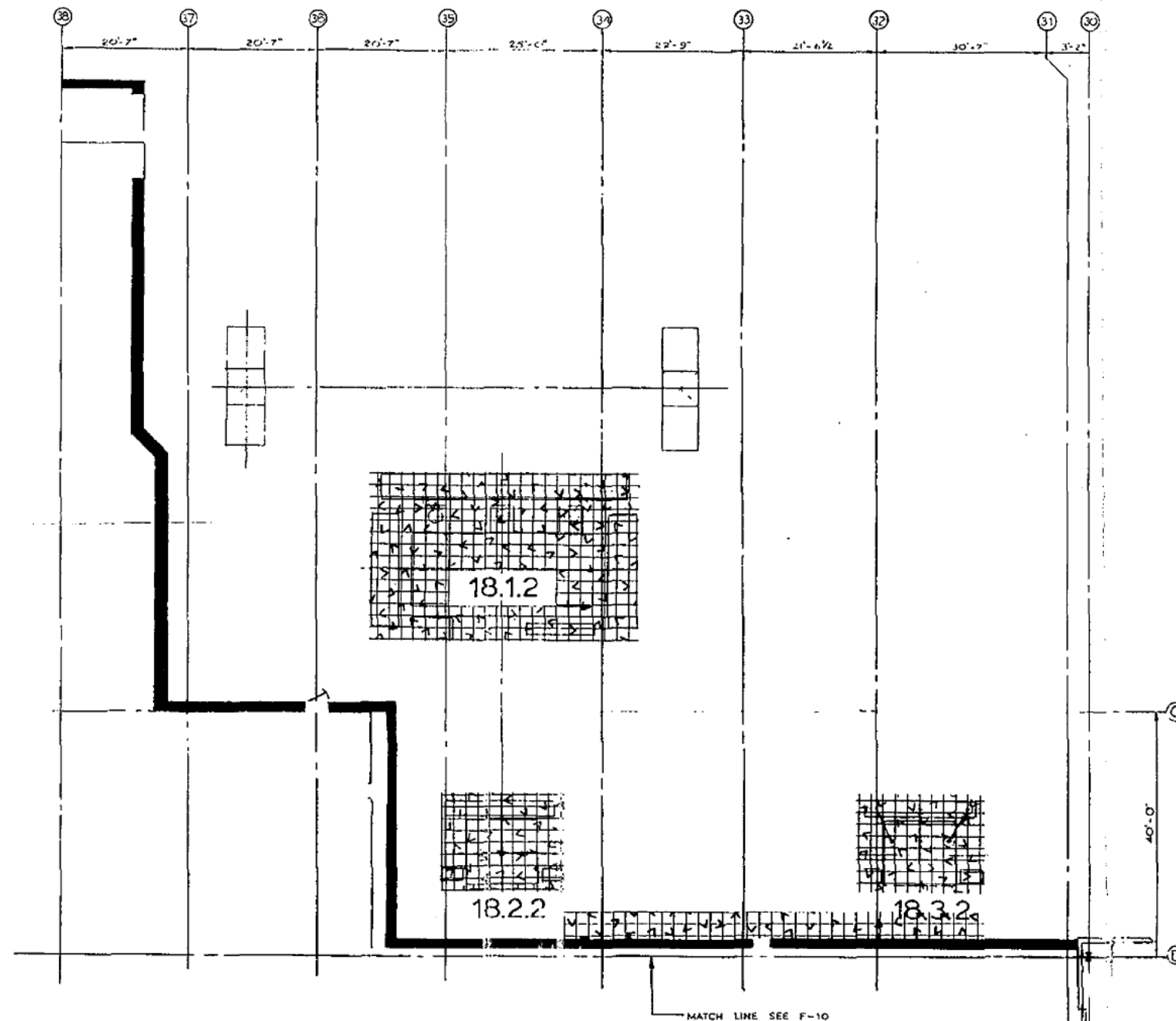


- ### Dresden Units 2 and 3
- #### **Fire Protection System Legend**



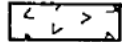

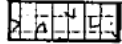
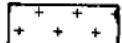



DRESDEN STATION
Units 2 & 3

FIGURE B-22
OFF GAS RECOMBINER ROOM, UNIT 3



Dresden Units 2 and 3

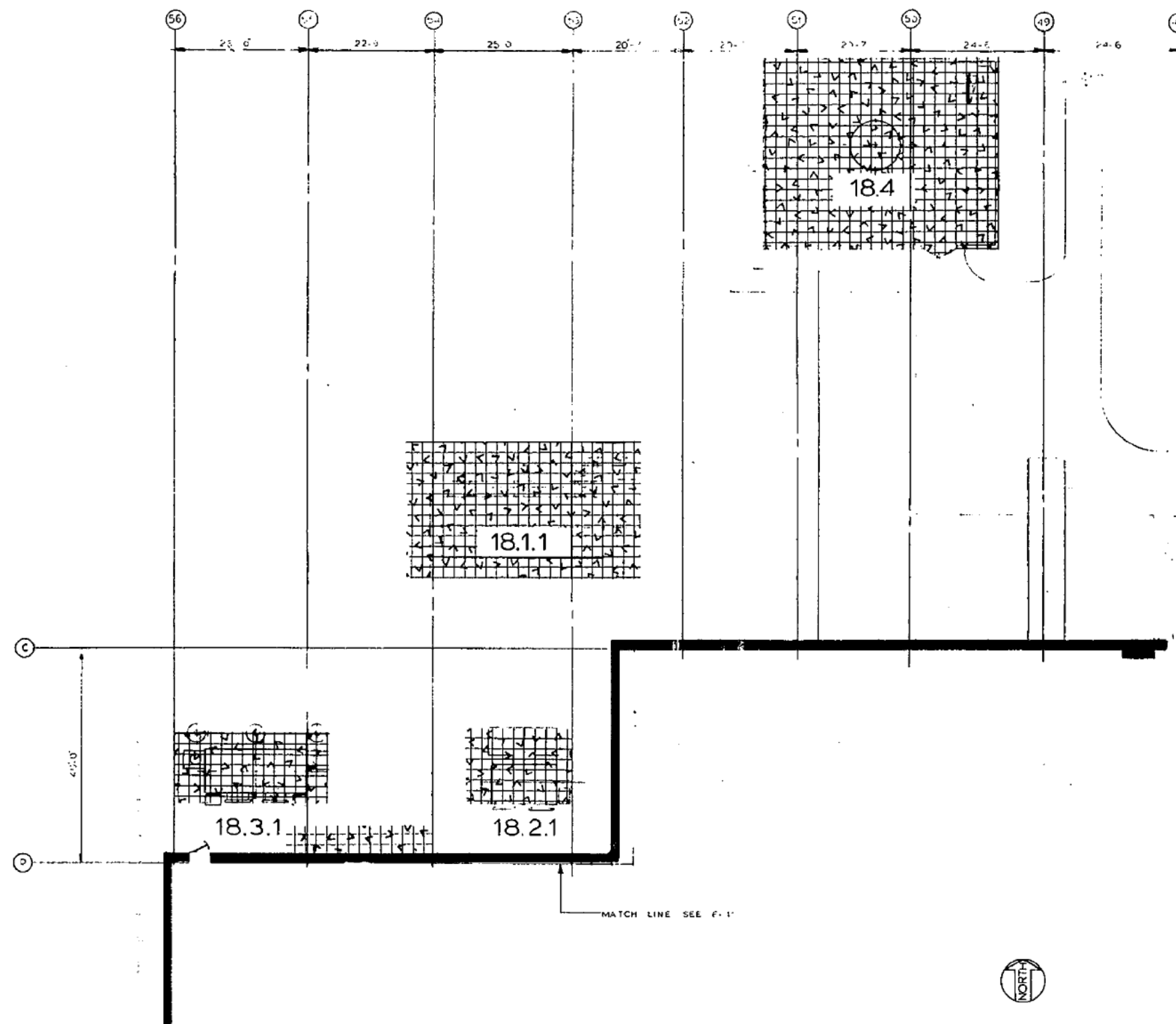
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
-  Detection and Fixed Automatic Water Suppression System
-  Gaseous Fire Suppression System
-  1-Hour Fire Barrier Cable Protection
-  Curbs in the Crib House
-  Zone/Area Boundaries in the Turbine and Reactor Buildings

DRESDEN STATION
Units 2 & 3

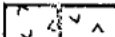
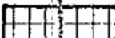
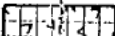

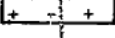


FIGURE B-23

OUTDOOR STRUCTURES, UNIT 2



Dresden Units 2 and 3

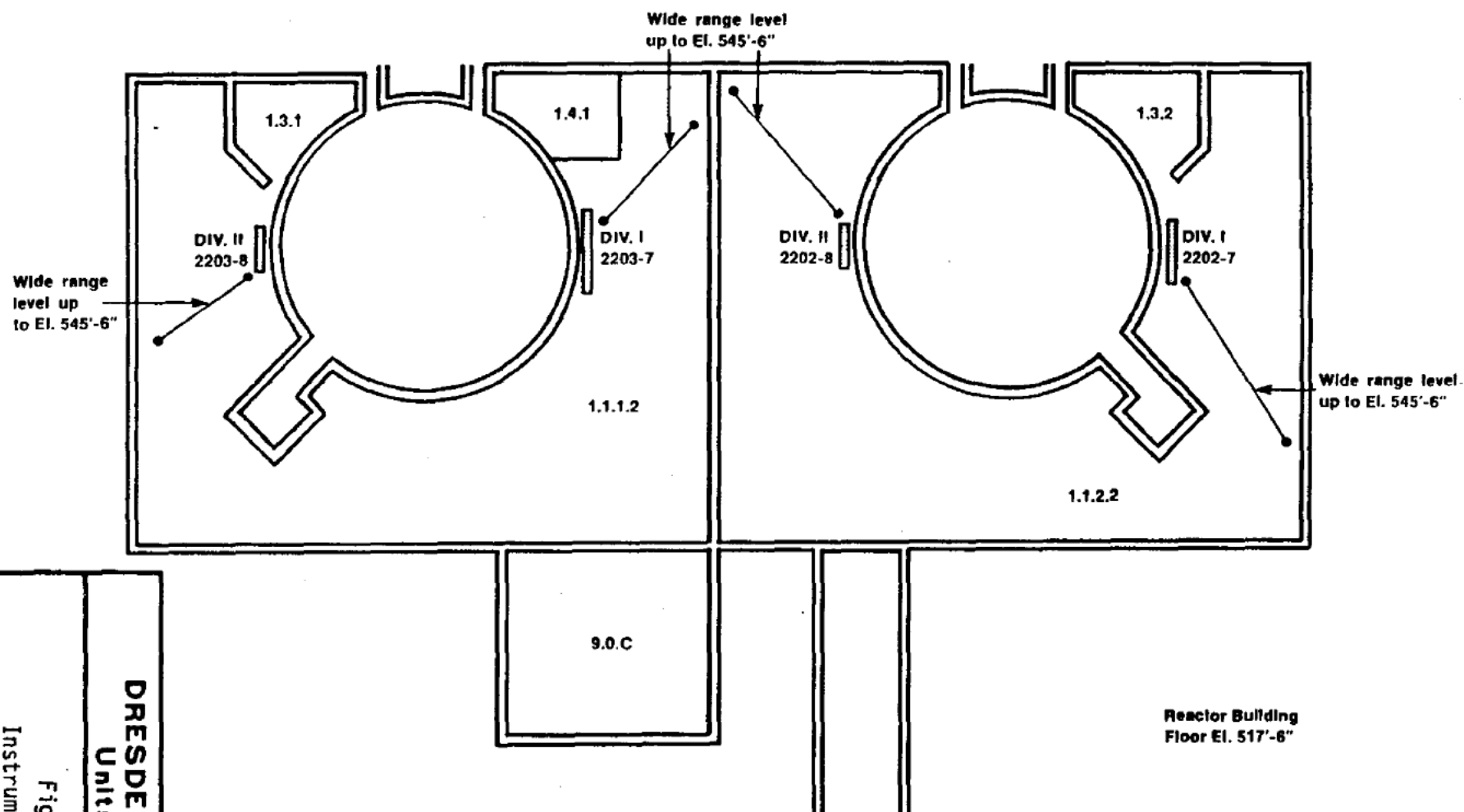
Fire Protection System Legend

-  Fire Detection System
-  Fixed Automatic Water Suppression System
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-  Curbs in the Crib House
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DRESDEN STATION Units 2 & 3

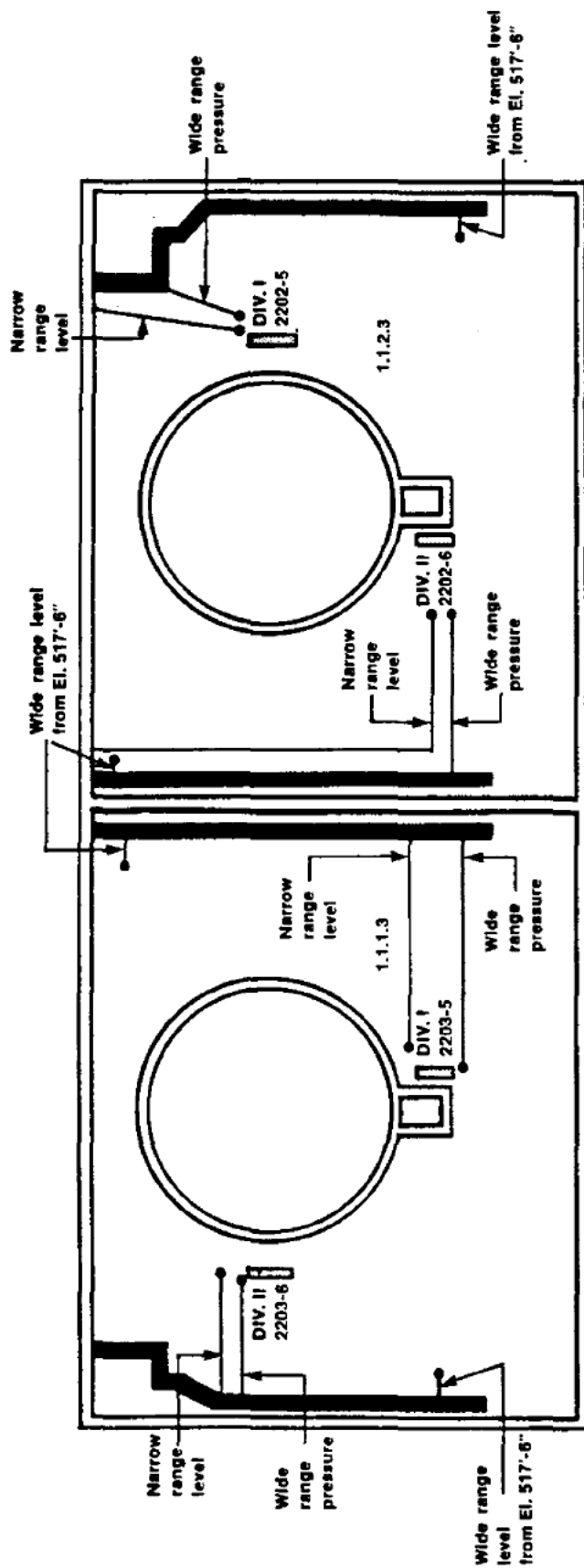
FIGURE B-24
OUTDOOR STRUCTURES, UNIT 3

C



DRESDEN STATION
Units 2 & 3

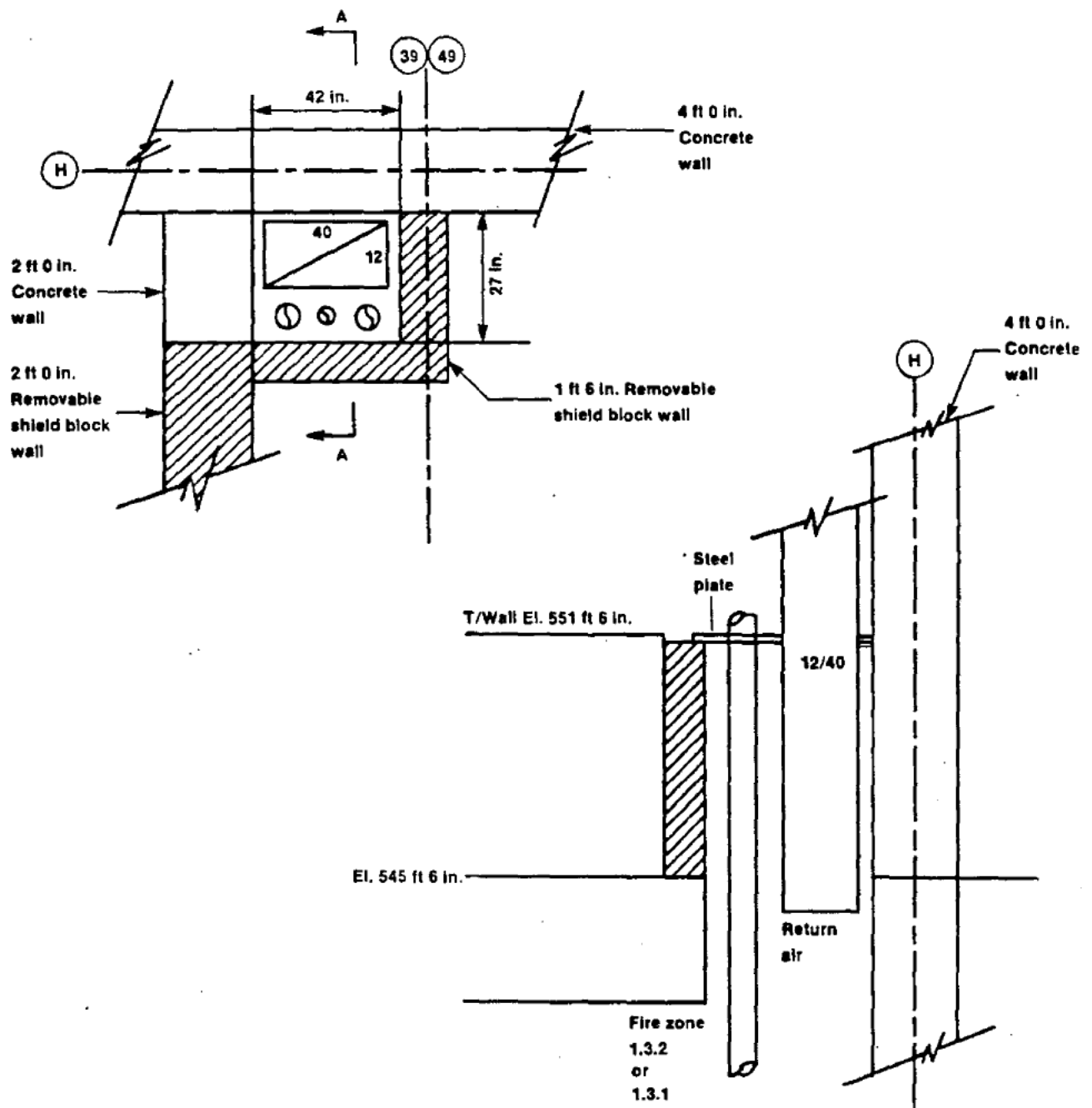
Figure C-1
Instrument Routings
(Sheet 1 of 2)



Reactor Building
Floor El. 545'-6"

DRESDEN STATION Units 2 & 3

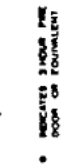
Figure C-1
Instrument Routings
(Sheet 2 of 2)



DRESDEN STATION Units 2 & 3

FIGURE C-2

MECHANICAL PENETRATION IN CEILING OF
SHUTDOWN COOLING PUMP ROOM



INBOARD ISOLATION CONDENSER VALVES
ALTERNATE POWER AND CONTROL FEED ROUTING

D

DRESDEN 2&3

REVISION 0
OCTOBER 1985

PROFESSIONAL LOSS CONTROL, INC.

METHODOLOGY FOR EVALUATION OF

FIRE RESISTANCE OF

STRUCTURAL STEEL

Prepared by: Kenneth W. Dungan, P.E.

Date: January 23, 1985

Reviewed by: James R. Beller

Revision: 3

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1. INTRODUCTION

Structural steel members which form a part of or support fire barriers should be capable of withstanding the fire exposure presented by all combustibles contained within the fire area. Structural steel need not be protected if it can withstand this fire exposure. The methodology is intended as a screening tool for evaluating the severity of fire exposure to structural steel members.

This is a two part evaluation: first, the fire exposure is determined and second, the response of the structural steel member is assessed. The approach as described treats the evaluation in a systematic way by assessing simple and conservatively realistic limitations on the combustion process, the resultant room environment and finally, temperature histories of the structural steel members when required.

The conclusions reached will then be used to determine acceptability of the structural steel as a unique part of the fire barrier and to evaluate any needed modifications if deemed necessary.

II. ASSESSING FIRE DEVELOPMENT

The types of fixed combustible materials found in a nuclear power plant which can burn in such a way as to present a significant fire exposure to the general area in which they are located are very few. The prevalent materials encountered in the plant areas analyzed were cable insulation and lubricating oil. The insulation and jacketing on the cabling in cable trays are susceptible to ignition from internal or external sources. The heat output from a cable tray fire will affect the atmosphere of the room in which it is located. Lubricating oil, present in large pumps and certain other types of plant equipment, can escape and burn. Other types of combustibles contained within substantial metal enclosures (e.g. cabling in conduit and charcoal in filter units) have been assumed not to contribute to fires.

The methodology for assessing fire development can be divided into three different parts: limits on fire development, fire modeling techniques, and local heating effects. Each part will be examined in turn.

III. LIMITS ON FIRE DEVELOPMENT

In this section, practical limitations which govern the combustion process in a room are discussed. This will include physical limitations on the combustion of any fuel and fire test data regarding the burning characteristics of cable trays and combustible liquids such as lube oil.

A. Ventilation Limited Fires

One of the best understood and most extensively tested modes of combustion is that of ventilation controlled fires. In this type of fire the rate of burning is limited by the fire-induced air flow into the room. A balance is set up at each opening into the enclosure where heated gases flow out the top of the opening and clean air feeds in through the bottom. The boundary layer between the inflowing and outflowing gases is referred to as the neutral plane.

Many relationships, both empirical and analytical, have been developed to predict velocity profiles and mass flow rates at openings during ventilation controlled fires as well as resultant heat release rates and peak fire temperatures. This analysis employs a relationship developed by Coulbert(1) which predicts the heat release rate that can be supported by the fire induced air flow. The relation is:

$$Q = 1580 A \sqrt{H}$$

where Q = heat output (kW)

A = area of opening (m²)

H = height of opening (m)

The term $A\sqrt{H}$ is often called the ventilation factor. Any empirical relationship for the heat release rate or mass burning rate will be proportional to the ventilation factor. If there is more than one ventilation opening, then the ventilation factor is taken as the sum of the individual ventilation factors.

The rate of burning is independent of the type of combustibles which are burning. The fire duration, until room burnout, is the total heat value (heat of combustion times quantity) of all the combustibles in the room divided by the heat release rate of the fire.

For the purpose of this analysis, the ventilation rates were based on the available air flow through openings into the room such as doorways. Fixed ventilation systems were assumed not to contribute to the ventilation rate, since installed fire dampers will actuate.

B. Fuel Controlled Fires

When excess air is available for combustion, the heat output of the fire will be dependent on the free burning characteristics of the exposed combustibles. The fixed combustibles that can pose a threat of damage to the structural steel in the areas where they are located consist of grouped electrical cables (cable trays) and combustible liquids such as lubricating oils.

1. Cable Tray Burning Characteristics

The best available data on free burning cable trays containing hypalon and neoprene jacketed cables appear in the FMRC/EPRI (2) test reports. For these cables, a mass burning rate of 6.7 Kg/min was measured for an array of 12 cable trays, each 8' long and 18" wide. This reduces to a surface controlled burning rate of 0.1 (lb/min)/ft² of cable tray or a heat release rate of 1000 (BTU/min)/ft² (190 KW/m²). Similar burning rates can be developed for other cable materials based on test data.

Another parameter vital to cable tray fire assessment is flame spread rate. Full scale tests conducted by FMRC/EPRI demonstrate a lateral spread rate of six to seven feet per hour in horizontal tray stacks. This figure agrees with observations of fire spread rates in similar tray arrays in the Reactor Building at the Browns Ferry fire. For this analysis a more conservative figure of 10 ft/hr has been assumed.

An important parameter that is developed for plant areas where cable fires are to be analyzed is the average combustible loading in the cable trays. This figure is expressed as pounds of insulation and jacketing per square foot of cable tray surface area. It should not be confused with the combustible loading per square foot of floor area which is not used in this analysis. The combustible loading figure for the trays can be divided by the mass burning rate of 0.1 (lbs/min)/ft² to determine the time it takes for a tray to burn to completion.

These parameters were applied to determine the worst case fire involving cable trays that can occur in an area. The fire is assumed to originate at the point in the room intersected by the maximum number of cable trays. The fire is assumed to spread out along horizontal trays at a rate of 10 feet per hour and instantaneously up any vertical trays encountered. The area of cable tray which has become involved when the original point of the fire burns itself out defines the steady state fire size. This quantity is multiplied by 1000 (Btu/min.)/ft² (190 kw/m²) to determine the maximum heat release rate possible from a spreading cable fire in the area.

The duration of the spreading cable fire is taken to be the time required to consume all of the cabling in the area or 3 hours, whichever comes first. The maximum heat release rate is assumed to be the heat output of the fire through its entire duration. This is a very conservative assumption since the quantity of cabling involved will be less as the fire spreads out of the area of origin. The assumptions governing spreading cable fire scenarios hold as long as the room gas temperature remains below the ignition temperature of the cabling. The auto-ignition temperature of the hypalon jacket cable referenced above is approximately 1100°F. If the area temperature exceeds 1100°F, it must be assumed that all cables are burning simultaneously unless the fire becomes ventilation controlled.

2. Lubricating Oil Burning Characteristics

Free burning fires involving combustible liquids have been evaluated as pool fires. Although it is possible to have a spray fire if the oil escapes through a small orifice under pressure, it would be necessary to have a high spill rate to produce a significant heat output. In this case the mass of the oil will fall to floor level and form a pool.

Pool fires of varying sizes have been studied extensively for many years. Hydrocarbon liquids have been found to burn such that the depth of a pool will be reduced at a rate of approximately 5 mm/min(3). An equilibrium pool size can be calculated where the spill rate into the pool equals the mass burning rate of the fire. The consequent heat output can be determined by multiplying the mass burning rate times the heat of combustion of the liquid.

The normal quantity of combustible liquids in an area is that amount contained within equipment. To accomodate the possibility that a fire could occur where the lubricants are being changed, all lubricating oil quantities have been doubled in the calculations. Under free burning conditions a variety of oil leakage rates and consequent fire durations and heat outputs are possible.

IV. FIRE MODELING TECHNIQUES

The methodology for analyzing the fire resistance of structural steel in a given plant area requires that assessments be made of fire duration and heat output for the fire scenarios to be evaluated using the considerations discussed previously. This information is used along with data on the materials and geometry for the compartment under consideration as input for a simple and conservatively realistic fire model which predicts a gas temperature for the area.

This model should not be confused with sophisticated models which attempt to predict temperature profiles and/or gas concentrations throughout the room from ignition of the fire through its decay period. Since the heat output of the fire has been assumed constant throughout its duration and the only parameter of interest is room area temperature, the modeling has been greatly simplified.

Heat Balance Method

Writing a heat balance for the compartment is one of the most straightforward methods of determining the area temperature of a fire, especially when the heat output of the fire is assumed constant. A simplification of the method proposed by Babrauskas and Williamson (4) as modified by Berry (5) is used. Two conservative assumptions are made which allow this simplification:

1. Radiative and convective heat losses through openings in the enclosure are negligible (see Berry 5).
2. Heat loss through the walls will be dominated by the thermal inertia of the barriers, $\rho C_p K$ (assumption of semi-infinite slab approximation).

The massive reinforced concrete and concrete block construction prevalent throughout nuclear power plants plays a very important role in determining the time-temperature history of compartment fires. The thermal penetration time of a wall or ceiling/floor slab is defined as the period of time required for a temperature rise on one side to be transferred through to the back side. The thermal penetration time is a material property and can be determined if the thermal diffusivity of the wall material and its thickness are known.

The thermal penetration time for 12-inch thick concrete walls will exceed 7 hours and for 8 inch thick concrete block walls will be approximately 4 hours. Both of these times exceed the maximum 3-hour duration for the fire scenarios analyzed in this study. These results have an important implication. For all of the fire scenarios analyzed, the barriers will be absorbing heat without transferring it out the back face. This permits the use of the semi-infinite slab approximation for heat transfer through the walls.

The heat balance equation can be described as follows:

Q = heat release rate (kW) of fire ($Q = 1580 A_0 \sqrt{H}$ for ventilation controlled fires)

$Q = \sigma A_t \eta (T_g^4 - T_w^4)$ = radiant heat transferred to boundary

$Q = \frac{(\pi \rho C_p k) A_t (T_w - T_0)}{2\sqrt{t}}$ = conductive heat loss through boundary

To get T_g as a function of t these equations can be solved to yield the following expression:

$$T_g = \left\{ \frac{Q}{\sigma A_t} + \left(T_0 + \frac{Q\sqrt{t}}{A_t K} \right)^4 \right\}$$

where Q = heat release rate (kW) of fire

$K = 1/2 (\pi \rho C_p)$

η = function of emissivity of fire gases and boundary walls

A_t = total heat loss surface area of boundary

This relationship is similar in form to that developed by Harmathy (6) except the heat release rate is defined by either the ventilation factors or the fuel surface controlled fire. This is not an iterative process. The formula can be used to determine the gas temperature at any time during the course of the fire.

A conservative assumption that has been made in the application of the model is that no heat will be lost through the floor.

V. LOCAL HEATING EFFECTS

The fire models just discussed are used to determine generalized conditions in the enclosure where the fire is occurring. However, plumes of heated gases will rise above burning objects and create localized hot zones that can effect the steel members located above. In these analyses, the results of heating of structural members due to engulfment in fire plumes has been referred to as localized heating effects.

The problems of localized heating can best be quantified by applying fire plume models to predict gas temperature profiles. This same approach can be applied to the evaluation of the impact of transient combustibles on structural steel and on cable ignition.

A. Plume Modeling:

Alpert and Ward (8) present empirical relationships for temperature increase, ΔT , with respect to height above fuel package, H , and size of fire, Q . This general relationship is as follows:

$$\Delta T = 300 (kQ)^{.667} H^{-1.67}$$

Using this relationship, "safe" separation distances from fuel packages can be evaluated for localized heating of steel. If these relations predict a plume temperature at the level of the bottom flange of the steel higher than the critical temperature of the steel, the heating of the steel is assessed.

1. Cable Tray Fires

Cable tray fire test data was examined to establish temperature profiles above burning cable trays. Tests performed by Sandia Laboratories (7) and FMRC/EPRI (2) show that temperatures in the vicinity of 1500°F are reached in the flame region immediately above the surface of a burning cable tray. This temperature drops rapidly with increasing distance above the surface of the cable tray.

The plume of a cable fire is dependent on the number of trays in a stack and the separation between trays. To evaluate the effects of cable trays on localized heating of steel, the heat release rate from a stack of trays must be estimated and used to calculate plume temperature profiles. During FMRC/EPRI (2) large scale tests on Hypalon cable, the temperature measured by thermocouples 6'5" above the top tray of the 12 tray array (2 stacks of 6) was 840°F. Using this data and applying the plume relationship described above, a temperature profile can be estimated as follows:

T = 1100°F	H = 5.41 ft
1300°F	4.87 ft
1500°F	4.45 ft

Applying the plume relationships to other cable arrays is necessary to estimate the plume effects of other stacks of trays on overhead structured steel. This was done by using the ratio of heat release rates which are directly proportioned to the width and number of trays in a stack. Estimated separation distance from stacks of 24" wide cable trays to reach plume temperatures of 1300°F and 1100°F are shown below:

No. of Trays	Distance above top tray for T_g	
	$T_g = 1300^\circ\text{F}$	$T_g = 1100^\circ\text{F}$
1	2.0 ft	2.21 ft.
2	2.7 ft	2.98 ft.
3	3.1 ft	3.40 ft.
4	3.5 ft	3.86 ft.
5	3.8 ft	4.20 ft.
6	4.1 ft	4.50 ft.

Similar separation criteria can be developed for cable materials other than those referenced above.

For evaluation of local effects of cable fire plume the data were rounded off and applied as separation requirements:

No. of Trays	Distance from top tray to bottom of beam
1	2 ft
2	3 ft
3-5	4 ft
>5	5 ft

These criteria were used to identify areas where stacks of cable trays were located less than these "safe" separation distances from structural steel. These areas were then evaluated regarding the cable loading, size of steel member, and number of trays to determine the potential effects on the structured steel.

Cable trays located within one foot of the bottom of steel beams were assumed to subject the beam to a constant temperature of 1500°F for the period of time it takes the tray to burn to completion (cable tray combustible loading divided by mass burning rate for tray fires). Trays closer than the separation distances previously identified but greater than 1 foot were assumed to subject the beam to a constant temperature of 1300°F for the period of time it takes for the tray to burn to completion.

Horizontal separation distances are also dependent on distance from the ceiling. The ceiling jet associated with the impingement of the plume of the ceiling will be fairly uniform in temperature for a distance of $.2H$ (8). Therefore, for cable trays in beam pockets the same separation criteria was used for horizontal separation as outlined above for vertical separation.

2. Pool Fires

Realistic relations for determining temperature distributions for fire plumes have been developed by Heskestad of FMRC (9). These relationships are based on large scale fire tests involving a variety of liquid fuels.

Fire plumes are considered to have a virtual origin (point source) from which the plume can be considered to emanate. A virtual origin has no physical meaning for fires involving most types of solid and liquid fuels. For liquid pool fires the virtual origin height, H_0 , (relative to floor level) can be theoretically predicted using the following relation:

$$H_0 = -1.02D + 0.083 Q^{.4}$$

Where D = pool diameter (m)

Heskestad gives a relation which can be used to determine the temperature rise in the plume (above ambient) at any height in the plume. This equation is used to determine the temperature to which the structural steel located above the pool will be subjected.

$$\Delta T_0 = 9.1 [T_{\infty} / (g c_p^2 \rho_{\infty}^2)]^{.333} Q_c^{.667} (H - H_0)^{-1.67}$$

Where ΔT_0 = temperature rise in plume ($^{\circ}\text{K}$)

T_{∞} = ambient temperature ($^{\circ}\text{K}$)

g = acceleration of gravity (m/s^2)

c_p = specific heat of air ($\text{KJ/Kg}^{\circ}\text{K}$)

ρ_{∞} = ambient density of air (Kg/m^3)

Q_c = convective heat flux in plume, $Q_c = .65Q$, (KW)

H = height above pool surface

VI. TRANSIENT COMBUSTIBLES

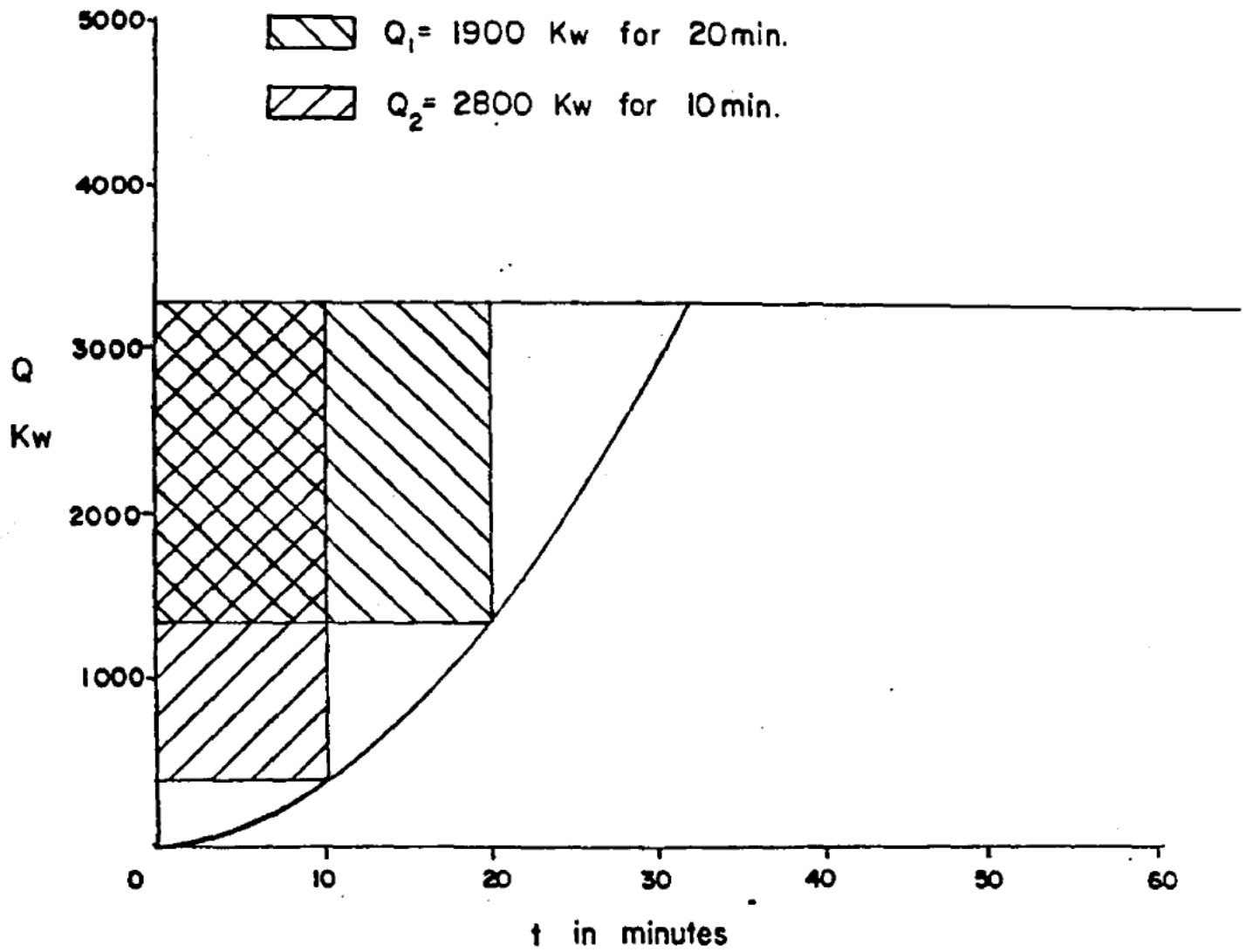
The effect of transient combustibles on the fire exposure to structural steel was also evaluated. This evaluation included both the effects on area calculations using the heat balance method and on localized heating from plumes. Since it is difficult and subjective to quantify the type and amount of transient combustibles which could be in an area, the approach taken was to quantify the size of fire which would cause the acceptance criteria outlined in Section VII to be exceeded.

A. Area Effects

The evaluation of transient combustibles using the heat balance method falls into three (3) categories. The first is fires controlled by ventilation openings (see Section III). For this case, transients could affect the duration of the fire but would not effect the heat release rate. The heat value in Btu's of the total quantity of transients can be calculated by determining the extended duration necessary to exceed the acceptance criteria and multiplying this extended duration by the ventilation limited heat release rate.

The second category is those transients accounted for in the early stages of a cable fire by assuming a constant heat release rate at the maximum value. This quantity can be estimated assuming a geometric growth of the fire. An example is shown graphically in Figure 1.

The third category is the additive effects of transient combustibles on in-situ combustibles. These effects were analyzed by applying the heat balance method for different unitized heat release rates (heat release rate from fire divided by the heat loss area, Q/A_t) to calculate the duration of fires required to exceed the area temperature acceptance criteria of 1100°F. These results are plotted in Figure 2. This figure is used to determine the maximum fires that did not exceed the acceptance criteria. As can be seen, this does not provide a unique solution since fire size and duration provides an infinite number of combinations. For analysis purposes, only the maximum size fire for the duration calculated in the area calculation was listed.



RB unit 1
Elevation 217'-0"

Figure 1

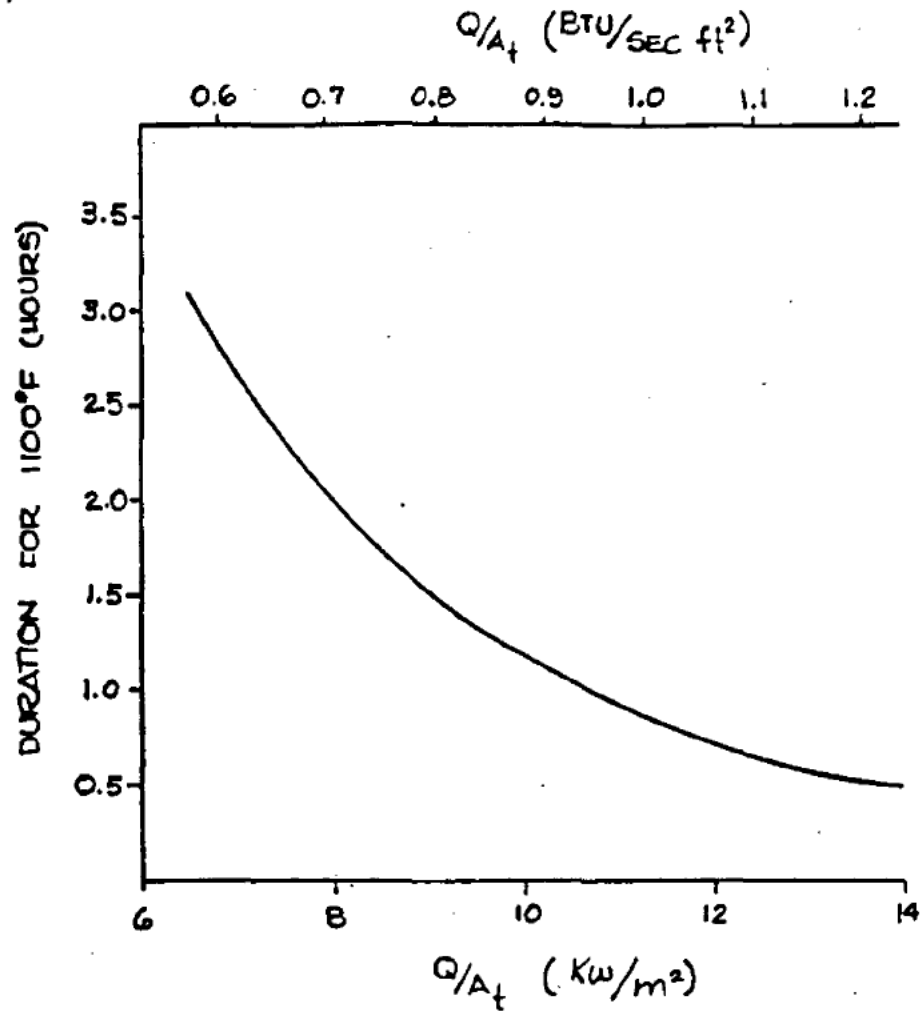


FIGURE 2

B. Localized Effects

The hazards of transient combustibles may be either that of an ignition source for insitu combustibles (i.e. cables) or as a direct exposure to structural steel. To evaluate the potential effects of transient combustibles, the plume correlation relationships previously outlined were used to develop plots of height above fuel packages vs. fire size for three different temperatures; 1) 1100°F 2) 1300°F and 3) 1500°F.

Figure 3 shows the relationship of fire size to height above fuel array for these temperature criteria.

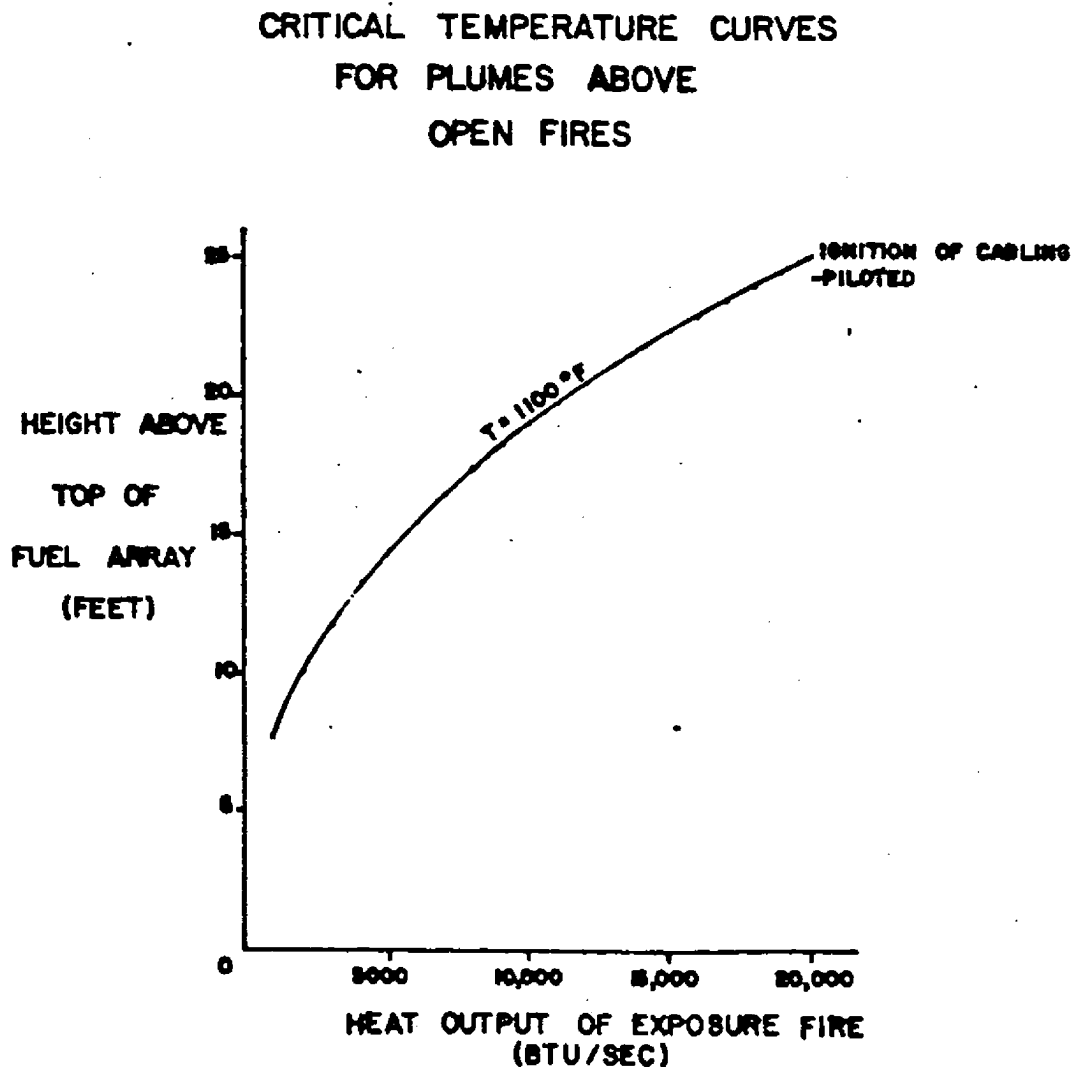


Figure 3

The approach taken in this analysis was to quantify the size fire in Btu/sec necessary to reach plume temperatures at the bottom flange of the steel of 1100°F, 1300°F, and 1500°F using Figure 3. Transient fires were quantified up to 21,100 kW (20,000 Btu/sec). Since these are such large fires, it was not considered necessary to quantify any larger. For plume temperatures of 1300°F and 1500°F, the time required to heat the steel exposed to the plume to 1100°F is calculated. The heat release rate and duration yield the total BTUs which can be related to the total amount of transient combustible material.

It is important to remember that the heat release rate is the driving force and not the total heat of combustion of the materials. Alpert and Ward (8) provide some data on heat release rates for various materials such as wooden pallets, flammable liquids and storage related commodities. Limited data exists on "trash" or health physics supplies. To develop some guidance for these commodities, Sandia Laboratories tests for ignition source fire characterization (12) were evaluated. The temperature profiles recorded during these tests were used to estimate maximum heat release rates for Tests 3, 4, 5 and 10. These results are contained in Table 1.

Table 1
Characterization of Transient Combustible Fires

<u>Test #</u>	<u>Test Description</u>	<u>Estimated Peak Heat Release Rate</u>
3	20 lb of computer paper in two plastic trash bags	570 Btu/sec
4	25 lb of rags, 17 lb of paper towels, 13 lb of plastics (gloves and tape), 2 gal methanol placed in two plastic trash bags	600 Btu/sec
5	30 lb of computer paper in two 50 gal plastic trash cans (16.5 lb each)	700 Btu/sec
10	Same as 5	750 Btu/sec

VII STRUCTURAL STEEL RESPONSE

Once the area and localized exposure temperatures have been determined for the various fires that could occur in an area, an assessment is made of the effects of these temperatures on the structural steel members. An 1100°F cross-sectional average temperature of the steel member has been established as the temperature below which no protection of the steel beams is required and the member is capable of supporting the fire barrier. This is a conservative criteria because it neglects the added fire endurance provided by end restraints and composite construction.

The following measures are used in verifying compliance with this 1100°F temperature criteria:

1. If the area and localized peak temperatures are less than 1100°F, then the unprotected structural steel member is acceptable.
2. If the area or localized peak temperature is greater than 1100°F, the temperature of the steel will be calculated as described in the following sections.
 - a. If the calculated steel temperature is less than 1100°F, then the unprotected structural member is acceptable.
 - b. If the calculated steel temperature is greater than 1100°F, then either the member will be coated to provide the required fire resistance or measures will be taken to reduce the fire exposure to the beam to a level such that the member temperature will be less than 1100°F.

A 1000°F cross sectional average temperature of the steel member has been established for columns with the following verification steps:

1. If the area temperatures are less than 1000°F, then only localized heating is evaluated.
2. Columns are exposed to plume temperatures of 1500°F from cable trays, pool fires or transient combustibles. Exposure duration is the greater of the following: a) the duration of cable exposure, b) the duration of the pool fire, or c) 30 minutes from transient combustibles. If the columns exposed do not reach 1000°F, the unprotected member is acceptable.

Heating of Structural Steel Members

The temperature of the structural steel member is determined using the unsteady state heat transfer calculation outlined by Stanzak (10).

$$\Delta T = 231 \frac{U}{G} (T_a - T_i) \Delta t$$

Where T = temperature rise in steel member during interval t
(°C)

U = surface of steel member exposed to fire (m²/m)

G = weight of steel member (Kg/m)

T_a = average fire temperature during interval (°C)

T_i = temperature of steel member at beginning of interval
(°C)

Δt = time interval in hours

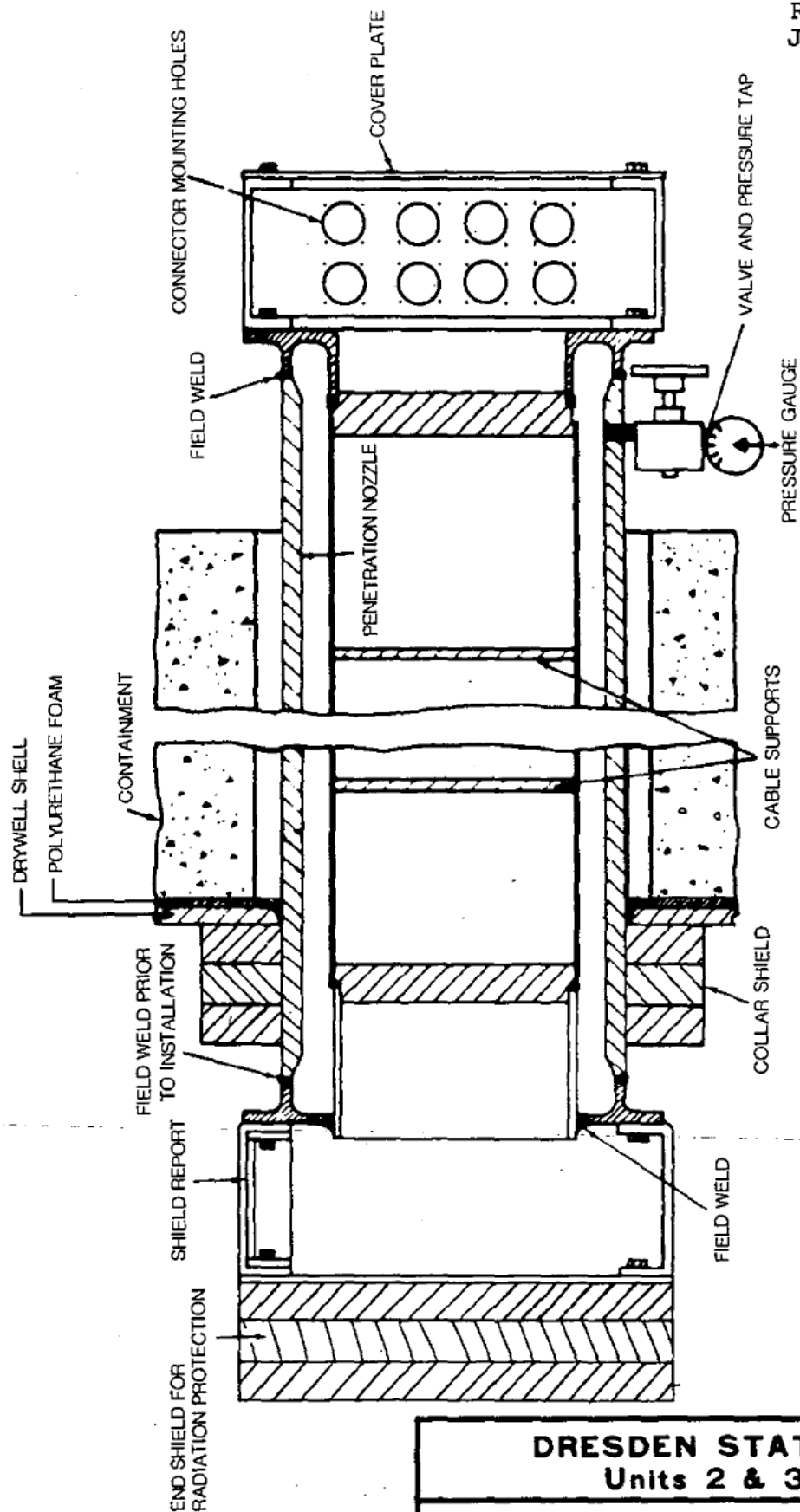
Since the steel temperature rise is calculated over a time interval, a simple iterative process is set up where the steel temperature rise is added to the previous steel temperature for the next iteration. In all cases the peak fire temperatures have been used as a constant input to the steel temperature calculations.

This approach for evaluating effects of localized plumes incorporates a major conservatism in that only a portion of the beam's length would be heated rather than the entire length of the beam. Even though this is the case, no credit has been taken for conductive heat losses along the beam.

REFERENCES

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2. FMRC, "Categorization of Cable Flammability, Intermediate Scale Fire Tests of Cable Tray Installations," Electric Power Research Institute, EPRI NP-1881, August 1982.
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4. V. Babrauskas and R. B. Williamson, "Post Flashover Compartment Fires," University of California, Berkeley, Report No. UCB FRG 75-1, December, 1975.
5. D. L. Berry and E. E. Minor, "Nuclear Power Plant Fire Protection - Fire Barriers (Subsystem Study Task 3)," SAND 78-1990, NUREG/CR-0468, Sandia National Laboratories, September 1979.
6. T. Z. Harmathy, "A New Look at Compartment Fires," Fire Technology, Vol. 8, No. 4, November 1972.
7. W. H. Schmidt and F. R. Krause, "Burn Mode Analysis of Horizontal Cable Tray Fires," SAND 81-0079, NUREG/CR-2431, Sandia National Laboratories, February, 1982.
8. Alpert, Ronald L. and Ward, Edward J., "Evaluating Unsprinklered Fire Hazards," SFPE Technology Report 83-2, presented at the SFPE Fire Protection Engineering Seminar, Kansas City, Missouri, May 1983.
9. Gunnar Heskestad, "Engineering Relations for Fire Plumes," Society of Fire Protection Engineers Technical Report 82-8.
10. W. W. Stanzak (translator), "The Calculation of the Fire Resistance of Steel Construction," National Research of Canada, Technical Translation 1425, March, 1971.
11. ASTM STP 422, Symposium on Fire Test Methods - Restraint and Smoke, American Society of Testing Materials, 1967.
12. Douglas D. Cline, Walter A. VonRiesemann, James M. Chavez, "Investigation of Twenty-Foot Separation Distance as a Fire Protection Method as Specified by 10 CFR 50, Appendix R," NUREG/CR-3192, SAND 830306, Sandia National Laboratories, October 1983.

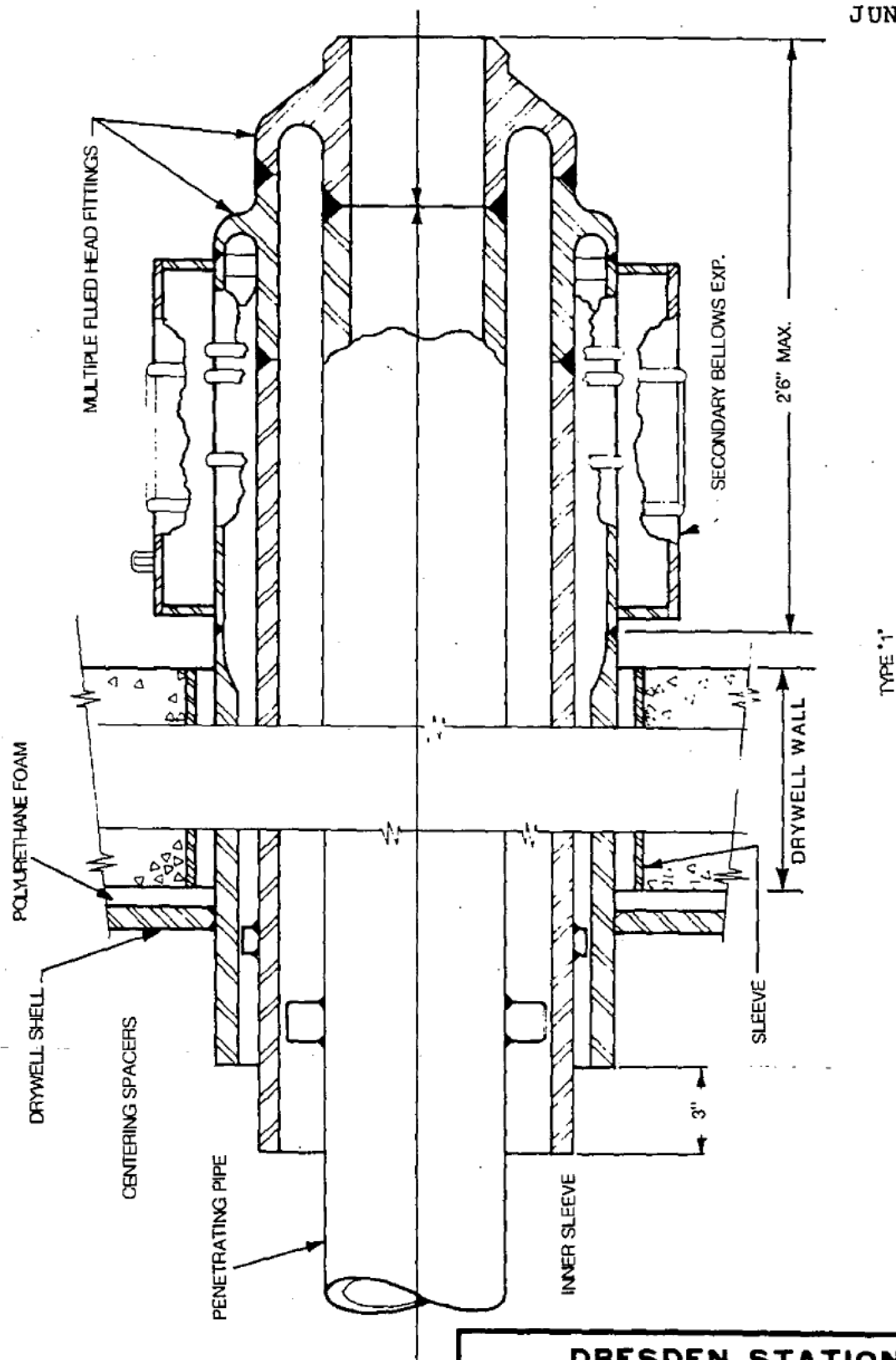
E



DRESDEN STATION
Units 2 & 3

FIGURE E-1

TYPICAL ELECTRICAL PENETRATION
ASSEMBLY CANISTER

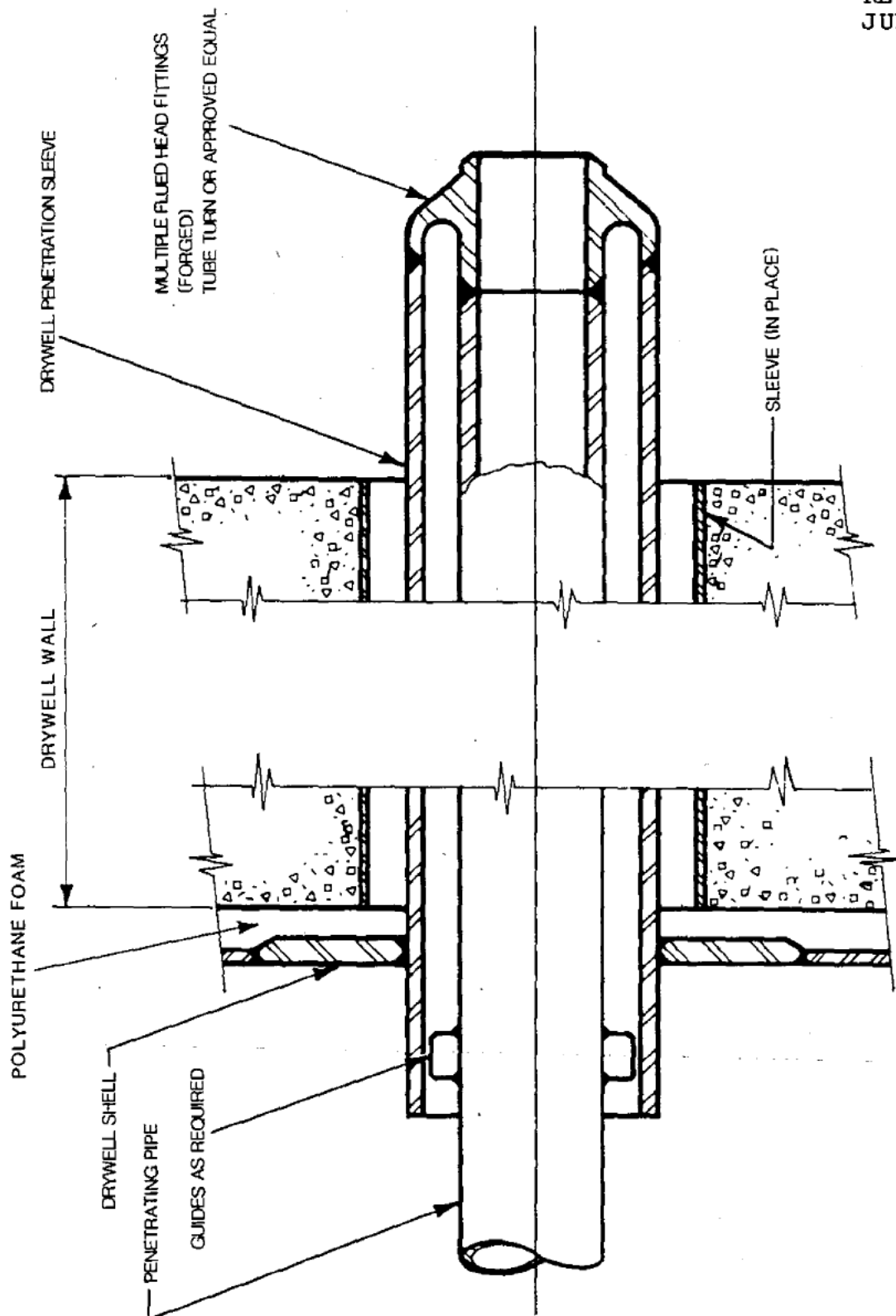


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DRESDEN STATION
Units 2 & 3

FIGURE E-2

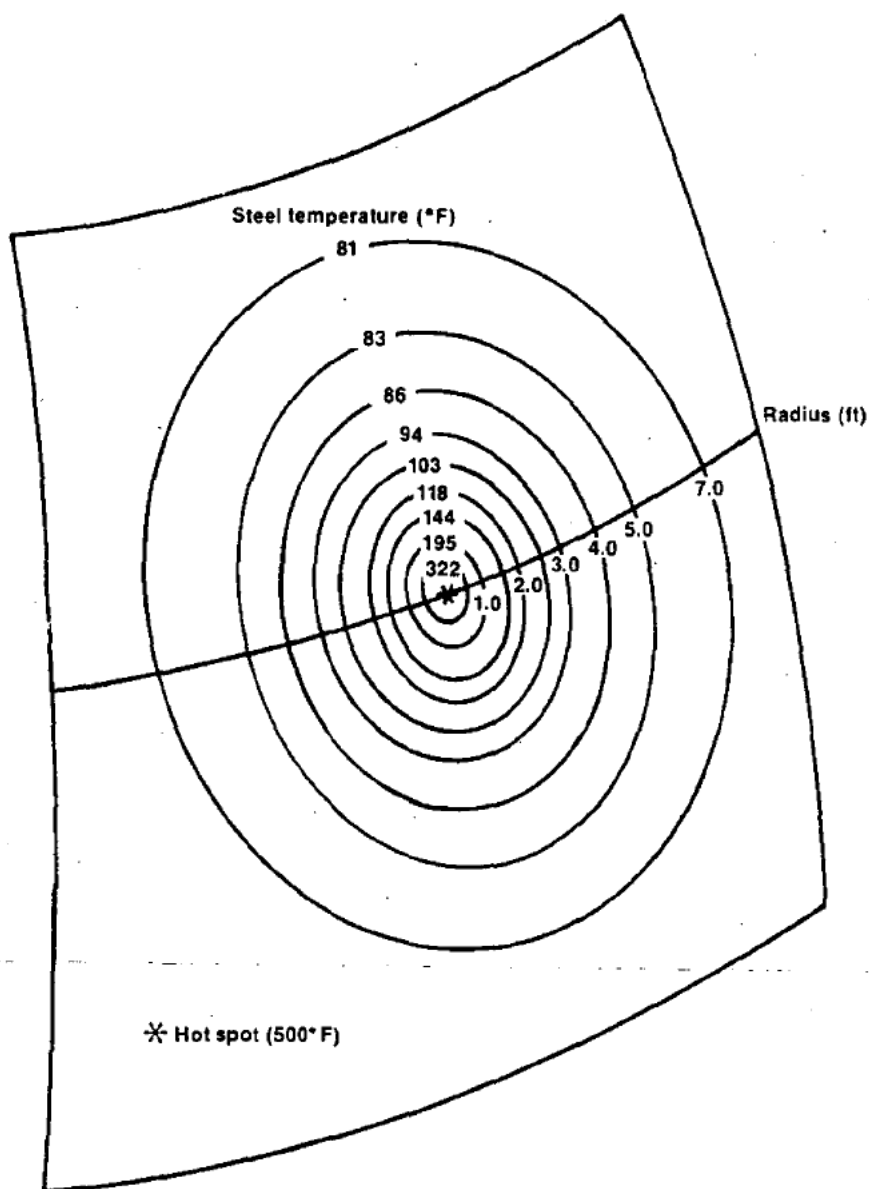
TYPICAL MECHANICAL
PENETRATION ASSEMBLIES
(SHEET 1 OF 2)



DRESDEN STATION
Units 2 & 3

FIGURE E-2

TYPICAL MECHANICAL
PENETRATION ASSEMBLIES
(SHEET 2 OF 2)



DRESDEN STATION Units 2 & 3
FIGURE E-3 STEEL CONTAINMENT TEMPERATURE PROFILES

IV

Dresden 2 & 3

FIRE PROTECTION REPORTS

Volume 4 – Section IV

TABLE OF CONTENTS

<u>TAB</u>	<u>SUBJECT</u>
1	Listing of withdrawn exemption requests, based on GL 86-10 evaluations.
2	Evaluations

Based on the Office of Nuclear Reactor Regulation's (NRR) interpretation of Appendix R Section III.G.3, Commonwealth Edison Company (CECo) has withdrawn the following exemption requests and considers them to be Generic Letter 86-10 evaluations. Refer to the applicable section for details.

<u>Section</u>	<u>Subject</u>
3.2	Justification for lack of complete 3-hour fire barriers around Fire Zone 1.3.2.
3.3	Justification for lack of complete 3-hour fire barriers between fire areas.
3.8	Justification for separation between mechanical components of redundant cold shutdown systems.
4.2	Justification for lack of complete 3-hour fire barriers between fire areas.
4.8	Justification for lack of complete 3-hour barriers around Fire Zone 1.4.1.
4.9	Justification for lack of complete 3-hour fire barriers around Fire Zone 1.3.1.
4.10	Justification for separation between mechanical components of redundant cold shutdown systems.
5.2	Justification for lack of complete fire barriers surrounding Turbine Building Zone Groups.
9.1	Justification for 4kV Bus Duct Penetrations.
9.2	Justification for Standby Gas Treatment System Piping Penetrations.
10.1	Justification for Appendix R Structural Steel Request.

Dresden 2 & 3

FIRE PROTECTION PROGRAM DOCUMENTATION PACKAGE
EVALUATIONS

<u>TAB</u>	<u>EVALUATIONS</u>
A.	Cable Tray Penetration Fire Seal Detail for the Auxiliary Electric Equipment Room/ Cable Tunnel Fire Wall dated 11-21-88.
B.	EC 353102-86-10 Evaluation for Fire Barrier Penetrations
C.	EC 355027-86-10 Evaluation for U2 HPCI Steam Tunnel & Associated Penetrations
D.	EC 355925-86-10 Evaluation for Turbine Building Wall Penetration U3 Isophase Bus Return Air Duct
E.	EC 358637-86-10 Evaluation for Turbine Building Wall Penetration F-147-33 for U2 Isophase Bus Return Air Duct
F.	EC 358719-86-10 Evaluation for 2/3 Generator Bus Duct to 4Kv Bus 33-1 Wall Penetration
G.	EC 360923-86-10 Evaluation for Clean & Dirty Oil Tank Room Fire Barriers
H.	EC 349956-86-10 Evaluation for Fire Door 46 (Clean & Dirty Oil Tank Room)
I.	EC 400600-86-10 Evaluation on Fire Doors 48A, 52A and 116A

Tab A

November 21, 1988

To: E.D. Eenigenburg

Subject: Cable Tray Penetration Fire Seal Detail for the Auxiliary
Electric Equipment Room/Cable Tunnel Fire Wall.

References: Professional Loss Control's "Evaluation of Penetration Seal
Systems at the Dresden and Quad Cities Nuclear Power Plants,"
dated April 21, 1987.

Drawing F-156, Sheet 1 Rev. B and Sheet 2 Rev. C, Three Hour
Fire Barrier Record.

On November 18, 1988 I was contacted by Eric Skowron, Dresden Station
Technical Staff Engineer, regarding a problem with the cable tray penetration
fire barrier detail for the top cable tray penetrations through the Auxiliary
Electric Equipment Room/Cable Tunnel wall. Mr. Skowron presented an
alternative detail, and has requested a fire protection assessment of the
design.

The North-South wall separating the Unit 3 Cable Tunnel from the
Auxiliary Electric Equipment room constitutes a 3-hour fire wall separating
fire zones. As such, all penetrations through the wall must provide an
equivalent 3-hour barrier. The wall has sixteen (16) cable tray penetrations
stacked eight trays high on either side of the wall. These cable tray
penetrations have fire seals identified on the Fire Barrier Record, Drawing
F-156 as Detail 10 on Drawing 12 E-6508. Approval of this cable tray fire
seal detail is contained in the referenced PLC report.

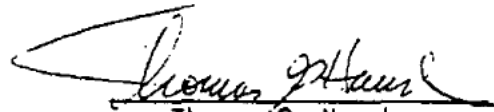
During a recent field inspection, Mr. Skowron discovered that the Detail
10 fire seals for the top trays on either side of the wall were not
installed. The top cable trays run horizontally on the West side of the wall,
and then arc 90 degrees through the wall to a vertical riser section that is
almost flush with the East side of the wall. This configuration makes
installation of Detail 10 impracticable.

A proposed fire barrier detail, and installation and inspection notes
for these two cable trays are shown in the attached figures. This fire
barrier detail differs from the other Detail 10 penetration barriers in the
following respects:

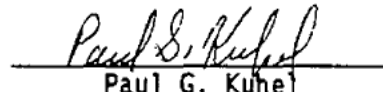
1. The West side of the penetration will have a Fire-X Glassboard face
coated with flame retardant mastic. This board will provide
structural support for the inorganic fiber and a solid base for
application of the flame retardant mastic. This is deemed to be an
enhancement over the Detail 10 design.

2. The cable tray riser section will actually make up the East face of the penetration seal. The riser section will provide a noncombustible enclosure, as well as a substantial structural backing for the inorganic fiber.
3. The inorganic fill will be no less than 12 inches and, in fact, will primarily extend past the 18 inch penetration thickness into the cable tray riser. The thermal insulation provided will be superior to that of the tested configurations mentioned in the PLC report.

Supporting arguments for acceptance of the Detail 10 seals as contained in the PLC report are also deemed to be applicable for the detail presented here. Installation of this detail is therefore acceptable from a fire protection standpoint.



Thomas G. Hausheer
Qualified Fire Protection Engineer

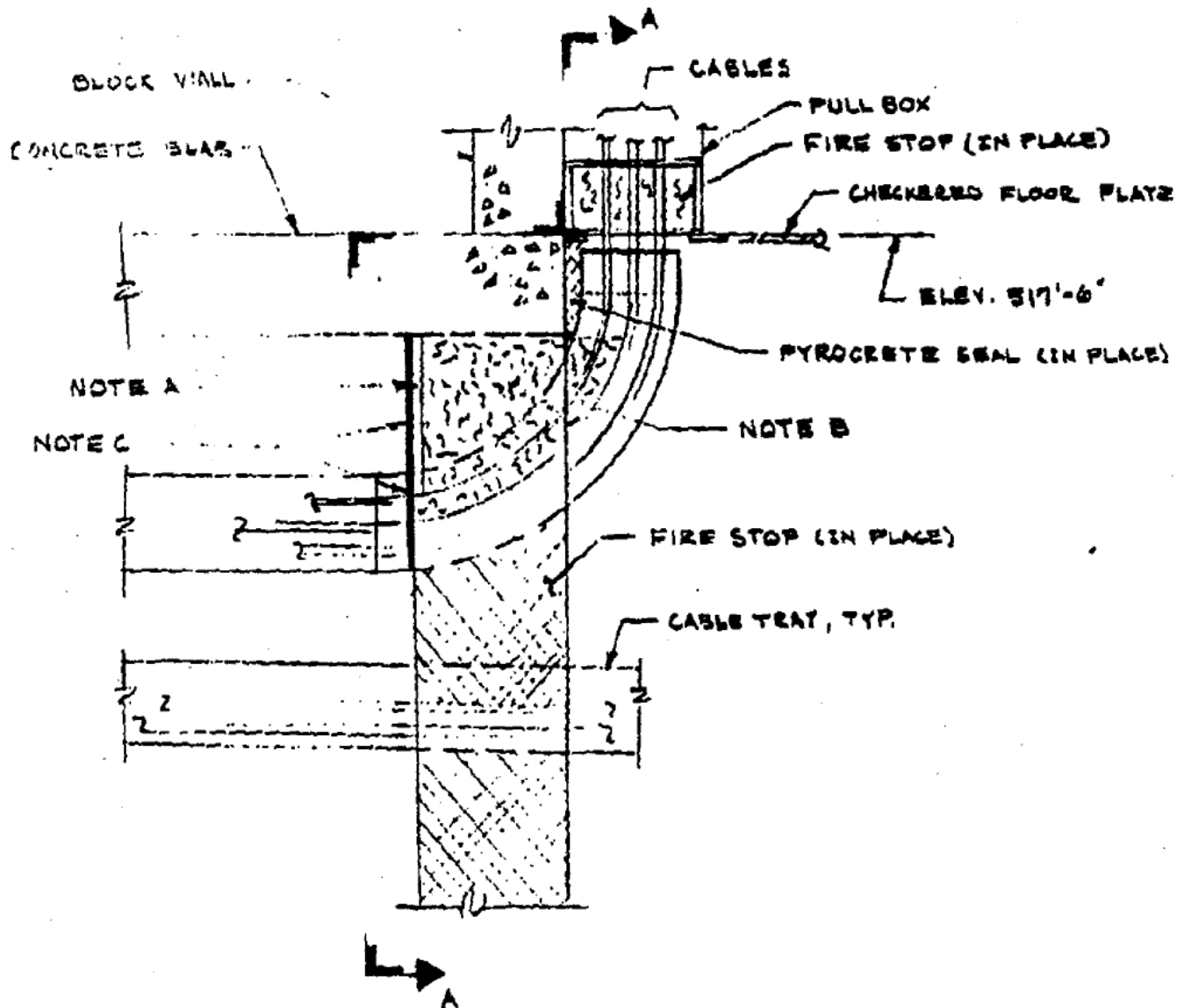


Paul G. Kuhel
Supervisor of Station Support Services

PGK/TGH/bah
2986H/9-10

cc: G.P. Wagner - w/attachments
R.J. Whalen - "
E. Skowron - "
M.M. Dillon - "
D.J. Roberts - "
W.B. Fancker //

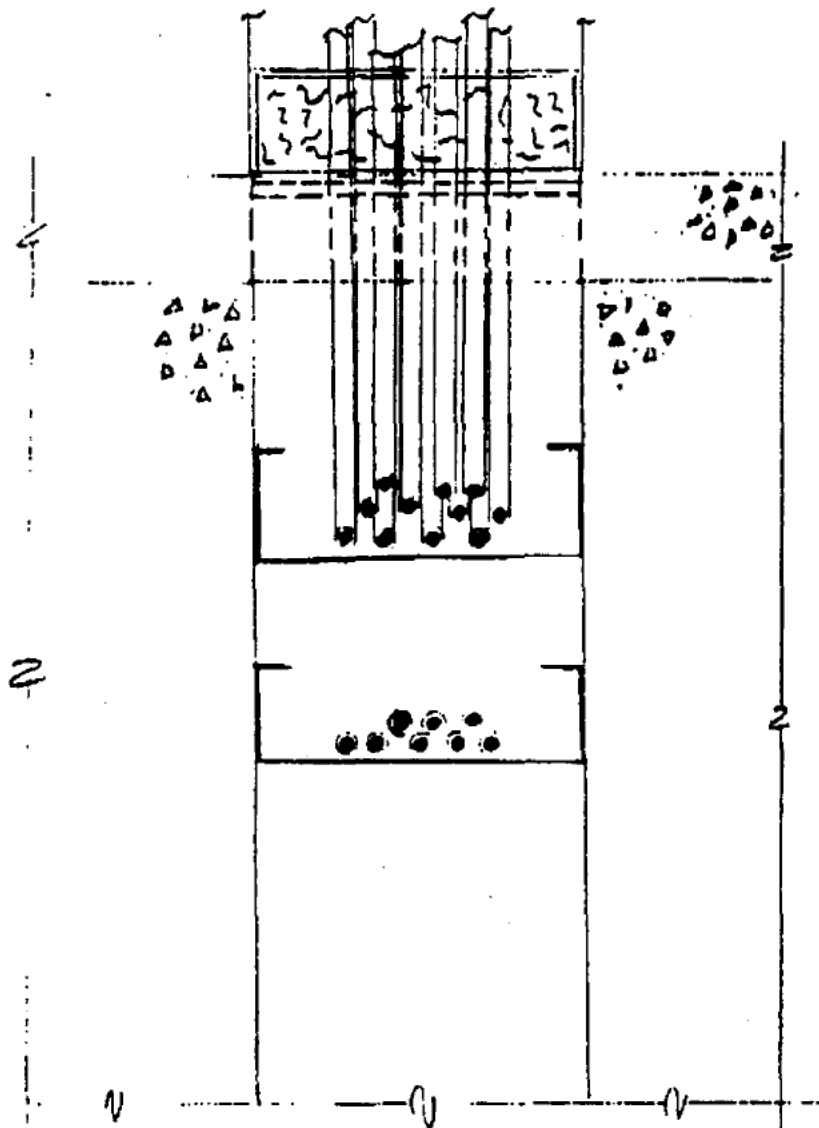
Revision 8
April 1992



ELEVATION

FIRE STOP DETAIL FOR CABLE TRAY ROUTING
POINTS CT1T AND CT2T (REF. DWG. 12E-204B)

Revision 8
April 1992



SECTION A-A

FIBER FILL AND CERAMIC FIBER
BOARD NOT SHOWN FOR CLARITY

NOTES

- A. Fire-X Glassboard manufactured by Klemlite Corporation, Joliet, Illinois
- B. Inorganic fiber shall be Johns-Manville Cerafiber, Cerablanket, Ceraform; or Babcock & Wilcox Kaowool brand of ceramic fiber.
- C. Flame retardant mastic shall be "Flamemastic 77" by the Flamemaster Corp., Sun Valley, California and shall be applied approximately 1/4" thick; or Vimasco Cable Coating No. 31 by Vimasco Corp., Nitro, West Virginia, and shall be applied approximately 1/8" thick wet (approximately 1/16" thick after drying); or Flamesafe S-100 by Thomas and Betts.
- D. Cables are substantially coated with Pyrocrete fire proofing (in place).

GENERAL INSTRUCTIONS

- 1. All foreign material, such as wood or foam plastic construction forms, shall be removed. All putty type "duct sealing" compounds not specified in the detail shall be removed. Openings must be broom clean and free of dust accumulation and debris. Fire proofing coating on the cables and tray shall be left in place.
- 2. The inorganic fiber shall be packed hand tight (9 pcf min.). Pack fiber around new and existing cables.
- 3. The mastic shall lap 1" minimum around the cables and around the perimeter of the barrier.
- 4. The mastic coating shall have no cracks or holes once the seal is complete.

INSPECTION ACCEPTANCE CRITERIA

The seal shall be inspected in accordance with the inspection requirements for detail "E10" in procedure DFPP 4175-2, except that this detail may be inspected on the flush side only.

Revision 8
April 1992DFFD 4175-2
Revision 6

- d. IF a penetration of an Appendix R fire barrier is found that is not labeled. THEN label the penetration with the fire protection drawing number and penetration number on that drawing. (For example, "F-54-23" denotes penetration 23 on drawing F-54.) At least one side of a penetration should be labeled; both sides should be labeled if accessible. Engraved plastic labels should be attached adjacent to the penetration. Doorways, hatch openings, stairwells, HVAC ducts, floor drains, and other obvious penetrations need not be labeled.

2. Visual Inspection

Apply the appropriate visual inspection acceptance criteria to the fire stop/break. Certain TRINCO mechanical seals, indicated below by the comments "Flush Side Only", "Best Side Only", or "One Side Only", require inspection of only one side of the seal. For other fire stops, both sides of the fire stop should be inspected if easily accessible; inspection of one side of the fire stop may be omitted if warranted by radiation protection concerns.

- a. Mastic/inorganic fiber/asbestos board fire stops (Details T-M7 - Flush Side Only, E2, E3, E5, E7, E8, E10, E11, and E17):

- (1) Any breaches in the mastic or asbestos board on a surface of the fire stop shall have areas totalling less than 4 square inches (sq. in.).
- (2) IF any breaches in the mastic or asbestos board are present, THEN no obvious voids in the inorganic fiber packing shall be visible.

- b. Mastic/inorganic fiber/sheet metal cover fire break (Detail E9):

- (1) The sheet metal cover shall be securely bolted in place.
- (2) Any breaches in the mastic on a side of the fire break shall have areas totalling less than 4 sq. in.
- (3) IF any breaches in the mastic are present, THEN no obvious voids in the inorganic fiber packing shall be visible.

- (4) No cables shall bypass the fire break.

- c. Firecode CT Gypsum fire break (Detail E14):

- (1) The top surface of the gypsum shall completely cover all of the cables in the tray for at least 12 inches along the tray and for the full width of the tray.

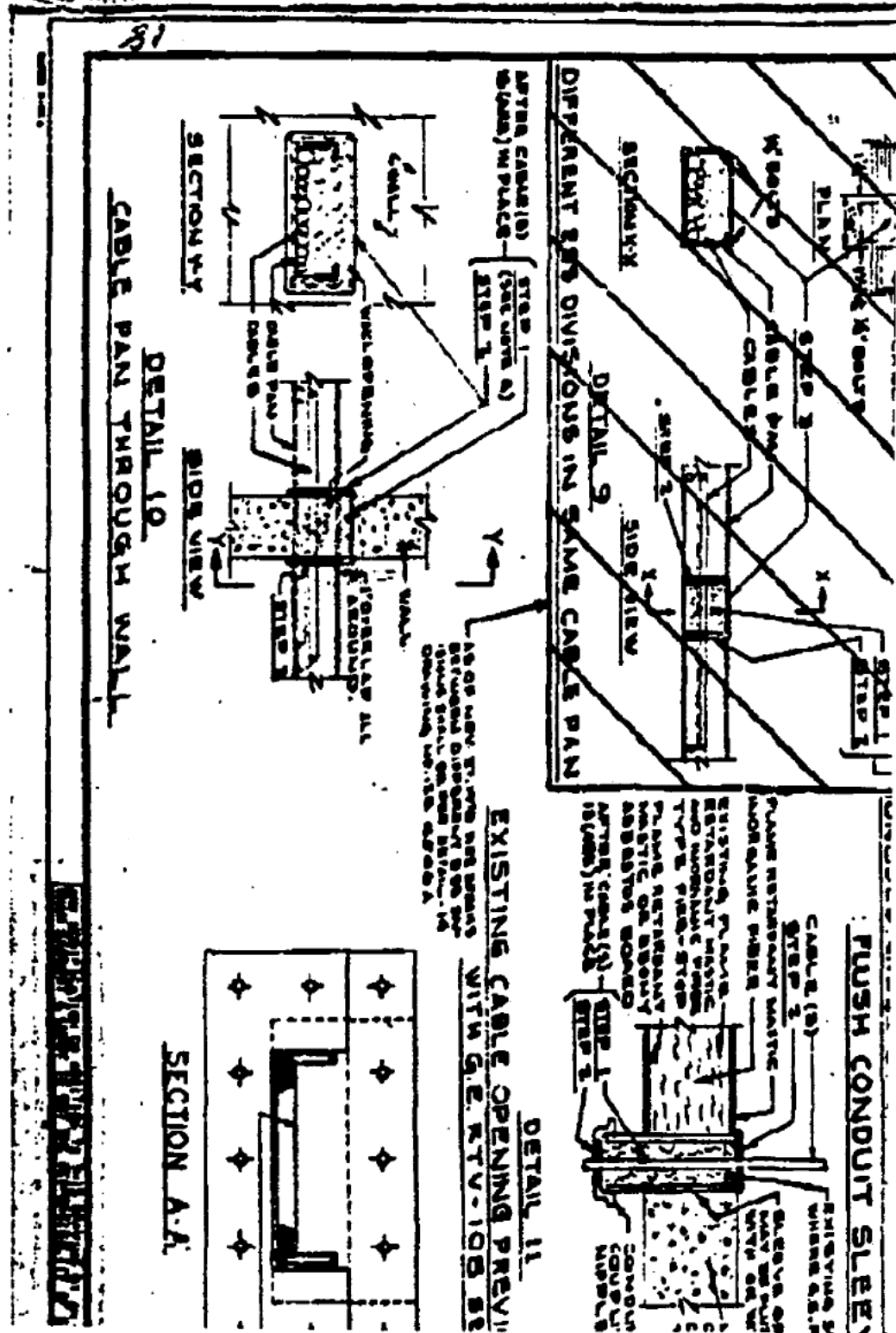
APPROVED

JAN 29 '87

D.Q.S.R.

0026X
0050b

Revision 8
April 1992



Tab B

Engineering Change

Print Date: 03/02/05

EC Number : 0000353102 000
Status/Date : CLOSED 03/02/05
Facility : DRE
Type/Sub-type: EVAL SYS



Page: 1

EC Title: 86-10 PENETRATION FIRE BARRIER EVALUATION

Mod Nbr : KW1: FIRE KW2: 86-10 KW3: BARR KW4: PENE KW5:

Master EC : N	Resp Engr : DRD08	Temporary : N
Outage : N	Work Group :	Aprd Req'd Date:
WO Required : N	Alert Group: SEB	Exp Insvc Date:
Adv Wk Appvd:	Image Addr :	Expires On : 10/28/07
Auto-Advance: Y	Alt Ref. :	Auto-Asbuild : N
Caveat Outst:	Priority :	Discipline :
Department :		
Location :		

<u>Milestone</u>	<u>Date</u>	<u>PassPort</u>	<u>Name</u>	<u>Req By</u>
110-PREPARE EC	12/28/04	DRD08	BEMBNISTER	PAUL
120-REVIEW EC	12/28/04	DRDUW	KNOX	DAVID
300-APPROVE EC	12/28/04	DREJV	KOTOWSKI	JOSEPH
900-ARCHIVE EC	03/02/05	ELGBC	COOLEY	BERLINDA
210-DEPT RVW-01	12/29/04	U999CJP	PRAGMAN	CHRISTOPHER

Corporate Fire Protection, Qualified Fire Protection Engineer

Units

03 UNIT THREE

Systems

41 FIRE PROTECTION

Cross References

<u>Ref.</u>	<u>Number</u>	<u>Sub-</u>	<u>Description</u>
<u>Type</u>		<u>Number</u>	
AR	00285801		CAN NOT FIND 86-10 DOCUMENTATION FOR FIRE BARR
AS	00285801	02	Complete 86-10 Documentation

Engineering Change

Number : 0000353102 000
Facility : DRE
Type/Sub-type: EVAL SYS

Print Date: 03/02/05

Page: 1

Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : DRD08
Last Updated Date: 12/29/04
Text Status : UNLOCKED

EC-EVAL 353102 - Revision 0

86-10 Evaluation for Fire Barrier Penetrations

Reason For Evaluation / Scope:

Generic Letter 86-10 requires that evaluations be performed for justification of openings in Appendix R (Safe Shutdown) fire barriers and that these 86-10 evaluations be retained for subsequent NRC audits. IR 285801 was written because, though per the plant design the following penetrations in Appendix R walls do not have fire barriers installed, the associated 86-10 evaluation could not be located during a audit performed by the Fire Protection System engineer. This EC-EVAL is being performed to provide documented justification for the listed penetrations not having fire barriers installed. It will be used to close out ATI 285801-02.

F-77-3 and 18 (Drawings F-77, Sheet 1 & 2) - These two are in the same wall penetration. Penetration 18 is small, approximately 1" by 2", hole with two small tubes routed through the steel plate acting as the fire barrier for penetration 3. These penetrations are on the east wall,

45'-6" elevation, of the Isocondenser "3" Valve Room. The drawings show the opening in the penetration fire barrier.

F-104-11 and 13 (Drawings F-104, Sheet 1 & 2) - These penetrations are on the north wall, east side, of the Unit 2 Isocondenser floor, 589' elevation. The design drawings state that an exemption request was submitted for these penetrations not having fire barriers installed. The fire barrier exemption requests for Dresden Station were later turned into 86-10 evaluations. The F-104-11 and 13 penetrations are a mirror image of the F-115 penetrations listed below.

F-115-1 and 2 (Drawings F-115, Sheet 1 & 2) - These penetrations are on the north wall west side, of the Unit 3 Isocondenser floor, 589' elevation. The design drawings state that an exemption request was submitted for these penetrations not having a fire barrier installed. The fire barrier exemption requests for Dresden Station were later turned into 86-10 evaluations. The F-115-1 and 2 penetrations are a mirror image of the F-104 penetrations listed above.

In addition there are HVAC ducts in the north wall on both units that go to the fuel pool, separator/dryer storage pits/pools and reactor wells on the refuel floor that do not contain fire dampers. The fuel pools, dryer/separator pits and reactor wells are part of the reactor building refuel floor fire zones 1.1.1.6 and 1.1.2.6. Though there is an existing 86-10 evaluation that justifies there not being a continuous fire barrier between the refuel floor and the Isocondenser floor in the reactor building these HVAC ducts going through the north wall are not mentioned by name in the evaluation. This EC-EVAL will be used to note that they are bounded by that original evaluation.

Detailed Evaluation:

Penetrations F-77-3 and 18

This section provides justification for lack of a three-hour fire barrier in penetrations F-77-3 and 18.

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Number : 0000353102 000
Facility : DRE
Type/Sub-type: EVAL SYS

Print Date: 03/02/05

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Finding

Penetration F-77-03/18, is located at 560'-6" in the east wall of the Unit 3 Isolation Condenser (isocondenser) "3" Valve Room. Penetration F-77-03 is a 20" diameter opening with the 14" diameter pipe. The fire barrier on the penetration is a welded steel plate, S&L Detail 2 (Ref. 13).

Penetration 18 is a small (approximately 1" x 2") hole in the plate through which two small tubes are routed. There is no fire barrier installed for the small hole in the steel plate. This wall separates two different safe shut down paths. The valve room is fire zone 1.1.5.C, which is part of the Isocondenser Safe Shut Down path, Fire Area RB3-I. The 545'-6" elevation of the Unit 3 Reactor Building is fire zone 1.1.1.3, which is part of the LPCI/HPCI Safe Shut Down path, Fire Area RB3-II.

Fire Scenario

a. Fire Protection Considerations

1. There are no combustible materials routed through the penetration.
2. The horizontal penetration is located in a vertical wall.
3. Each zone is protected by an automatic smoke detector system. There is area wide smoke detection on the 545'-6" elevation of the Unit 3 Reactor Building, fire zone 1.1.1.3. There is no smoke detection in the Isocondenser "3" Valve Room however the ceiling of the room consists of open grading to the Isocondenser "2" Valve Room, which has a grated ceiling to the 589' elevation, the isocondenser floor, fire zone 1.1.1.5.A. Smoke in the isocondenser valve room would rise to isocondenser floor, 589' elevation and actuate the smoke detectors on the ceiling of that floor.
4. Transient fire loads are not stored in the Isocondenser "3" Valve Room during power operations due to the elevated radiological dose in the room.
5. The areas in question have low combustible loadings. Calculation DRE97-0105, Ref. 5, gives the combustible loading in the Isocondenser "3" Valve Room as insignificant, <1000 Btu/ft², and on the Unit 3 Reactor Building 545'-6" elevation as 19,662 Btu/ft². These are considered low combustible loadings and result in a calculated fire duration of 0 minutes for the Isocondenser "3" Valve Room and 14.7 minutes for the Unit 3 Reactor Building 545'-6" elevation.
6. There is no combustible material with in three feet of either side of the penetration.

b. Assumptions

A fire in the Isocondenser "3" Valve Room would not affect LPCI/HPCI Safe Shutdown Path as there is no credible way for a fire in the Isocondenser "3" Valve Room to spread to the Unit 3 Reactor Building 545'-6" elevation.

There is negligible fixed combustible loading in the Isocondenser "3" Valve Room. It is a radiation area and as such there are no transient combustibles stored in the area. With no combustible material routed through penetration F-77-18, no combustible material with in three feet of the penetration, and low combustible material loading a fire in the Isocondenser "3" Valve Room would not be sustained nor could it spread from the isocondenser valve room to the Unit 3 Reactor Building 545'-6" elevation.

If a fire were to occur in the Isocondenser "3" Valve Room smoke from the

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Type/Sub-type: EVAL SYS

Print Date: 03/02/05

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fire would spread to the isocondenser floor were it would set off the smoke detectors in the ceiling. This would allow the Fire Brigade to respond and put out the fire.

Likewise a fire on the Unit 3 Reactor Building 545'-6" elevation could not credibly spread to the isocondenser valve room. There is no combustible material routed through the penetration nor is there any combustible material within three feet of the penetration. The natural tendency of a fire is to spread up and outward. Reactor Instrumentation & Protection Rack 2203-5 is located below the below the penetration. Except for the short run of the flex conduit on the rack all of the cables are within conduit. In addition the rack is within a caged area to prevent accidental actuation of the instrumentation on the rack. This includes preventing the storage of transient combustibles in the area. There are cables trays in the overhead above the penetration but there is no credible way for a fire to spread down from the trays to the penetration as there are no intervening combustibles. Thus the limited amount of combustible material in the area of the penetration, physical size and configuration of the penetration would prevent a fire from spreading from the 545'-6" elevation to the Isocondenser "3" Valve Room.

There is the potential that smoke could spread from the Unit 3 Reactor Building 545'-6" elevation to the Isocondenser "3" Valve Room. However well before smoke from any fire would enter through the small opening in the penetration smoke detectors on the 545'-6" elevation would alarm and the on-site fire brigade would be able to extinguish the fire. In the unlikely event this were to not occur. Any smoke or gas that would pass through the penetration to the isocondenser valve room would be vented through the grated ceiling to the Isocondenser "2" Valve Room and isocondenser floor above. There it would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor.

This smoke would have minimal or no affect on the ability to safely shutdown the plant. The smoke would rise through the grating in the ceiling of the "2" valve room up to the ceiling of the isocondenser floor on the 589' elevation. The smoke would not affect the ability of any components in the isocondenser valve rooms or on the isocondenser floor to operate.

The Safe Shutdown Path for a fire in fire zone 1.1.1.3, Unit 3 RB 545'-6" elevation is A-1. Safe Shutdown Path A-1 assumes that power is lost for the isocondenser isolation valves and that the valves are operated manually. The valves in both the Isocondenser "3" and "2" Valve Rooms would still be accessible for manual operation, either through the doors to the rooms or on the ladder from the isocondenser floor above. The "3" valve is located below the penetration. The smoke entering the room would rise straight up to isocondenser floor, 589' elevation. This will allow an operator to enter both the "2" and "3" valve rooms the room to operate the valves. Smoke on the isocondenser floor, 589' elevation, would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor. This would allow the operators access to the valves requiring manual operation on the isocondenser floor. If the smoke was too heavy,

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EC Number : 0000353102 000
Facility : DRE
Type/Sub-type: EVAL SYS

Print Date: 03/02/05

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the valves could be operated as required by an operator wearing SCBA gear.
Penetrations F-104-11 / 13

Finding

This section provides justification for lack of a three-hour fire barrier in penetrations F-104-11 and 13. These penetrations are in the north wall, east end, of the Unit 2 isocondenser floor, elevation 589'. It separates the Isocondenser area, Fire Zone 1.1.2.5A, from the Unit 2 Fuel Pool Skimmer Surge Tank Room, which is in Fire Zone, 1.1.2.5.D. The safe shut down path C (LPCI/HPCI) is used for a fire on the isocondenser floor and safe shut down path B1 (Isocondenser) is used for a fire in fire zone 1.1.2.5.D. There is no safe shut down equipment, components or cables located in fire zone 1.1.2.5.D.

Fire Scenario - Assumption

Fire on the Isocondenser Floor Fire Zone 1.1.2.5.A

There is no continuity of combustibles through the penetrations in question and no combustible material within 3 feet of penetrations F-104-11 and 13. The lowest penetration, F-104-13, is 19'-6" above the floor. The combustible loading in the isocondenser fire zone, 1.1.2.5.A is <1000 BTU/ft². In addition the isocondenser floor area has a high ceiling and area wide smoke detection. Other than the potential for minor smoke the heat and products of combustion of a fire on the Unit 2 isocondenser floor would not spread through the penetrations in question and in the unlikely event that they did there is no safe shut down equipment, components or cables located in fire zone 1.1.2.5.D on the other side of the fire barrier.

Fire in Fire Zone 1.1.2.5.D

The Unit 2 Fuel Pool Skimmer Surge Tank Room is a locked high radiation area. The only way to enter the room is through the locked fire door from the isocondenser floor. There is grating opening with shielding in the back wall of the room to the rest of fire zone 1.1.2.5.D. There are no unsealed electrical penetrations through this back wall. There is no continuity of combustibles through the penetrations in question nor is there any combustible material within three feet of the penetrations. The fire load in the zone is 1,520 Btu/ft². This equivalent to a 1.14-minute fire. Based on the location of the penetrations, other than the potential for minor smoke, the heat and products of combustion a fire in Fire Zone 1.1.2.5.D will not enter and adversely effect the equipment and components on the isocondenser floor. Nor would it prevent the manual operation of the valves on the isocondenser floor required for the safe shut down of the plant. Smoke on the isocondenser floor would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor. This would allow the operators access to the valves requiring manual operation on the isocondenser floor. If the smoke was too heavy, the valves could be operated as required by an operator wearing SCBA gear.

Penetrations F-115-1 / 2

This section provides justification for lack of a three-hour fire barrier in penetrations F-115-1 and 2.

Fire Scenario - Assumption

Fire on the Isocondenser Floor Fire Zone 1.1.1.5.A

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There is no continuity of combustibles through the penetrations in question and no combustible material within three feet of penetrations F-115-1 and 2. The lowest penetration, F-115-2, is 19'-6" above the floor. The combustible loading in the isocondenser fire zone, 1.1.1.5.A is 3,236 BTU/ft². This is equivalent to a 2.4-minute fire. In addition the isocondenser floor has high ceiling (+20 ft) and area wide smoke detection. Other than the potential for minor smoke the heat and products of combustion of a fire on the Unit 3 isocondenser floor would not spread through the penetrations in question and in the unlikely event that they did there is no safe shut down equipment, components or cables located on the other side of the fire barrier in fire zone 1.1.1.5.D.

Fire in Fire Zone 1.1.1.5.D

The Unit 3 Fuel Pool Skimmer Surge Tank Room is a locked high radiation area. The only way to enter the room is through the locked fire door from the isocondenser floor. There is a grated opening with shielding in the back wall of the room to the rest of fire zone 1.1.1.5.D. There are no unsealed electrical penetrations through this back wall. There is no continuity of combustibles through the penetrations in question and no combustible material within three feet of the penetrations. The fire load in the zone is < 1,000 Btu/ft². Based on the location of the penetrations, other than the potential for minor smoke, the heat and products of combustion of a fire in Fire Zone 1.1.1.5.D will not enter and adversely effect the equipment and components on the isocondenser floor. Smoke on the isocondenser floor would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor. This would allow the operators access to the valves requiring manual operation on the isocondenser floor. If the smoke was too heavy, the valves could be operated as required by an operator wearing SCBA gear.

HVAC Penetrations North Wall of Isocondenser Floors

This section provides justification for lack of three-hour fire barriers in the HVAC penetrations on the north wall of the Isocondenser floor in both Unit 2 and Unit 3 Reactor Buildings. In Revision 1 of the September 1985 Appendix R Exemption Requests there is justification for open mechanical penetrations and HVAC ducts without fire barriers or fire dampers installed in the ceiling/floor of the isocondenser floor, 589' elevation, and refuel floor, 613' elevation in both Unit 2 and 3. In Revision 8 of the exemption request dated April 1992, the station withdrew those exemption requests said that they considered them to be 86-10 evaluations. These exemption requests/86-10 evaluations do not mention the Fuel Pool, Separator/Dryer Pit, and Reactor Well HVAC ducts in the north wall of the isocondenser floor Fire Zones, 1.1.1.5.A and 1.1.2.5.A by name, however they are similar to the HVAC ducts discussed in the evaluation in that they are routed from the refuel floor Fire Zones 1.1.1.6 and 1.1.2.6 to the isocondenser floor. Therefore it is Dresden Station's position that the lack of fire barriers or fire dampers in these HVAC ducts is bounded by the original evaluation discussed above. Though the combustible loading in Fire Zone 1.1.5.A has increased to 3,236 Btu/ft² from the <1000 Btu/ft² used in original 86-10 evaluation this has not adversely affected the results of the original evaluation which

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determined that "the heat and products of combustion from a fire below the refuel floor would not spread to the refuel floor and impact both units". 3,236 Btu/ft² is equivalent to a 2.4-minute fire.

Conclusions / Findings:

The boundaries noted above, separating the fire zones associated with the alternative shut-down paths, i.e. isolation condenser paths and HPCI/LPCI paths are not complete 3-hour rated fire barriers by definition because the penetrations noted above are unsealed mechanical penetrations. However the above analysis indicates that separation of Fire Areas RB2-I and RB2-II on Unit 2 and RB3-I and RB3-II on Unit 3 meet the intent of Generic Letter 83-33, 86-10 and Appendix R Section III-L which require that alternate shutdown paths be separated from each other so that a single fire cannot disable alternative shutdown paths. Therefore the unsealed mechanical penetrations noted above are acceptable as is.

References:

- 1) IR 285801; Can Not Find 86-10 Documentation for Fire Barrier Penetrations
- 2) Drawing F-4-1; Detection and Suppression Reactor Bldg EL 545'-6" Dresden Station Unit 2&3
- 3) Drawing F-6-1; Detection and Suppression Reactor Bldg EL 589'-0" Dresden Station Unit 2&3
- 4) Drawing F-7-1; Detection and Suppression Reactor Bldg EL 613'-0" Dresden Station Unit 2&3
- 5) Drawing F-77, Sheet 1; Section F-77 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 6) Drawing F-77, Sheet 2; Section F-77 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 7) Drawing F-104, Sheet 1; Section F-104 3 Hour Fire Barrier Unit 2 Reactor Building Dresden Nuclear Power Station
- 8) Drawing F-104, Sheet 2; Section F-104 3 Hour Fire Barrier Unit 2 Reactor Building Dresden Nuclear Power Station
- 9) Drawing F-115, Sheet 1; Section F-115 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 10) Drawing F-115, Sheet 2; Section F-115 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 11) Determination of Combustible Loading; Calculation DRE97-0105, Revision 5.
- 12) Dresden Station Appendix R Exemption Requests and Analysis, Revision 8.
- 13) Drawing B-440, Sheet 1, Typical Details for Sealing Floor & Wall Openings Sheet 1.
- 14) Dresden Station Update Fire Hazards Analysis
- 15) ATI 285801-02, Can Not Find 86-10 Documentation for Fire Barrier Penetrations

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From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 04/12/94
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Attributes

Attribute Sub-category: DAR

<u>Attribute Name</u>	<u>Value</u>	<u>PassPort</u>	<u>Date</u>
CC-AA-102 ATT 1A	FORM	DRD08	12/28/04

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86-10 Evaluation for Fire Barrier Penetrations

Reason For Evaluation / Scope:

Generic Letter 86-10 requires that evaluations be performed for justification of openings in Appendix R (Safe Shutdown) fire barriers and that these 86-10 evaluations be retained for subsequent NRC audits. IR 285801 was written because, though per the plant design the following penetrations in Appendix R walls do not have fire barriers installed, the associated 86-10 evaluation could not be located during an audit performed by the Fire Protection System engineer. This EC-EVAL is being performed to provide documented justification for the listed penetrations not having fire barriers installed. It will be used to close out ATI 285801-02.

F-77-3 and 18 (Drawings F-77, Sheet 1 & 2) - These two are in the same wall penetration. Penetration 18 is small, approximately 1" by 2", hole with two small tubes routed through the steel plate acting as the fire barrier for penetration 3. These penetrations are on the east wall, 545'-6" elevation, of the Isocondenser "3" Valve Room. The drawings show the opening in the penetration fire barrier.

F-104-11 and 13 (Drawings F-104, Sheet 1 & 2) - These penetrations are on the north wall, east side, of the Unit 2 Isocondenser floor, 589' elevation. The design drawings state that an exemption request was submitted for these penetrations not having fire barriers installed. The fire barrier exemption requests for Dresden Station were later turned into 86-10 evaluations. The F-104-11 and 13 penetrations are a mirror image of the F-115 penetrations listed below.

F-115-1 and 2 (Drawings F-115, Sheet 1 & 2) - These penetrations are on the north wall west side, of the Unit 3 Isocondenser floor, 589' elevation. The design drawings state that an exemption request was submitted for these penetrations not having a fire barrier installed. The fire barrier exemption requests for Dresden Station were later turned into 86-10 evaluations. The F-115-1 and 2 penetrations are a mirror image of the F-104 penetrations listed above.

In addition there are HVAC ducts in the north wall on both units that go to the fuel pool, separator/dryer storage pits/pools and reactor wells on the refuel floor that do not contain fire dampers. The fuel pools, dryer/separator pits and reactor wells are part of the reactor building refuel floor fire zones 1.1.1.6 and 1.1.2.6. Though there is an existing 86-10 evaluation that justifies there not being a continuous fire barrier between the refuel floor and the Isocondenser floor in the reactor building these HVAC ducts going through the north wall are not mentioned by name in the evaluation. This EC-EVAL will be used to note that they are bounded by that original evaluation.

Detailed Evaluation:

Penetrations F-77-3 and 18

This section provides justification for lack of a three-hour fire barrier in penetrations F-77-3 and 18.

Finding

Penetration F-77-03/18, is located at 560'-6" in the east wall of the Unit 3 Isolation Condenser (isocondenser) "3" Valve Room. Penetration F-77-03 is a 20" diameter opening with the 14" diameter pipe. The fire barrier on the penetration is a welded steel plate, S&L Detail 2 (Ref. 13). Penetration 18 is a small (approximately 1" x 2") hole in the plate through which two small tubes are routed. There is no fire barrier installed for the small hole in the steel plate. This wall separates two different safe shut down paths. The valve room is fire zone 1.1.5.C, which is part of the Isocondenser Safe Shut Down path, Fire Area RB3-I. The 545'-6" elevation of the Unit 3 Reactor Building is fire zone 1.1.1.3, which is part of the LPCI/HPCI Safe Shut Down path, Fire Area RB3-II.

Fire Scenario

a. Fire Protection Considerations

1. There are no combustible materials routed through the penetration.
2. The horizontal penetration is located in a vertical wall.
3. Each zone is protected by an automatic smoke detector system. There is area wide smoke detection on the 545'-6" elevation of the Unit 3 Reactor Building, fire zone 1.1.1.3. There is no smoke detection in the Isocondenser "3" Valve Room however the ceiling of the room consists of open grading to the Isocondenser "2" Valve Room, which has a grated ceiling to the 589' elevation, the isocondenser floor, fire zone 1.1.1.5.A. Smoke in the isocondenser valve room would rise to isocondenser floor, 589' elevation and actuate the smoke detectors on the ceiling of that floor.
4. Transient fire loads are not stored in the Isocondenser "3" Valve Room during power operations due to the elevated radiological dose in the room.
5. The areas in question have low combustible loadings. Calculation DRE97-0105, Ref. 5, gives the combustible loading in the Isocondenser "3" Valve Room as insignificant, $<1000 \text{ Btu/ft}^2$, and on the Unit 3 Reactor Building 545'-6" elevation as $19,662 \text{ Btu/ft}^2$. These are considered low combustible loadings and result in a calculated fire duration of 0 minutes for the Isocondenser "3" Valve Room and 14.7 minutes for the Unit 3 Reactor Building 545'-6" elevation.

6. There is no combustible material within three feet of either side of the penetration.

b. Assumptions

A fire in the Isocondenser "3" Valve Room would not affect LPCI/HPCI Safe Shutdown Path as there is no credible way for a fire in the Isocondenser "3" Valve Room to spread to the Unit 3 Reactor Building 545'-6" elevation. There is negligible fixed combustible loading in the Isocondenser "3" Valve Room. It is a radiation area and as such there are no transient combustibles stored in the area. With no combustible material routed through penetration F-77-18, no combustible material within three feet of the penetration, and low combustible material loading a fire in the Isocondenser "3" Valve Room would not be sustained nor could it spread from the isocondenser valve room to the Unit 3 Reactor Building 545'-6" elevation.

If a fire were to occur in the Isocondenser "3" Valve Room smoke from the fire would spread to the isocondenser floor where it would set off the smoke detectors in the ceiling. This would allow the Fire Brigade to respond and put out the fire.

Likewise a fire on the Unit 3 Reactor Building 545'-6" elevation could not credibly spread to the isocondenser valve room. There is no combustible material routed through the penetration nor is there any combustible material within three feet of the penetration. The natural tendency of a fire is to spread up and outward. Reactor Instrumentation & Protection Rack 2203-5 is located below the penetration. Except for the short run of the flex conduit on the rack all of the cables are within conduit. In addition the rack is within a caged area to prevent accidental actuation of the instrumentation on the rack. This includes preventing the storage of transient combustibles in the area. There are cables trays in the overhead above the penetration but there is no credible way for a fire to spread down from the trays to the penetration as there are no intervening combustibles. Thus the limited amount of combustible material in the area of the penetration, physical size and configuration of the penetration would prevent a fire from spreading from the 545'-6" elevation to the Isocondenser "3" Valve Room.

There is the potential that smoke could spread from the Unit 3 Reactor Building 545'-6" elevation to the Isocondenser "3" Valve Room. However well before smoke from any fire would enter through the small opening in the penetration smoke detectors on the 545'-6" elevation would alarm and the on-site fire brigade would be able to extinguish the fire. In the unlikely event this were to not occur. Any smoke or gas that would pass through the penetration to the isocondenser valve room would be vented through the grated ceiling to the Isocondenser "2" Valve Room and isocondenser floor above. There it would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor.

This smoke would have minimal or no effect on the ability to safely shutdown the plant. The smoke would rise through the grating in the ceiling of the "2" valve room up to the ceiling of the isocondenser floor on the 589' elevation. The smoke would not affect the

ability of any components in the isocondenser valve rooms or on the isocondenser floor to operate.

The Safe Shutdown Path for a fire in fire zone 1.1.1.3, Unit 3 RB 545'-6" elevation is A-1. Safe Shutdown Path A-1 assumes that power is lost for the isocondenser isolation valves and that the valves are operated manually. The valves in both the Isocondenser "3" and "2" Valve Rooms would still be accessible for manual operation, either through the doors to the rooms or on the ladder from the isocondenser floor above. The "3" valve is located below the penetration. The smoke entering the room would rise straight up to isocondenser floor, 589' elevation. This will allow an operator to enter both the "2" and "3" valve rooms the room to operate the valves. Smoke on the isocondenser floor, 589' elevation, would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor. This would allow the operators access to the valves requiring manual operation on the isocondenser floor. If the smoke was too heavy, the valves could be operated as required by an operator wearing SCBA gear.

Penetrations F-104-11 / 13

Finding

This section provides justification for lack of a three-hour fire barrier in penetrations F-104-11 and 13. These penetrations are in the north wall, east end, of the Unit 2 isocondenser floor, elevation 589'. It separates the Isocondenser area, Fire Zone 1.1.2.5A, from the Unit 2 Fuel Pool Skimmer Surge Tank Room, which is in Fire Zone, 1.1.2.5.D. The safe shut down path C (LPCI/HPCI) is used for a fire on the isocondenser floor and safe shut down path B1 (Isocondenser) is used for a fire in fire zone 1.1.2.5.D. There is no safe shut down equipment, components or cables located in fire zone 1.1.2.5.D.

Fire Scenario - Assumption

Fire on the Isocondenser Floor Fire Zone 1.1.2.5.A

There is no continuity of combustibles through the penetrations in question and no combustible material within 3 feet of penetrations F-104-11 and 13. The lowest penetration, F-104-13, is 19'-6" above the floor. The combustible loading in the isocondenser fire zone, 1.1.2.5.A is <1000 BTU/ft². In addition the isocondenser floor area has a high ceiling and area wide smoke detection. Other than the potential for minor smoke the heat and products of combustion of a fire on the Unit 2 isocondenser floor would not spread through the penetrations in question and in the unlikely event that they did there is no safe shut down equipment, components or cables located in fire zone 1.1.2.5.D on the other side of the fire barrier.

Fire in Fire Zone 1.1.2.5.D

The Unit 2 Fuel Pool Skimmer Surge Tank Room is a locked high radiation area. The only way to enter the room is through the locked fire door from the isocondenser floor. There is a grating opening with shielding in the back wall of the room to the rest of fire zone 1.1.2.5.D. There are no unsealed electrical penetrations through this back wall. There is no continuity of combustibles through the penetrations in question nor is there any combustible material within three feet of the penetrations. The fire load in the zone is 1,520 Btu/ft². This is equivalent to a 1.14-minute fire. Based on the location of the penetrations, other than the potential for minor smoke, the heat and products of combustion from a fire in Fire Zone 1.1.2.5.D will not enter and adversely affect the equipment and components on the isocondenser floor. Nor would it prevent the manual operation of the valves on the isocondenser floor required for the safe shut down of the plant. Smoke on the isocondenser floor would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor. This would allow the operators access to the valves requiring manual operation on the isocondenser floor. If the smoke was too heavy, the valves could be operated as required by an operator wearing SCBA gear.

Penetrations F-115-1 / 2

This section provides justification for lack of a three-hour fire barrier in penetrations F-115-1 and 2.

Fire Scenario - Assumption

Fire on the Isocondenser Floor Fire Zone 1.1.1.5.A

There is no continuity of combustibles through the penetrations in question and no combustible material within three feet of penetrations F-115-1 and 2. The lowest penetration, F-115-2, is 19'-6" above the floor. The combustible loading in the isocondenser fire zone, 1.1.1.5.A is 3,236 BTU/ft². This is equivalent to a 2.4-minute fire. In addition the isocondenser floor has high ceiling (+20 ft) and area wide smoke detection. Other than the potential for minor smoke the heat and products of combustion from a fire on the Unit 3 isocondenser floor would not spread through the penetrations in question and in the unlikely event that they did there is no safe shut down equipment, components or cables located on the other side of the fire barrier in fire zone 1.1.1.5.D.

Fire in Fire Zone 1.1.1.5.D

The Unit 3 Fuel Pool Skimmer Surge Tank Room is a locked high radiation area. The only way to enter the room is through the locked fire door from the isocondenser floor. There is a grating opening with shielding in the back wall of the room to the rest of fire zone 1.1.1.5.D. There are no unsealed electrical penetrations through this back wall. There is no continuity of combustibles through the penetrations in question and no combustible material within three feet of the penetrations. The fire load in the zone is < 1,000 Btu/ft².

Based on the location of the penetrations, other than the potential for minor smoke, the heat and products of combustion a fire in Fire Zone 1.1.1.5.D will not enter and adversely effect the equipment and components on the isocondenser floor. Smoke on the isocondenser floor would collect on the high (+20 ft) ceiling, alarming the smoke detectors there prior to drifting through the open hatch to the Reactor Building refueling floor. This would allow the operators access to the valves requiring manual operation on the isocondenser floor. If the smoke was too heavy, the valves could be operated as required by an operator wearing SCBA gear.

HVAC Penetrations North Wall of Isocondenser Floors

This section provides justification for lack of three-hour fire barriers in the HVAC penetrations on the north wall of the Isocondenser floor in both Unit 2 and Unit 3 Reactor Buildings. In Revision 1 of the September 1985 Appendix R Exemption Requests there is justification for open mechanical penetrations and HVAC ducts without fire barriers or fire dampers installed in the ceiling/floor of the isocondenser floor, 589' elevation, and refuel floor, 613' elevation in both Unit 2 and 3. In Revision 8 of the exemption request dated April 1992, the station withdrew those exemption requests said that they considered them to be 86-10 evaluations. These exemption requests/86-10 evaluations do not mention the Fuel Pool, Separator/Dryer Pit, and Reactor Well HVAC ducts in the north wall of the isocondenser floor Fire Zones, 1.1.1.5.A and 1.1.2.5.A by name, however they are similar to the HVAC ducts discussed in the evaluation in that they are routed from the refuel floor Fire Zones 1.1.1.6 and 1.1.2.6 to the isocondenser floor. Therefore it is Dresden Station's position that the lack of fire barriers or fire dampers in these HVAC ducts is bounded by the original evaluation discussed above. Though the combustible loading in Fire Zone 1.1.5.A has increased to 3,236 Btu/ft² from the <1000 Btu/ft² used in original 86-10 evaluation this has not adversely affected the results of the original evaluation which determined that "the heat and products of combustion from a fire below the refuel floor would not spread to the refuel floor and impact both units". 3,236 Btu/ft² is equivalent to a 2.4-minute fire.

Conclusions / Findings:

The boundaries noted above, separating the fire zones associated with the alternative shut-down paths, i.e. isolation condenser paths and HPCI/LPCI paths are not complete 3-hour rated fire barriers by definition because the penetrations noted above are unsealed mechanical penetrations. However the above analysis indicates that separation of Fire Areas RB2-I and RB2-II on Unit 2 and RB3-I and RB3-II on Unit 3 meet the intent of Generic Letter 83-33, 86-10 and Appendix R Section III-L which require that alternate shutdown paths be separated from each other so that a single fire cannot disable alternative shutdown paths. Therefore the unsealed mechanical penetrations noted above are acceptable as is.

References:

- 1) IR 285801; Can Not Find 86-10 Documentation for Fire Barrier Penetrations
- 2) Drawing F-4-1; Detection and Suppression Reactor Bldg EL 545'-6" Dresden Station Unit 2&3
- 3) Drawing F-6-1; Detection and Suppression Reactor Bldg EL 589'-0" Dresden Station Unit 2&3
- 4) Drawing F-7-1; Detection and Suppression Reactor Bldg EL 613'-0" Dresden Station Unit 2&3
- 5) Drawing F-77, Sheet 1; Section F-77 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 6) Drawing F-77, Sheet 2; Section F-77 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 7) Drawing F-104, Sheet 1; Section F-104 3 Hour Fire Barrier Unit 2 Reactor Building Dresden Nuclear Power Station
- 8) Drawing F-104, Sheet 2; Section F-104 3 Hour Fire Barrier Unit 2 Reactor Building Dresden Nuclear Power Station
- 9) Drawing F-115, Sheet 1; Section F-115 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 10) Drawing F-115, Sheet 2; Section F-115 3 Hour Fire Barrier Unit 3 Reactor Building Dresden Nuclear Power Station
- 11) Determination of Combustible Loading; Calculation DRE97-0105, Revision 5.
- 12) Dresden Station Appendix R Exemption Requests and Analysis, Revision 8.
- 13) Drawing B-440, Sheet 1, Typical Details for Sealing Floor & Wall Openings Sheet 1.
- 14) Dresden Station Update Fire Hazards Analysis
- 15) ATI 285801-02, Can Not Find 86-10 Documentation for Fire Barrier Penetrations

Tab C

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EC Number : 0000355027 000
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EC Title: UNIT 2 HPCI STEAM TUNNEL AND ASSOCIATED PENETRATIONS 86-10
EVALUATION

Mod Nbr : KW1: 86-10 KW2: FIRE KW3: PENE KW4: KW5:

Master EC : N	Resp Engr : DRD08	Temporary : N
Outage : N	Work Group :	Aprd Req'd Date:
WO Required :	Alert Group: A8330BOCAP	Exp Insvc Date:
Adv Wk Appvd:	Image Addr :	Expires On : 01/13/08
Auto-Advance: Y	Alt Ref. :	Auto-Asbuild : N
Caveat Outst:	Priority :	Discipline :
Department :		
Location :		

Milestone	Date	PassPort	Name		Req By
110-PREPARE EC	04/19/05	DRD08	BEMBNISTER	PAUL	APPROVED
120-REVIEW EC	04/19/05	DRDUW	KNOX	DAVID	APPROVED
210-DEPT RVW-EP	04/19/05	QDCEB	BUCKNELL	DOUGLAS	APPROVED
300-APPROVE EC	04/19/05	DREUL	LOCH	TIMOTHY	APPROVED
900-ARCHIVE EC	04/22/05	ELGBC	COOLEY	BERLINDA	CLOSED

Units

02 UNIT TWO

Systems

41 FIRE PROTECTION

Reference Documents List

Facility	Type	SubType	Document	Sheet
DRE	DWGC		F-450	
Title: FIRE BARRIER REFERENCES GROUND FLOOR PLAN				
DRE	DWGC		F-449	
Title: FIRE BARRIER REFERENCES BASEMENT FLOOR PLANS UNITS 2 & 3				
DRE	DWGC		F-2-1	
Title: DETECTION AND SUPPRESSION REACTOR BLDG. EL. 476'-6" UNIT 2 & 3				
DRE	DWGC		F-3-1	
Title: DETECTION AND SUPPRESSION REACTOR BLDG. EL. 517'-6" UNIT 2 & 3				
DRE	DWGC		B-626	
Title: HPCI PUMP BLDG. PLANS, EL. 526'-6" & 504'-6" UNIT 2 & 3				
DRE	DWGC		B-629	
Title: HPCI PUMP BLDG. SECTIONS & DETAILS UNIT 2 & 3				

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Reference Documents List

<u>Facility</u>	<u>Type</u>	<u>SubType</u>	<u>Document</u>	<u>Sheet</u>
DRE	DWGC		B-245	
Title: REACTOR BLDG. FRAMING SECTIONS & DETAILS, SHEET 7 UNIT 2				
DRE	DWGC		B-211	
Title: REACTOR BLDG. FRAMING MISCELLANEOUS PLANS UNIT 2				

Cross References

<u>Ref.</u>	<u>Type</u>	<u>Number</u>	<u>Sub-Number</u>	<u>Description</u>
AR		00295067		NRC IDENTIFIES DEFICIENCIES IN U2 HPCI ROOM.
AR		00325819		U2 HPCI STEAM TUNNEL HAS NOT BEEN EVALUATED FO

Engineering Change Comments

Comments

Last Updated By: DRD08

Last Updated Date: 04/19/05

Engineering Change

EC Number : 0000355027 000
cility : DRE
Type/Sub-type: EVAL PROG

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Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : QDCEB
Last Updated Date: 04/19/05
Text Status : UNLOCKED

EC EVAL 355027, Rev. 0

UNIT 2 HPCI STEAM TUNNEL AND ASSOCIATED PENETRATIONS 86-10 EVALUATION
REASON FOR EVALUATION/SCOPE:

On 01/27/05 an NRC inspection noted that there did not appear to be a seal around the HPCI steam return line where it penetrates the ceiling of the U2 HPCI Room to the U2 HPCI steam tunnel. He thought that there should be either a flooding barrier, a fire barrier or both at the penetration as all of the other penetrations in through the ceiling appear to have some sort of seal/barrier.

In addition while preparing this evaluation to document the station's response to the inspector's question it was noted that the Unit 2 HPCI Steam Pipe Tunnel is not shown on station fire protection program drawings nor was it addressed in the Fire Protection Reports for the Appendix R Program and Fire Hazard analysis. There are no fire barriers installed in the tunnel between 2/3 Diesel Generator Room and Unit 2 HPCI Room which are in Fire Zone RB 2/3 and the Unit 2 Torus Area which is part of Fire Zone RB 2.

This evaluation is being performed to document the station's response to the inspector's question as to if the U2 HPCI room ceiling to the HPCI Steam Pipe Tunnel is a fire or flood barrier and an 86-10 evaluation on the acceptability of the HPCI Steam Pipe Tunnel not having any fire barriers.

DETAILED EVALUATION:

UNIT 2 HPCI CEILING AS A BARRIER

The Unit 2 HPCI Steam Pipe Tunnel is not discussed in the Appendix R Program or Dresden Fire Hazard Analysis Report. The tunnel is 10 feet high, 7 feet wide, 56'-3" long and runs from column 42 to 9 feet west of column 44 at the 503'-6' elevation under the Unit 2 Reactor Building (RB) Material Access Interlock trackway and 2/3 Diesel Generator Room/ Unit 2 Reactor Building interlock. At all U2 HPCI Steam Tunnel interfaces with the Unit 2 and Unit 3 Reactor Buildings and 2/3 Diesel Generator Room the tunnel has three foot thick concrete walls and a four foot thick ceiling. The walls are 18 inches thick where they interface with the ground. There is an unrated door in the west wall of the tunnel to provide access from the 2/3 Diesel Generator Room. The tunnel contains piping only except for a lighting cable enclosed in conduit. There are no cables in the tunnel. There are no Safe Shutdown actions performed in the tunnel. The Unit 2 HPCI steam return pipe is routed through an unsealed penetration in the tunnel floor/U2 HPCI Room ceiling. The tunnel is part of secondary containment as is the U2 HPCI Room and U2 Torus Area.

Based on the structural configuration of the plant the HPCI Steam Pipe Tunnel is considered part of the U2 HPCI Room Fire Zone 11.2.3 for Appendix R safe shut down purposes. This is because it is separated from the 2/3 Diesel Generator Room, by thick concrete walls and ceiling and an unrated (for fire barrier purposes) secondary containment door. It is not considered part of the Torus Area because it is not located in the Reactor

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Building.

The tunnel and U2 HPCI Room are part of the same fire zone and have the same safe shut down path if a fire were to occur in either one of them so there is no requirement for a fire barrier in the penetrations. Both areas are part of secondary containment so there is no requirement for a containment barrier to be installed in the penetration. In addition the HPCI ceiling is not identified on any drawings or design documents as a flood barrier. Therefore a flood barrier is not required for the penetration.

If the tunnel were considered part of the U2/3 Diesel Generator Room the penetration still would not have to be sealed. The 2/3 DG Room is fire zone 9.0.C. The U2 HPCI Room is fire zone 11.2.3. The safe shut down path for 2/3 DG Room is either E or F. The safe shut down path for the U2 HPCI Room is E. The HPCI room ceilings and 2/3 Diesel Generator Room floor are not designed, identified or constructed as a flood barrier. The tunnel and HPCI room are both part of secondary containment so a containment barrier is not required on the penetration.

NO FIRE BARRIERS BETWEEN THE U2 TORUS AREA & HPCI STEAM TUNNEL

Fire Area RB2-II is separated from Fire Area RB-2/3 which is comprised of Fire Zones 9.0.C (2/3 Diesel Generator Room), 11.1.3 (Unit 3 HPCI Room) and 11.2.3 (Unit 2 HPCI Room) by a three hour fire barrier except for an HVAC opening with no fire damper which connects Fire Zone 11.2.1 in RB-II and Fire Zone 11.2.3 in RB-2/3 and the U2 HPCI Steam Tunnel. An 86-10 evaluation was performed for the HVAC duct not having a damper and it was found to be acceptable (See Section 3.3 in Fire Protection Reports Volume 4, Interim Measures/Exemption Requests, Tab III-3). RB2-II and RB-2/3 fire areas both have alternate safe shut down paths which employ the Isolation Condenser. Fire Area RB2-II utilizes the 2/3 diesel generator power train (Division I) while Fire Area RB-2/3 utilizes the Unit 2 dedicated diesel generator (Division II) to shut down Unit 2. A fire would have to affect both the 2/3 Diesel Generator (Division I) and the Unit 2 Diesel Generator (Division II) power trains before it would disable both alternate paths.

The south wall of the Unit 2 Reactor Building in the Torus Area is not identified on any drawing as a fire barrier. Except for the penetration through which the piping is routed the interface between the HPCI Tunnel and Torus area this wall is a three foot thick concrete wall which will act as a three hour fire barrier. It is identical to the three hour fire barrier wall installed between the U2 HPCI steam tunnel and U3 Reactor Building. The interface between the HPCI Tunnel and 2/3 Diesel Generator Room is three foot thick concrete walls and a four foot thick concrete ceiling. The walls and ceiling will act as a three hour fire barrier. There are two penetrations between the HPCI Tunnel and 2/3 Diesel Generator Room. One is the heavy duty unrated access door to the tunnel and the other is the penetration for the heating steam supply to the N2 inerting vaporizer. Both are sealed for Secondary Containment but not as a fire barrier. The HPCI steam return pipe penetration through the tunnel floor to the Unit 2 HPCI Room is not sealed. The other penetrations to the U2 HPCI Room are sealed with unknown material. The only cable in the tunnel is a lighting cable enclosed in conduit.

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There is no combustible material routed through any of the penetrations, the combustible loading in the HPCI Steam Tunnel is negligible and there is over 45ft between the open penetrations on the east side of the tunnel to the torus area and the penetrations to U2 HPCI Room and 2/3 Diesel Generator Room on the west side of the tunnel. There is no fire suppression or detection installed in the tunnel.

As noted above the concern is that a fire in one Fire Areas would spread to the other such that both the Unit 2/3 and Unit 2 Diesel Generators would be affected. This scenario is very unlikely. There are no combustibles in the area of the penetrations to the Unit 2 HPCI Steam Tunnel in either the U2 HPCI Room or the U2/3 Diesel Generator Room. Both the U2/3 Diesel Generator Room (Fire Zone 9.0.C) and Unit 2 HPCI Room (Fire Zone 11.2.3) have fire detection and suppression. If a fire were to start in either of those rooms it would be detected and suppressed prior to spreading to the HPCI Steam Tunnel. In the unlikely event that the fire was not detected and suppressed there is no combustible material present that could spread the fire the +45 feet through the tunnel to the Unit 2 Torus Area, Fire Zone, 1.1.2.1.

There is the additional scenario in that there is the possibility of an undetected diesel fuel leak in the 2/3 Diesel Generator Room where the fuel would flood the floor and leak into the U2 HPCI Steam Tunnel. From there it would travel through the tunnel into the Unit 2 torus Area prior to igniting. The above scenario is not credible. The U2/3 Diesel Generator Room floor is sloped to the room floor drain and the door to the HPCI Steam Tunnel has a high sill. If the fuel was to still pass through the door there are two floor drains in the tunnel between the 2/3 Diesel Generator Room door and the penetration to the Unit 2 Torus Area. The bottom of the penetration is located 26" above the tunnel floor. That will prevent any liquid from running to the torus area from the tunnel. The fire loading in the Unit 2 Torus Area, Fire Zone 1.1.2.1 is very low at 291 BTU/Sq ft and the cable trays that contain most of the combustible load, have linear thermal detectors installed in and below them. Additionally no combustible material is present in the proximity of the penetration to the HPCI Steam Tunnel. Smoke from a fire in the torus area would rise through the openings in the floor to the 517'-6" elevation where it would set off the detectors located on the ceiling. In the unlikely event that a fire in the torus area was not detected there is no combustible material that would spread the fire to and through the +45 ft of the U2 HPCI Steam Tunnel to either the Unit 2 HPCI or 2/3 Diesel Generator Rooms.

CONCLUSION/FINDINGS:

The spreading of a fire through the Unit 2 HPCI Steam Tunnel is very unlikely due to the detectors and/or fire suppression on either side of the tunnel, the lack of combustible loading in the tunnel, length of the tunnel and lack of combustible loading in the area of the tunnel penetrations. For these reasons the spreading of a fire from one fire area through the Unit 2 HPCI Steam Tunnel is not credible and the installation of a three hour fire barrier in the tunnel or at the penetrations to the tunnel is not warranted.

ATI 325819-03 has been issued to the Fire Protection Programs Engineer to

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revise and update the Fire Protection Programs documentation to describe the applicability of the Fire Protection Program to the Unit 2 HPCI Steam Tunnel. The associated drawing revisions to show the Unit 2 HPCI Steam Tunnel will be tracked by the same ATI.

REFERENCES:

- 1) Updated Fire Hazards Analysis
- 2) Appendix R Conformance (Sections III.G, III.J, and III.L) Safe Shutdown Report
- 3) Fire Protection Reports Volume 4; Interim Measures/Exemption Requests
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- 5) F-449, Rev. A; Fire Barrier References Basement Floor Plan
- 6) F-2-1, Rev. H; Detection And Suppression Reactor Building El. 476'-6"
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- 8) B-211, Rev. P; Reactor Building Framing Miscellaneous Plans
- 9) B-626, Rev. V; H.P.C.I. Pump Building Plans EL. 526'-6" & 504'-6"
- 10) B-629, Rev. F; H.C.P.I. Pump Building Sections & Details
- 11) B-245, Rev. H; Reactor Building Framing Section & Details Sheet 7.

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EC Number : 0000355027 000
Facility : DRE
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Print Date: 04/22/05

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Topic : MAINT NOTES
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 04/12/94
Text Status : UNLOCKED

VCODE: N322

Engineering Change

EC Number : 0000355027 000
Facility : DRE
Type/Sub-type: EVAL PROG

Print Date: 04/22/05

Page: 6

Topic : XFR/EDS
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 11/04/98
Text Status : UNLOCKED

SEE DCR 980283 NOTES FOR EQ RULES & SIGNATURES

Engineering Change

EC Number : 0000355027 000
Facility : DRE
pe/Sub-type: EVAL PROG

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Attributes

Attribute Sub-category: DAR

<u>Attribute Name</u>	<u>Value</u>	<u>PassPort</u>	<u>Date</u>
CC-AA-102 ATT 1A	FORM	DRD08	04/19/05
CC-AA-102 ATT 2	FORM	DRD08	04/19/05

EC EVAL 355027, Rev. 0
UNIT 2 HPCI STEAM TUNNEL AND ASSOCIATED
PENETRATIONS 86-10 EVALUATION

REASON FOR EVALUATION/SCOPE:

On 01/27/05 an NRC inspection noted that there did not appear to be a seal around the HPCI steam return line where it penetrates the ceiling of the U2 HPCI Room to the U2 HPCI steam tunnel. He thought that there should be either a flooding barrier, a fire barrier or both at the penetration as all of the other penetrations in through the ceiling appear to have some sort of seal/barrier.

In addition while preparing this evaluation to document the station's response to the inspector's question it was noted that the Unit 2 HPCI Steam Pipe Tunnel is not shown on station fire protection program drawings nor was it addressed in the Fire Protection Reports for the Appendix R Program and Fire Hazard analysis. There are no fire barriers installed in the tunnel between 2/3 Diesel Generator Room and Unit 2 HPCI Room which are in Fire Zone RB 2/3 and the Unit 2 Torus Area which is part of Fire Zone RB 2.

This evaluation is being performed to document the station's response to the inspector's question as to if the U2 HPCI room ceiling to the HPCI Steam Pipe Tunnel is a fire or flood barrier and an 86-10 evaluation on the acceptability of the HPCI Steam Pipe Tunnel not having any fire barriers.

DETAILED EVALUATION:

UNIT 2 HPCI CEILING AS A BARRIER

The Unit 2 HPCI Steam Pipe Tunnel is not discussed in the Appendix R Program or Dresden Fire Hazard Analysis Report. The tunnel is 10 feet high, 7 feet wide, 56'-3" long and runs from column 42 to 9 feet west of column 44 at the 503'-6" elevation under the Unit 2 Reactor Building (RB) Material Access Interlock trackway and 2/3 Diesel Generator Room/ Unit 2 Reactor Building interlock. At all U2 HPCI Steam Tunnel interfaces with the Unit 2 and Unit 3 Reactor Buildings and 2/3 Diesel Generator Room the tunnel has three foot thick concrete walls and a four foot thick ceiling. The walls are 18 inches thick where they interface with the ground. There is an unrated door in the west wall of the tunnel to provide access from the 2/3 Diesel Generator Room. The tunnel contains piping only except for a lighting cable enclosed in conduit. There are no cables in the tunnel. There are no Safe Shutdown actions performed in the tunnel. The Unit 2 HPCI steam return pipe is routed through an unsealed penetration in the tunnel floor/U2 HPCI Room ceiling. The tunnel is part of secondary containment as is the U2 HPCI Room and U2 Torus Area.

Based on the structural configuration of the plant the HPCI Steam Pipe Tunnel is considered part of the U2 HPCI Room Fire Zone 11.2.3 for Appendix R safe shut down

purposes. This is because it is separated from the 2/3 Diesel Generator Room, by thick concrete walls and ceiling and an unrated (for fire barrier purposes) secondary containment door. It is not considered part of the Torus Area because it is not located in the Reactor Building.

The tunnel and U2 HPCI Room are part of the same fire zone and have the same safe shut down path if a fire were to occur in either one of them so there is no requirement for a fire barrier in the penetrations. Both areas are part of secondary containment so there is no requirement for a containment barrier to be installed in the penetration. In addition the HPCI ceiling is not identified on any drawings or design documents as a flood barrier. Therefore a flood barrier is not required for the penetration.

If the tunnel were considered part of the U2/3 Diesel Generator Room the penetration still would not have to be sealed. The 2/3 DG Room is fire zone 9.0.C. The U2 HPCI Room is fire zone 11.2.3. The safe shut down path for 2/3 DG Room is either E or F. The safe shut down path for the U2 HPCI Room is E. The HPCI room ceilings and 2/3 Diesel Generator Room floor are not designed, identified or constructed as a flood barrier. The tunnel and HPCI room are both part of secondary containment so a containment barrier is not required on the penetration.

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pipe penetration through the tunnel floor to the Unit 2 HPCI Room is not sealed. The other penetrations to the U2 HPCI Room are sealed with unknown material. The only cable in the tunnel is a lighting cable enclosed in conduit.

There is no combustible material routed through any of the penetrations, the combustible loading in the HPCI Steam Tunnel is negligible and there is over 45ft between the open penetrations on the east side of the tunnel to the torus area and the penetrations to U2 HPCI Room and 2/3 Diesel Generator Room on the west side of the tunnel. There is no fire suppression or detection installed in the tunnel.

As noted above the concern is that a fire in one Fire Area would spread to the other such that both the Unit 2/3 and Unit 2 Diesel Generators would be affected. This scenario is very unlikely. There are no combustibles in the area of the penetrations to the Unit 2 HPCI Steam Tunnel in either the U2 HPCI Room or the U2/3 Diesel Generator Room. Both the U2/3 Diesel Generator Room (Fire Zone 9.0.C) and Unit 2 HPCI Room (Fire Zone 11.2.3) have fire detection and suppression. If a fire were to start in either of those rooms it would be detected and suppressed prior to spreading to the HPCI Steam Tunnel. In the unlikely event that the fire was not detected and suppressed there is no combustible material present that could spread the fire the +45 feet through the tunnel to the Unit 2 Torus Area, Fire Zone, 1.1.2.1.

There is the additional scenario in that there is the possibility of an undetected diesel fuel leak in the 2/3 Diesel Generator Room where the fuel would flood the floor and leak into the U2 HPCI Steam Tunnel. From there it would travel through the tunnel into the Unit 2 torus Area prior to igniting. The above scenario is not credible. The U2/3 Diesel Generator Room floor is sloped to the room floor drain and the door to the HPCI Steam Tunnel has a high sill. If the fuel was to still pass through the door there are two floor drains in the tunnel between the 2/3 Diesel Generator Room door and the penetration to the Unit 2 Torus Area. The bottom of the penetration is located 26" above the tunnel floor. That will prevent any liquid from running to the torus area from the tunnel.

The fire loading in the Unit 2 Torus Area, Fire Zone 1.1.2.1 is very low at 291 BTU/Sq ft and the cable trays that contain most of the combustible load, have linear thermal detectors installed in and below them. Additionally no combustible material is present in the proximity of the penetration to the HPCI Steam Tunnel. Smoke from a fire in the torus area would rise through the openings in the floor to the 517'-6" elevation where it would set off the detectors located on the ceiling. In the unlikely event that a fire in the torus area was not detected there is no combustible material that would spread the fire to and through the +45 ft of the U2 HPCI Steam Tunnel to either the Unit 2 HPCI or 2/3 Diesel Generator Rooms.

CONCLUSION/FINDINGS:

The spreading of a fire through the Unit 2 HPCI Steam Tunnel is very unlikely due to the detectors and/or fire suppression on either side of the tunnel, the lack of combustible loading in the tunnel, length of the tunnel and lack of combustible loading in the area of

the tunnel penetrations. For these reasons the spreading of a fire from one fire area through the Unit 2 HPCI Steam Tunnel is not credible and the installation of a three hour fire barrier in the tunnel or at the penetrations to the tunnel is not warranted.

ATI 325819-03 has been issued to the Fire Protection Programs Engineer to revise and update the Fire Protection Programs documentation to describe the applicability of the Fire Protection Program to the Unit 2 HPCI Steam Tunnel. The associated drawing revisions to show the Unit 2 HPCI Steam Tunnel will be tracked by the same ATI.

REFERENCES:

- 1) Updated Fire Hazards Analysis
- 2) Appendix R Conformance (Sections III.G, III.J, and III.L) Safe Shutdown Report
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- 9) B-626, Rev. V; H.P.C.I. Pump Building Plans EL. 526'-6" & 504'-6"
- 10) B-629, Rev. F; H.C.P.I. Pump Building Sections & Details
- 11) B-245, Rev. H; Reactor Building Framing Section & Details Sheet 7.

Tab D

Engineering Change

Print Date: 06/23/05

EC Number : 0000355925 000
Status/Date : CLOSED 06/23/05
Facility : DRE
Type/Sub-type: EVAL MECH



Page: 1

EC Title: EVALUATION OF TURBINE BUILDING WALL PENETRATION
FOR U3 ISOPHASE BUS DUCT AND RETURN AIR DUCT

Mod Nbr : KW1: FIRE KW2: PENE KW3: PROT KW4: 86-10 KW5:

Master EC : N	Resp Engr : LASLP	Temporary : N
Outage : N	Work Group :	Aprd Reqd Date: 06/27/05
WO Required :	Alert Group: A8352NESDM	Exp Insvc Date:
Adv Wk Appvd:	Image Addr :	Expires On : 03/17/08
Auto-Advance: Y	Alt Ref. :	Auto-Asbuild : N
Caveat Outst:	Priority :	Discipline :
Department :		
Location :		

<u>Milestone</u>	<u>Date</u>	<u>PassPort</u>	<u>Name</u>		<u>Req By</u>
110-PREPARE EC	06/20/05	LASLP	KLUGE	MARK	APPROVED
120-REVIEW EC	06/21/05	DRD08	BEMBNISTER	PAUL	APPROVED
300-APPROVE EC	06/22/05	LASQM	MARTINOVICH	MICHAEL	APPROVED
210-DEPT RVW-01	06/21/05	QDCEB	BUCKNELL	DOUGLAS	APPROVED
Qualified Fire Protection Engineer review by Doug Bucknell, Quad Cities					
900-ARCHIVE EC	06/23/05	ELGBC	COOLEY	BERLINDA	CLOSED

Units

03 UNIT THREE

Systems

41 FIRE PROTECTION

Cross References

<u>Ref.</u>	<u>Sub-</u>	
<u>Type</u>	<u>Number</u>	<u>Description</u>
EC	0000330982	ISOL PHASE BUS DUCT COOLING - POWER UPRATE
AR	00324996	NO DOCUMENTATION FOR PENETRATION BEING A 3 HR

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EC Number : 0000355925 000
Facility : DRE
Type/Sub-type: EVAL MECH

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Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : LASLP
Last Updated Date: 06/22/05
Text Status : UNLOCKED

1. Reason For Evaluation:

The Unit 3 Isophase Bus Duct Return Air Duct has a penetration on the Unit 3 North Turbine Building wall above elevation 542'-5" near column line 54. The existing wall is a three hour fire barrier. This penetration configuration consists of the 48-inch round aluminum duct fastened to an ASTM A-36 wall plate by a 2" aluminum angle flange and Nelson studs. This configuration has not been qualified as a 3-hour rated fire barrier, though it is erroneously stated to be a 3-hour barrier in EC 330982. This evaluation is to determine the acceptability of the installed configuration. Reference IR No. 324996.

1.1 Scope

The scope of this evaluation is to establish the acceptability of the Turbine Building wall penetration installation for the Unit 3 Isophase Bus Duct Return Air Duct. (This penetration is not shown on Revision G of F-197-1.) During this evaluation it was determined that the Isophase Bus Duct penetration, F-197-15, which contains three ducts is also not a qualified three hour fire barrier. No evaluation could be found that addressed the penetration so this evaluation will cover that penetration as well.

1.2 Licensing and Design Basis

Documents related to the licensing and design basis for the Turbine Building wall include:

Dresden Fire Protection Report

10CFR50 Appendix R

BTP 9.5-1, Appendix A

Letter from Commonwealth Edison to USNRC, Dresden Station Units 2 and 3 Fire Protection Modifications, dated January 25, 1978

Safety Evaluation Report, Dresden Units 2 and 3 Fire Protection, dated March 22, 1978

Generic Letter 86-10

1.3 Definitions

None

2. Detailed Evaluation:

2.1 Description

The three isophase bus ducts, one for each phase, pass through the Turbine Building wall at elevation 540' near the return duct penetration installed under EC 330982. Although the Turbine Building wall (1-foot reinforced concrete) is a 3-hour fire rated barrier, the Isophase Bus Duct penetrations are not qualified penetrations in the sense that no test report data is available for their configuration. These penetrations are noted as having an "acceptable seal" on F-197, sheet 2 (penetration no. 15).

The Turbine Building barrier configuration in the vicinity of the Reserve

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Auxiliary Transformers was a subject evaluated during the 1977-78 Appendix A compliance effort. The NRC staff was concerned about the bus duct penetrations nearest to the transformer, i.e., the 4kV cable duct to the 4kV safety related switchgear 33 and 34 inside the building. By letter dated January 25, 1978, Commonwealth Edison committed to provide a sprinkler head to cover the cable bus duct penetration through the Turbine Building wall for the west bus leaving Transformer 32. This bus duct penetration had the potential to expose safety related cables routed to the 4kV switchgear inside the Turbine Building. This commitment was accepted by the NRC in the Safety Evaluation dated March 1978. The actual installed configuration provides sprinkler protection for each of the two cable buses from Transformer 31 and each of the two cable buses from Transformer 32, as verified by field walkdown.

It should be noted that no commitments were made concerning the isophase bus duct penetrations, which are located at a higher elevation and which do not directly expose the switchgear. When the new return duct penetration was designed, the intent was to make the new return air duct penetration configuration an equivalent level of protection to the existing bus duct penetrations. The isophase bus duct penetration is described on F-197, Sheet 2, as a flange bolted to a frame. A similar configuration was used for the return duct penetration, as shown on drawing M-2873 Sheet 4. Therefore the design intent was met for the penetration installed under EC 330982.

The return air penetration consists of 3/4" thick steel plate bolted to the wall with a 48" diameter, 0.19 inch thick aluminum duct routed through. The isophase penetration consists of a similar steel plate bolted to the wall with three 36" diameter aluminum ducts. The steel plate configuration is qualified as a three hour barrier as it is bounded by S&L Detail 2 on Drawing B-440, Sheet 1 and Professional Loss Control letter dated 04-21-87, Evaluation of Penetration Seal Systems at the Dresden and Quad Nuclear Power Plants. However, this configuration has never been qualified with aluminum ducts.

2.2 Assumptions

None

2.3 Safe Shutdown Capability

This type of penetration seal is acceptable in the Turbine Building North outside wall because if the penetration were to fail in a fire it would not adversely affect the ability to shut down the reactor for either unit at Dresden Station.

First the wall does not separate the redundant safe shut down paths at Dresden Station. The outside portion of the wall contains the Unit 3 Main Power Transformers, Auxiliary Transformers 31 and 32, and associated cables. None of these components are required for safe shutdown of the plant. If a fire were to occur inside of the Turbine Building in that area, Fire Zone 8.2.5.E or 8.2.6.E, safe shutdown paths A1 would be used to safely shut down Unit 3 if required. Thus if a fire started on either side of the penetration and went through the turbine building wall in question the unit could still be safely shut down. There are no

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components on the inside of the Unit 3 Turbine Building in that area that are required for the safe shutdown of Unit 2.

In addition in the unlikely event that a fire burned through the aluminum duct on either side of the penetration the fire would not spread through the duct to the other side of the wall. There is no combustible material inside of the duct which would allow the fire to spread to the other side of the wall. The ducts are self-contained on both sides of the penetration. The fire would have to burn through the aluminum duct wall on both sides of the penetration in order to prorogate through the wall via the isophase ducts. With no combustibles in the duct this is very unlikely to happen. Smoke would be expected to enter the duct in the event of burn through. However as the duct work is totally enclosed on both sides of the penetration, the amount of smoke entering the turbine building would be limited to that escaping through the duct work seals. In addition the smoke would not have any adverse effect on any equipment in the turbine building required to safely shut down the units.

2.4 Fire Protection Equipment

There is no fire protection equipment that directly protects the isophase return duct penetration. There are smoke detectors in the Turbine Building in the area of the penetrations.

2.5 Fire Hazards Analysis

The wall containing the isophase bus ducts is rated as a three hour fire barrier. The closest fire hazard to the isophase duct penetrations is one of the cable buses from Transformer 31. As noted above under Description, this cable bus has a sprinkler located at the penetration to the Turbine Building. The most significant hazard in the area is Transformer 31 itself, which has heat detectors and a deluge system to provide protection against a postulated fire. The Turbine Building mezzanine contains switchgear 33 and 34 and associated cables near the return duct penetration. There is smoke detector coverage in the area of the switchgear.

2.6 Attachments

None

3. Conclusions / Findings:

The isophase return air duct penetration installed under EC 330982 and penetration F-197-15 for the existing isophase bus ducts are unqualified penetration barriers installed in a three hour rated fire wall. This configuration however is acceptable from a Generic Letter 86-10 evaluation view point because it does not adversely affect the ability to safely shut down either unit at Dresden Station. The fire barrier does not separate redundant safe shutdown paths as there is no equipment or components on the turbine building exterior required for the safe shutdown of the units.

In addition if a fire were to burn through the isophase aluminum duct on either side of the penetrations it would not spread through the self-contained duct to the other side of the wall. Therefore, the penetrations as designed and built are acceptable as is and do not have an impact on post-fire safe shutdown.

4. References:

Engineering Change

EC Number : 0000355925 000
Facility : DRE
Type/Sub-type: EVAL MECH

Print Date: 06/23/05

Page: 4

- 1) Drawing F-197, Sheet 1 (Rev. G)
- 2) Drawing F-197, Sheet 2 (Rev. F)
- 3) Drawing M-2873, Sheet 4 (Rev. A)
- 4) EC 330982, Rev. 3; Isol Phase Bus Duct Cooling - Power Uprate
- 5) Letter from ComEd to USNRC, Dresden Station Units 2 and 3 Fire Protection Modifications, dated January 25, 1978.
- 6) NRC Fire Protection Safety Evaluation Report, March 1978
- 7) Drawing B-440, Sheet 1 (Rev. A)
- 8) Drawing B-440, Sheet 2 (Rev. A)
- 9) Professional Loss Control (PLC) Letter dated 04-21-1987, Evaluation of Penetration Seal Systems at the Dresden And Quad Cities Nuclear Power Plants
- 10) AR 00324996-02

Engineering Change

Print Date: 06/23/05

EC Number : 0000355925 000
Facility : DRE
Type/Sub-type: EVAL MECH

Page: 5

Topic : MAINT NOTES
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 04/12/94
Text Status : UNLOCKED

VCODE: W120

Engineering Change

EC Number : 0000355925 000
Facility : DRE
Type/Sub-type: EVAL MECH

Print Date: 06/23/05

Page: 1

Attributes

Attribute Sub-category: DAR

<u>Attribute Name</u>	<u>Value</u>	<u>PassPort</u>	<u>Date</u>
CC-AA-102 ATT 1A	FORM	LASLP	06/13/05
CC-AA-102 ATT 2	FORM	LASLP	06/13/05

EC EVAL 355925, Rev. 0
Evaluation of Turbine Building Wall Penetration
For U3 Isophase Bus Duct and Return Air Duct

1. Reason For Evaluation:

The Unit 3 Isophase Bus Duct Return Air Duct has a penetration on the Unit 3 North Turbine Building wall above elevation 542'-5 1/2" near column line 54. The existing wall is a three hour fire barrier. This penetration configuration consists of the 48-inch round aluminum duct fastened to an ASTM A-36 wall plate by a 1/4" aluminum angle flange and Nelson studs. This configuration has not been qualified as a 3-hour rated fire barrier, though it is erroneously stated to be a 3-hour barrier in EC 330982. This evaluation is to determine the acceptability of the installed configuration. Reference IR No. 324996.

1.1 Scope

The scope of this evaluation is to establish the acceptability of the Turbine Building wall penetration installation for the Unit 3 Isophase Bus Duct Return Air Duct. (This penetration is not shown on Revision G of F-197-1.) During this evaluation it was determined that the Isophase Bus Duct penetration, F-197-15, which contains three ducts is also not a qualified three hour fire barrier. No evaluation could be found that addressed the penetration so this evaluation will cover that penetration as well.

1.2 Licensing and Design Basis

Documents related to the licensing and design basis for the Turbine Building wall include:

Dresden Fire Protection Report

10CFR50 Appendix R

BTP 9.5-1, Appendix A

Letter from Commonwealth Edison to USNRC, Dresden Station Units 2 and 3 Fire Protection Modifications, dated January 25, 1978

Safety Evaluation Report, Dresden Units 2 and 3 Fire Protection, dated March 22, 1978

Generic Letter 86-10

1.3 Definitions

None

2. Detailed Evaluation:

2.1 Description

The three isophase bus ducts, one for each phase, pass through the Turbine Building wall at elevation 540' near the return duct penetration installed under EC 330982. Although the Turbine Building wall (1-foot reinforced concrete) is a 3-hour fire rated barrier, the Isophase Bus Duct penetrations are not qualified penetrations in the sense that no test

EC EVAL 355925, Rev. 0
Evaluation of Turbine Building Wall Penetration
For U3 Isophase Bus Duct and Return Air Duct

report data is available for their configuration. These penetrations are noted as having an "acceptable seal" on F-197, sheet 2 (penetration no. 15).

The Turbine Building barrier configuration in the vicinity of the Reserve Auxiliary Transformers was a subject evaluated during the 1977-78 Appendix A compliance effort. The NRC staff was concerned about the bus duct penetrations nearest to the transformer, i.e., the 4kV cable duct to the 4kV safety related switchgear 33 and 34 inside the building. By letter dated January 25, 1978, Commonwealth Edison committed to provide a sprinkler head to cover the cable bus duct penetration through the Turbine Building wall for the west bus leaving Transformer 32. This bus duct penetration had the potential to expose safety related cables routed to the 4kV switchgear inside the Turbine Building. This commitment was accepted by the NRC in the Safety Evaluation dated March 1978. The actual installed configuration provides sprinkler protection for each of the two cable buses from Transformer 31 and each of the two cable buses from Transformer 32, as verified by field walkdown.

It should be noted that no commitments were made concerning the isophase bus duct penetrations, which are located at a higher elevation and which do not directly expose the switchgear. When the new return duct penetration was designed, the intent was to make the new return air duct penetration configuration an equivalent level of protection to the existing bus duct penetrations. The isophase bus duct penetration is described on F-197, Sheet 2, as a flange bolted to a frame. A similar configuration was used for the return duct penetration, as shown on drawing M-2873 Sheet 4. Therefore the design intent was met for the penetration installed under EC 330982.

The return air penetration consists of 1/4" thick steel plate bolted to the wall with a 48" diameter, 0.19 inch thick aluminum duct routed through. The isophase penetration consists of a similar steel plate bolted to the wall with three 36" diameter aluminum ducts. The steel plate configuration is qualified as a three hour barrier as it is bounded by S&L Detail 2 on Drawing B-440, Sheet 1 and Professional Loss Control letter dated 04-21-87, Evaluation of Penetration Seal Systems at the Dresden and Quad Nuclear Power Plants. However, this configuration has never been qualified with aluminum ducts.

2.2 Assumptions

None

2.3 Safe Shutdown Capability

This type of penetration seal is acceptable in the Turbine Building North outside wall because if the penetration were to fail in a fire it would not adversely the ability to shut down the reactor for either unit at Dresden Station.

First the wall does not separate the redundant safe shut down paths at Dresden Station. The outside portion of the wall contains the Unit 3 Main Power Transformers, Auxiliary

EC EVAL 355925, Rev. 0
Evaluation of Turbine Building Wall Penetration
For U3 Isophase Bus Duct and Return Air Duct

Transformers 31 and 32, and associated cables. None of these components are required for safe shutdown of the plant. If a fire were to occur inside of the Turbine Building in that area, Fire Zone 8.2.5.E or 8.2.6.E, safe shutdown paths A1 would be used to safely shut down Unit 3 if required. Thus if a fire started on either side of the penetration and went through the turbine building wall in question the unit could still be safely shut down. There are no components on the inside of the Unit 3 Turbine Building in that area that are required for the safe shutdown of Unit 2.

In addition in the unlikely event that a fire burned through the aluminum duct on either side of the penetration the fire would not spread through the duct to the other side of the wall. There is no combustible material inside of the duct which would allow the fire to spread to the other side of the wall. The ducts are self-contained on both sides of the penetration. The fire would have to burn through the aluminum duct wall on both sides of the penetration in order to prorogate through the wall via the isophase ducts. With no combustibles in the duct this is very unlikely to happen. Smoke would be expected to enter the duct in the event of burn through. However as the duct work is totally enclosed on both sides of the penetration, the amount of smoke entering the turbine building would be limited to that escaping through the duct work seals. In addition the smoke would not have any adverse effect on any equipment in the turbine building required to safely shut down the units.

2.4 Fire Protection Equipment

There is no fire protection equipment that directly protects the isophase return duct penetration. There are smoke detectors in the Turbine Building in the area of the penetrations.

2.5 Fire Hazards Analysis

The wall containing the isophase bus ducts is rated as a three hour fire barrier. The closest fire hazard to the isophase duct penetrations is one of the cable buses from Transformer 31. As noted above under Description, this cable bus has a sprinkler located at the penetration to the Turbine Building. The most significant hazard in the area is Transformer 31 itself, which has heat detectors and a deluge system to provide protection against a postulated fire. The Turbine Building mezzanine contains switchgear 33 and 34 and associated cables near the return duct penetration. There is smoke detector coverage in the area of the switchgear.

2.6 Attachments

None

EC EVAL 355925, Rev. 0
Evaluation of Turbine Building Wall Penetration
For U3 Isophase Bus Duct and Return Air Duct

3. Conclusions / Findings:

The isophase return air duct penetration installed under EC 330982 and penetration F-197-15 for the existing isophase bus ducts are unqualified penetration barriers installed in a three hour rated fire wall. This configuration however is acceptable from a Generic Letter 86-10 evaluation view point because it does not adversely affect the ability to safely shut down either unit at Dresden Station. The fire barrier does not separate redundant safe shutdown paths as there is no equipment or components on the turbine building exterior required for the safe shutdown of the units. In addition if a fire were to burn through the isophase aluminum duct on either side of the penetrations it would not spread through the self-contained duct to the other side of the wall. Therefore, the penetrations as designed and built are acceptable as is and do not have an impact on post-fire safe shutdown.

4. References:

- 1) Drawing F-197, Sheet 1 (Rev. G)
- 2) Drawing F-197, Sheet 2 (Rev. F)
- 3) Drawing M-2873, Sheet 4 (Rev. A)
- 4) EC 330982, Rev. 3; Isol Phase Bus Duct Cooling - Power Uprate
- 5) Letter from ComEd to USNRC, Dresden Station Units 2 and 3 Fire Protection Modifications, dated January 25, 1978.
- 6) NRC Fire Protection Safety Evaluation Report, March 1978
- 7) Drawing B-440, Sheet 1 (Rev. A)
- 8) Drawing B-440, Sheet 2 (Rev. A)
- 9) Professional Loss Control (PLC) Letter dated 04-21-1987, Evaluation of Penetration Seal Systems at the Dresden And Quad Cities Nuclear Power Plants
- 10) AR 00324996-02

Tab E

Engineering Change

Company Name : EXELON GENERATION CO.,LLC
EC Number : 0000358637 000
Status/Date : CLOSED 12/21/2005
Facility : DRE DRESDEN GENERATING STATION
Type/Sub-type: EVAL PROG

Print Date: 12/21/2005

Exelon

Page: 1

EC Title: 86-10 EVALUATION OF TURBINE BUILDING WALL PENETRATION F-147-33
FOR THE U2 ISOPHASE BUS RETURN AIR DUCT

Mod Nbr : KW1: FIRE KW2: 86-10 KW3: PENE KW4: KW5:

Master EC	: N	Work Group	:	Temporary	:	N
Outage	: N	Alert Group	:	Aprd Req'd Date	:	
WO Required	: N	Image Addr	:	Exp Insvc Date	:	
Adv Wk Appvd	:	Alt Ref.	:	Expires On	:	09/15/2008
Auto-Advance	: Y	Priority	:	Auto-Asbuild	:	N
Caveat Outst	:	Department	:	Discipline	:	
Resp Engr	: PAUL	G BEMBNISTER	:		:	
Location	:		:		:	

Units

Fac	Unit	Description
DRE	02	UNIT TWO

Systems

Fac	System	Description
DRE	41	FIRE PROTECTION

Engineering Change

EC Number : 0000358637 000
Status/Date : CLOSED 12/21/2005
Facility : DRE
Type/Sub-type: EVAL PROG



Print Date: 12/21/2005

Exelon

Page: 1

EC Title: 86-10 EVALUATION OF TURBINE BUILDING WALL PENETRATION F-147-33
FOR THE U2 ISOPHASE BUS RETURN AIR DUCT

Mod Nbr : KW1: FIRE KW2: 86-10 KW3: PENE KW4: KW5:

Master EC : N	Work Group :	Temporary : N
Outage : N	Alert Group: A8351NESPR	Aprd Reqd Date:
WO Required : N	Image Addr :	Exp Insvc Date:
Adv Wk Appvd:	Alt Ref. :	Expires On : 09/15/2008
Auto-Advance: Y	Priority :	Auto-Asbuild : N
Caveat Outst:	Department :	Discipline :
Resp Engr : PAUL	G BEMBNISTER	
Location :		

<u>Milestone</u>	<u>Date</u>	<u>PassPort</u>	<u>Name</u>	<u>Req By</u>
110-PREPARE EC	12/15/2005	DRD08	BEMBNISTER	PAUL APPROVED
120-REVIEW EC	12/16/2005	COXFX	COX	FRANKIE APPROVED
300-APPROVE EC	12/20/2005	SIPEJV	SIPEK	JOSEPH APPROVED
Qualification for F. Cox and P Bembinister verified 12/20/05				
900-ARCHIVE EC	12/21/2005	ELGBC	COOLEY	BERLINDA CLOSED

Units

<u>Fac</u>	<u>Unit</u>	<u>Description</u>
DRE	02	UNIT TWO

Systems

<u>Fac</u>	<u>System</u>	<u>Description</u>
DRE	41	FIRE PROTECTION

Engineering Change Comments

Comments Last Updated By: DRDAL Last Updated Date: 12/21/2005

Engineering Change

EC Number : 0000358637 000
Facility : DRE
Type/Sub-type: EVAL PROG

Print Date: 12/21/2005

Exelon_®

Page: 1

Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : SIPEJV
Last Updated Date: 12/20/2005
Text Status : UNLOCKED

Topic : XFR/EDS
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 04/16/1997
Text Status : UNLOCKED

MECHANICAL SEPARATION DIVISION: RIII THE DATA IN THE
FOLLOWING FIELDS HAVE NOT BEEN VERIFIED AND ARE FOR
REFERENCE ONLY: SEISMIC CLASS, FURNISH SPEC, INSTALL
SPEC.

EC EVAL 358637, Rev. 0
86-10 Evaluation of Turbine Building Wall Penetration
F-147-33 For The U2 Isophase Bus Return Air Duct

1. Reason For Evaluation:

The justification for the Isophase Bus Return Air Duct (EPU) for Main Power Transformer (MPT) 2 Turbine Building penetration configurations acceptability in a 3-hour fire barrier in EC 330981, Rev. 0, is confusing. The purpose of this 86-10 evaluation is to provide clear justification and documentation that penetration F-147-33 as shown on drawing F-174, Sheets 1 & 3 is acceptable as installed.

Penetration F-147-33 is on the Unit 2 north Turbine Building wall above elevation 541'-6" near column line 34, row D. The existing wall is a three-hour fire barrier. The penetration configuration consists of the 48-inch round aluminum duct fastened to a steel (ASTM A-36) wall plate by a 1/4" aluminum angle flange and Nelson studs. This configuration has not been qualified as a three-hour rated fire barrier.

1.1 Scope

The scope of this evaluation is to perform a Generic Letter 86-10 evaluation to justify and document the acceptability of the Turbine Building wall penetration for the MPT 2 Isophase Bus Return Air Duct, F-147-33, for Appendix R purposes.

1.2 Licensing and Design Basis

Documents related to the licensing and design basis for the Turbine Building wall include:

Dresden Fire Protection Report
10CFR50 Appendix R
BTP 9.5-1, Appendix A
Letter from Commonwealth Edison to USNRC, Dresden Station Units 2 and 3 Fire Protection Modifications, dated January 25, 1978
Safety Evaluation Report, Dresden Units 2 and 3 Fire Protection, dated March 22, 1978
Generic Letter 86-10

1.3 Definitions

None

2. Detailed Evaluation:

2.1 Description

The Isophase Bus Duct Return Air Duct penetration, F-147-33, is similar to the Isophase Bus penetration, F-147-1. Penetration F-147-1 consists of three isophase bus ducts, one for each phase, pass through the Unit 2 north Turbine Building wall at elevation 537'-6",

EC EVAL 358637, Rev. 0
86-10 Evaluation of Turbine Building Wall Penetration
F-147-33 For The U2 Isophase Bus Return Air Duct

row D, column 35. Although the Turbine Building wall (1-foot reinforced concrete) is a three-hour fire rated barrier, the Isophase Bus Duct penetrations are not qualified penetrations in the sense that no test report data is available for their configuration. This penetration is noted as having an "acceptable seal" on F-147, Sheet 2. That it is acceptable is based on the NRC Safety Evaluation Report dated March 1978.

The Turbine Building barrier configuration in the vicinity of the Reserve Auxiliary Transformers was a subject evaluated during the 1977-78 Appendix A compliance effort. The NRC staff was concerned about the bus duct penetrations nearest to the transformer, i.e., the 4kV cable duct to the 4kV safety related switchgear 23 and 24 inside the building. By letter dated January 25, 1978, Commonwealth Edison committed to provide a sprinkler head to cover the cable bus duct penetration through the Turbine Building wall for the west bus leaving Transformer 22. This bus duct penetration had the potential to expose safety related cables routed to the 4kV switchgear inside the Turbine Building. This commitment was accepted by the NRC in the Safety Evaluation dated March 1978. The actual installed configuration provides sprinkler protection for each of the two cable buses from Transformer 21 and each of the two cable buses from Transformer 22, as verified by field walkdown.

No commitments were made concerning the isophase bus duct penetrations, which are located at a higher elevation and which do not directly expose the switchgear. When the new return duct penetration was designed, the intent was to make the new return air duct penetration configuration an equivalent level of protection to the existing bus duct penetrations. The isophase bus duct penetration, F-147-1, is described on F-147, Sheet 2, as a flange bolted to a frame. A similar configuration was used for the return duct penetration, F-147-33, as shown on drawing B-80B.

The return air penetration consists of aluminum plate bolted to the wall with a 48" diameter, 0.19-inch thick aluminum duct routed through. The isophase penetration consists of a similar aluminum plate bolted to the wall with three 36" diameter aluminum ducts. Both configurations in penetrations F-147-1 and F-147-33 have never been qualified by test as a three-hour fire barrier.

2.2 Assumptions

None

2.3 Safe Shutdown Capability

The type of penetration seal in F-147-33 installed in the Unit 2 Turbine Building north outside wall is acceptable. Even if the penetration were to fail in a fire it would not adversely the ability to shut down the reactor for either unit at Dresden Station.

First the Unit 2 Turbine Building north outside wall does not separate redundant safe shut down paths at Dresden Station. The outside portion of the wall contains the Unit 2 Main

EC EVAL 358637, Rev. 0
86-10 Evaluation of Turbine Building Wall Penetration
F-147-33 For The U2 Isophase Bus Return Air Duct

Power Transformer, Auxiliary Transformers 21 and 22, and associated cables. None of these components are required for safe shutdown of the plant. If a fire were to occur inside of the Turbine Building in that area, Fire Zone 8.2.5.A or 8.2.6.A, safe shutdown path B1 would be used to safely shut down Unit 2 if required. If a fire were to start in the area of the transformers and spread through the barriers the same safe shut down paths would still be used. Thus if a fire were to start on either side of the penetrations and went through the turbine building wall in question the unit could still be safely shut down. There are no components on the inside or outside of the Unit 2 Turbine Building in that area required for the safe shutdown of Unit 3.

Additionally in the unlikely event that a fire burned through the aluminum duct on either side of the penetration the fire would not spread through the duct to the other side of the wall. This is because there is no combustible material inside of the duct, which would allow the fire to spread to the other side of the wall. The ducts are self-contained on both sides of the penetration. The fire would have to burn through the aluminum duct wall on both sides of the penetration in order to propagate through the wall via the isophase bus duct cooling return duct. With no combustibles in the duct this is very unlikely to happen. Smoke would be expected to enter the duct in the event of burn through. However as the duct-work is totally enclosed on both sides of the penetration, the amount of smoke entering the turbine building would be limited to that escaping through the duct work seals. In addition the smoke would not have any adverse effect on any equipment in the Turbine Building required to safely shut down either unit.

2.4 Fire Protection Equipment

There is no fire protection equipment that directly protects the isophase bus duct cooling return duct penetration. There are smoke detectors in the Unit 2 Turbine Building in the area of the penetration.

2.5 Fire Hazards Analysis

The wall containing the isophase bus duct cooling return duct is rated as a three-hour fire barrier. The closest fire hazard to the isophase bus duct cooling return duct penetration is one of the cable buses from Transformer 21. As noted above under Description, this cable bus has a sprinkler located at the penetration to the Turbine Building. The most significant hazard in the area is Transformer 21 and Transformer 22, which have heat detectors and a deluge system to provide suppression against a postulated fire. The Turbine Building mezzanine contains 4KV Switchgear Buses 21, 22, 23, 24 and associated cables near the return duct penetration. There is smoke detector coverage in the area of the switchgear.

2.6 Attachments

None

EC EVAL 358637, Rev. 0
86-10 Evaluation of Turbine Building Wall Penetration
F-147-33 For The U2 Isophase Bus Return Air Duct

3. Conclusions / Findings:

The isophase bus duct cooling air return duct penetration F-147-33 is an unqualified penetration barriers installed in a three-hour rated fire wall. This configuration however is acceptable because in the unlikely event a fire were to burn through the penetration it would not adversely affect the ability to safely shut down either unit at Dresden Station. The fire barrier does not separate redundant safe shutdown paths as there is no equipment or components on the Turbine Building exterior required for the safe shutdown of the units. In addition if a fire were to burn through the aluminum isophase bus duct cooling air return duct on either side of the penetrations it would not spread through the self-contained duct to the other side of the wall. Therefore, the penetration as designed and built is acceptable and will not have any adverse impact on post-fire safe shutdown.

4. References:

- 1) Drawing F-147, Sheet 1 (Rev. G)
- 2) Drawing F-147, Sheet 2 (Rev. E)
- 3) Drawing F-147, Sheet 3 (Rev. C)
- 4) Drawing B-80B, (Rev. A)
- 5) Letter from ComEd to USNRC, Dresden Station Units 2 and 3 Fire Protection Modifications, dated January 25, 1978.
- 6) NRC Fire Protection Safety Evaluation Report, March 1978
- 7) Drawing B-158 (Rev. W)
- 8) Professional Loss Control (PLC) Letter dated 04-21-1987, Evaluation of Penetration Seal Systems at the Dresden And Quad Cities Nuclear Power Plants

Tab F

Engineering Change

Company Name : EXELON GENERATION CO.,LLC
C Number : 0000358719 000
Status/Date : CLOSED 01/13/2006
Facility : DRE DRESDEN GENERATING STATION
Type/Sub-type: EVAL PROG

Print Date: 01/13/2006

Exelon

Page: 1

EC Title: 86-10 EVALUATION OF 2/3 DIESEL GENERATOR BUS DUCT TO 4KV BUS 33-1
WALL PENETRATION, F-57-26

Mod Nbr :	KW1: FIRE	KW2: PENE	KW3: 86-10	KW4:	KW5:
Master EC : N	Work Group :	Temporary :	N		
Outage : N	Alert Group: *(SYS ENG)	Aprd Req'd Date:			
WO Required : N	Image Addr :	Exp Insvc Date:			
Adv Wk Appvd:	Alt Ref. :	Expires On :	09/16/2008		
Auto-Advance: Y	Priority :	Auto-Asbuild :	N		
Caveat Outst:	Department :	Discipline :			
Resp Engr : PAUL	G BEMBNISTER				
Location :					

Units

<u>Fac</u>	<u>Unit</u>	<u>Description</u>
DRE	03	UNIT THREE

Systems

<u>Fac</u>	<u>System</u>	<u>Description</u>
DRE	41	FIRE PROTECTION

Engineering Change

Print Date: 01/13/2006

EC Number : 0000358719 000
Status/Date : CLOSED 01/13/2006
Facility : DRE
Type/Sub-type: EVAL PROG

**Exelon**

Page: 1

EC Title: 86-10 EVALUATION OF 2/3 DIESEL GENERATOR BUS DUCT TO 4KV BUS 33-1
WALL PENETRATION, F-57-26

Mod Nbr : KW1: FIRE KW2: PENE KW3: 86-10 KW4: KW5:

Master EC : N	Work Group :	Temporary : N
Outage : N	Alert Group: *(SYS ENG)	Aprd Reqd Date:
WO Required : N	Image Addr :	Exp Insvc Date:
Adv Wk Appvd:	Alt Ref. :	Expires On : 09/16/2008
Auto-Advance: Y	Priority :	Auto-Asbuild : N
Caveat Outst:	Department :	Discipline :
Resp Engr : PAUL	G BEMBNISTER	
Location :		

<u>Milestone</u>	<u>Date</u>	<u>PassPort</u>	<u>Name</u>	<u>Req By</u>
110-PREPARE EC	12/22/2005	DRD08	BEMBNISTER	PAUL
120-REVIEW EC	12/22/2005	DRD08	BEMBNISTER	PAUL
Signed per telecon with Frank Cox. Paul Bembnister 12/22/05				
300-APPROVE EC	12/22/2005	SIPEJV	SIPEK	JOSEPH
900-ARCHIVE EC	01/13/2006	ELGBC	COOLEY	BERLINDA

Units

<u>Fac</u>	<u>Unit</u>	<u>Description</u>
DRE	03	UNIT THREE

Systems

<u>Fac</u>	<u>System</u>	<u>Description</u>
DRE	41	FIRE PROTECTION

Planning/Scheduling Information

Planning Start : Level of Effort:

<u>Planning Event</u>	<u>From Date</u>	<u>Thru Date</u>
100-PREP EVAL		

Engineering Change Comments

Comments Last Updated By: SIPEJV Last Updated Date: 12/22/2005

Engineering Change

EC Number : 0000358719 000
Facility : DRE
Type/Sub-type: EVAL PROG

Print Date: 01/13/2006

Exelon_W

Page: 1

Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : SIPEJV
Last Updated Date: 12/22/2005
Text Status : LOCKED

Topic : XFR/EDS
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 05/26/1999
Text Status : UNLOCKED

SEE DCR 980370 FOR BULK UPDATE OF CODE RELATED FIELD

EC EVAL 358719, Rev. 0
86-10 Evaluation of 2/3 Diesel Generator Bus Duct
to 4KV Bus 33-1 Wall Penetration, F-57-26

1. Reason For Evaluation:

Documentation verifying that electrical bus duct configuration in penetration F-57-26 as a qualified fire barrier cannot be found. IR 397394 was written on 11/09/05 documenting that there were 19 penetrations in fire barriers at Dresden Station where the associated drawing did not show that there was an acceptable fire barrier installed in the penetration. One of these penetrations was F-57-26 which is located on the wall, elevation 521'-6", between the Unit 3 Reactor Building and Unit 2/3 Diesel Generator Room. The associated drawing F-57, Sheet 3, does not give any indication that an approved fire barrier is installed. This penetration was inspected on 12/17/05 under 866710-01. It was found that an electrical connection seal, surrounded by grout, was installed per Golden Gate Switchboard Co. drawings 85006, Sheets 2,3 & 4. The bus duct and this associated penetration were installed per Modification M12-2/3-83-13 in the mid 1980's to provide separate power supplies from the U2/3 Diesel Generator to Unit 2 and Unit 3. This enabled Dresden Station to meet Appendix R requirements so one fault on the bus duct would not remove the ability to shut down both Unit 2 and 3. The separation in the Unit 3 Reactor Building was also required so that Safe Shutdown Path "A-1" can be used for shutting down Unit 3.

The purpose of this evaluation is to provide documentation that the existing configuration in penetration F-57-26 is acceptable even assuming that it is not a three-hour fire barrier.

1.1 Scope

The scope of this evaluation is to perform a Generic Letter 86-10 evaluation to justify and document the acceptability of the existing bus duct configuration in penetration, F-57-26, which contains the U2/3 Diesel to Switchgear Bus 33 bus duct penetration.

1.2 Licensing and Design Basis

Documents related to the licensing and design basis for the bus duct penetration F-57-26 include:

Dresden Fire Protection Report
10CFR50 Appendix R
Generic Letter 86-10
Design Modification M12-2/3-83-13

1.3 Definitions

None

EC EVAL 358719, Rev. 0
86-10 Evaluation of 2/3 Diesel Generator Bus Duct
to 4KV Bus 33-1 Wall Penetration, F-57-26

2. Detailed Evaluation:

2.1 Description

Penetration F-57-26 is located in the wall between the Unit 2/3 Diesel Generator (Fire Zone 9.0.C) and Unit 3 Reactor Building (Fire Zone 1.1.1.2). The penetration consists of a wall bushing connection built by Golden Gate Switchboard Company, which is grouted into the wall.

The safety evaluation for Modification M12-2/3-83-13 installation of the bus duct penetration in the wall between the Unit 2/3 Diesel Generator Room and Unit 3 Turbine Building states that "The new bus duct penetration is seismically and environmentally qualified and is a fire stop." (Roll 2338, Approximate Frame 2849) Grout has been used to fill the opening surrounding the bus duct in the penetration. The grout acts as a three-hour fire barrier, bounded by Transco Penetration Fire Barrier Details M-5 and M-9. Golden Gate Switchboard Co. Drawing 85006, Sheet 4, shows the bus duct wall bushings in the penetration supported in 4 inches of lead bounded on both sides by a 1/4" aluminum plate. No combustibles are routed through the penetration. This is therefore a substantial barrier. However despite a review of Dresden Station design drawings and Modification M12-2/3-83-13 under which the penetration was installed no documentation has been found that justifies the bushing connection as an acceptable three-hour fire barrier. In addition, the Golden Gate Switchboard Company was contacted and could not find any documentation certifying that the existing configuration is qualified as a three-hour fire barrier. So the conservative assumption has been made that the barrier in penetration F-57-26 is not qualified as a three-hour fire barrier. IR 436254 was written.

For a fire in the Unit 2/3 Diesel Generator Room, Fire Zone 9.0.C, Safe Shutdown Path "F" would be used. If a fire were to occur in the Unit 3 Reactor Building, 517'-6" elevation, Fire Zone 1.1.1.2, Safe Shutdown Path "A-1" would be used. These are redundant safe shutdown paths, therefore a suitable fire barrier is required between the U2/3 Emergency Diesel Generator Room and the Unit 3 Reactor Building.

If a fire were to occur in either of the fire zones listed above Unit 2 could be shut down using the normal shut down method or Safe Shutdown path "E". Thus loss of the fire barrier in penetration F-57-26 will not prevent the Safe Shutdown of Unit 2.

2.2 Assumptions

No documentation has been found certifying that the existing configuration in penetration F-57-26 has been tested and approved as a three-hour fire barrier. Therefore, the assumption has been made that the barrier installed in penetration F-57-26 is not a qualified fire barrier.

EC EVAL 358719, Rev. 0
86-10 Evaluation of 2/3 Diesel Generator Bus Duct
to 4KV Bus 33-1 Wall Penetration, F-57-26

All existing fire protection features are appropriately maintained to meet their intended design function.

2.3 Safe Shutdown Capability

The Safe Shutdown capability of the plant is not adversely affected by the existing configuration of the non-rate fire barrier in penetration F-57-26. Penetration F-57-26 is a horizontal penetration located in a vertical wall. There is no combustible material routed through the penetration. The bus duct is constructed of 1/8" thick carbon steel. The bus duct barrier inside of the penetration consists of bushings for each of the three phases mounted in a wall consisting of four inches of lead contained by a 1/4" thick aluminum plate on each side. The barrier is inside of a 1/8" thick carbon steel frame. This presents a substantial barrier to prevent a fire from burning through the penetration.

The Emergency U2/3 Diesel Generator Room, Fire Zone 9.0.C, is protected by an automatic CO₂ fire suppression system. This will suppress any fire that is initiated in the U2/3 Emergency Diesel Generator Room preventing it from challenging the penetration barrier and spreading to the Unit 3 Reactor Building, Fire Zone 1.1.1.2. Credit can be taken for this automatic fire suppression in U2/3 Emergency Diesel Generator Room and a fire barrier is not required in the penetration. (Ref. 9, Section 5.3.6)

In the Unit 3 Reactor Building, 517'-6" elevation, Fire Zone 1.1.1.2 there is no credible fire which could damage the penetration and then spread through it into the U2/3 Emergency Diesel Generator Room.

Combustible Loads in the Area of the Penetration

The natural tendency of a fire is to spread up and outward. There are only two instrument cables in the area of the penetration. They are not enough of a combustible load to damage the bus duct in the unlikely event that they would catch fire. The nearest significant combustibles are cables in a vertical cable tray located on the same wall approximately 5'-6" the east of the penetration. The cables are routed through the wall at an elevation above the bus duct and there is 5'-6" thick concrete building support column located between the two penetrations with no intervening combustibles. There is no credible scenario by which a fire could spread from this vertical cable tray to the area of penetration F-57-26. Likewise to the west at approximately 20 feet from the penetration there is another vertical cable tray located on the same wall. The cables in that tray are routed through the same wall at an elevation higher than penetration F-57-26. There are no intervening combustibles between the cable tray and penetration F-57-26. There is no credible scenario by which a fire could spread from this vertical cable tray to the area of penetration F-57-26.

The remaining significant combustible material in the area is MCC 38-7 which is located approximately 16 feet to the west of the penetration. The MCC is not considered a credible fire threat to penetration based on the following from the Dresden Station NRC

EC EVAL 358719, Rev. 0
86-10 Evaluation of 2/3 Diesel Generator Bus Duct
to 4KV Bus 33-1 Wall Penetration, F-57-26

IPEEE Review, Attachment 2, Section 2.1.5 (Ref. 8). The IPEEE states that fires in MCCs are assumed to result in functional failures. Based on construction, propagation of a postulated fire to the outside of the MCC is not considered likely. However, to address potential uncertainty, 10% of the postulated MCC fires are assumed to propagate vertically outside the MCC and potentially damage circuits above the MCC. In addition "Low voltage cabinets and panels are those containing circuits that operate at less than 600 Volts. Fire propagation is not considered to be credible if the panel is "substantially sealed". MCC 38-7 is "substantially sealed" to prevent water intrusion. There are no intervening combustible materials between MCC 38-7 and penetration F-57-26. Thus there is no credible scenario in which a fire would spread from MCC 38-7 to penetration F-57-26.

Transient combustible material at Dresden Station is controlled and limited by procedure. There is the possibility that combustible material may be stored in the area of the penetration. However based on its location it has not been a staging area in the past. Based on how close the penetration is to the floor storing material under it is not very likely. In addition there is no ignition source in the area to start a fire. Transient ignition sources at Dresden Station are controlled by procedure and require a fire watch.

If a Fire Were to Occur

In the event there was a fire at the penetration it is unlikely that it would spread through it to the Unit 2/3 Emergency Diesel Generator Room. The bus duct is constructed of 1/8" carbon steel. If the steel plate were inside of the penetration inside of the wall it would be considered a qualified three-hour fire barrier. (Detail 1, Drawing B-440, Ref. 3) So for a fire to propagate from the Unit 3 Reactor Building to the U2/3 Emergency Diesel Generator Room it would first have to burn through the steel plate walls of the bus duct. It then would have to burn through the two 1/4" aluminum plates and 4-inches of lead inside of the duct in the penetration and then burn through the 1/8" thick steel bus duct walls in the Unit 2/3 Emergency Diesel Generator Room. There is no combustible material within the bus duct routed through the penetration so this is not credible scenario. The steel bus duct is grouted into the wall so a fire could not propagate through the wall around the bus duct.

In the unlikely event that a fire did burn through the penetration there is no combustible material in the area of the penetration in the Unit 2/3 Emergency Diesel Generator Room that would allow the fire to spread and threaten other components in the room.

Finally a fire in the Unit 3 Reactor Building 517'-6" elevation, Fire Zone 1.1.1.2 would initiate the smoke detectors in the fire zone. This provides reasonable assurance that a fire in the area of the penetration would be promptly detected and extinguished by the station fire brigade.

EC EVAL 358719, Rev. 0
86-10 Evaluation of 2/3 Diesel Generator Bus Duct
to 4KV Bus 33-1 Wall Penetration, F-57-26

2.4 Fire Protection Equipment

The Unit 2/3 Diesel Generator Room (Fire Zone 9.0.C) is protected by an automatic CO₂ suppression system initiated by heat detectors in the room. The CO₂ system protects the penetration in the U2/3 Diesel Generator Room. In addition there is a portable extinguishers in the room.

The Unit 3 Reactor Building 517' elevation (Fire Zone 1.1.1.2) does not contain any fire suppression systems. There are smoke detectors located through out the fire zone. In addition fire extinguisher and hose stations are located in the fire zone for fighting potential fires.

2.5 Fire Hazards Analysis

The north wall of the Unit 2/3 Diesel Generator Room (Fire Zone 9.0.C) separates it from Fire Zone 1.1.1.2, Unit 3 Reactor Building 517'-6" elevation, which is part of Fire Area RB3-II. It is a minimum 1-foot 6-inch thick reinforced concrete 3-hour fire barrier. It is in this wall that penetration F-57-26 is located.

Fire Zone 9.0.C is covered by complete thermal fire detection, which alarms locally and in the main control room. This fire zone is also protected by a complete, automatic, total flooding CO₂ suppression system. The stairway to the Diesel Generator Fuel Oil Day Tank Room is located under this penetration therefore the amount of combustibles in the area of the penetration are very light.

Fire Zone 1.1.1.2 has complete ionization fire detection. Hose stations and fire extinguishers are available in the fire zone. The permanent combustible loading in the area of the penetration is very light. The Dresden Station transient combustible loading permit program would prevent storage of transient combustibles in the area from being excessive.

2.6 Attachments

None

3. Conclusions / Findings:

Penetration F-57-26 does not contain a qualified fire barrier. It is located in the wall separating the Unit 3 Reactor Building 517'-6" elevation, Fire Zone 1.1.1.2 and the Unit 2/3 Emergency Diesel Generator Room, Fire Zone 9.0.C. This wall is a rated three-hour fire barrier, which separates redundant safe shut down components for Dresden Unit 3.

The above evaluation shows that the existing configuration is acceptable as is. A fire initiated in the U2/3 Emergency Diesel Generator Room would not adversely effect safe shut down equipment in the Unit 3 Reactor Building because it would be extinguished by

EC EVAL 358719, Rev. 0
86-10 Evaluation of 2/3 Diesel Generator Bus Duct
to 4KV Bus 33-1 Wall Penetration, F-57-26

the automatic fire suppression CO₂ system for the room before it could burn through the penetration.

A fire initiated on the Unit 3 Reactor Building side of the wall would not adversely affect safe shut down equipment in U2/3 Emergency Diesel Generator Room because:

- The low combustible loading and location of the combustible loading in the area could not result in a fire that would threaten the penetration.
- There is no continuity of combustible materials through the penetration.
- The steel plate construction of the bus duct and bus duct barrier construction inside of the penetration make it highly unlikely that fire could burn through the penetration and if it did, then burn through the bus duct wall in the U2/3 Emergency Diesel Generator Room.
- The smoke detectors and manual fire fighting equipment in the fire zone provides reasonable assurance that a fire in the area of the penetration would be promptly detected and extinguished by the station fire brigade.

Therefore this evaluation demonstrates that the existing penetration configuration is adequate in preventing a fire from spreading between the two fire zones.

4. References:

- 1) Drawing F-57, Sheet 1 (Rev. D)
- 2) Drawing F-57, Sheet 3 (Rev. B)
- 3) Drawing B-440, Sheet 1 (Rev. A)
- 4) Golden Gate Switchboard Co. Drawings
 - a. 85006, Sheet 1, Rev. 3.
 - b. 85006, Sheet 2, Rev. 3.
 - c. 85006, Sheet 3, Rev. 2.
 - d. 85006, Sheet 4, Rev. 3.
- 5) Modification M12-2/3-83-13
- 6) Fire Protection Reports Volume 1, Fire Hazard Analysis, Amendment 14
- 7) Fire Protection Reports Volume 2, Appendix R Conformance (Sections III.G, III.J, and III.L) Safe Shutdown Report, Amendment 14
- 8) NRC Review of the "Dresden Nuclear Power Station, Units 2 and 3 – Review of Individual Plant Examination of External Events (IPEEE) Submittal, Dated September 28, 2001.
- 9) EPRI; Fire-Induced Vulnerability Evaluation (FIVE), Final Report, Dated April 1992
- 10) IR 436254, No documentation on Fire Barrier in Penetration F-57-26.
- 11) IR 397394, Penetration Fire Barrier Inop or Status Unknown

Tab G

Engineering Change

Company Name : EXELON GENERATION CO.,LLC
EC Number : 0000360923 000
Status/Date : CLOSED 05/15/2006
Facility : DRE DRESDEN GENERATING STATION
Type/Sub-type: EVAL.PROG

Print Date: 05/23/2006

Exelon

Page: 1

EC Title: 86-10 EVALUATION OF CLEAN & DIRTY OIL TANK ROOM FIRE
BARRIERS

Mod Nbr :	KW1: FIRE	KW2: 86-10	KW3: PENE	KW4:	KW5:
Master EC : N	Work Group :	Temporary :	N		
Outage : N	Alert Group: A8330NESTB	Aprd Req'd Date:			
WO Required :	Image Addr :	Exp Insvc Date:			
Adv Wk Appvd:	Alt Ref. :	Expires On :	02/02/2009		
Auto-Advance: Y	Priority :	Auto-Asbuild :	N		
Caveat Outst:	Department :	Discipline :			
Resp Engr : PAUL	G BEMBNISTER				
Location :					

Units

<u>Fac</u>	<u>Unit</u>	<u>Description</u>
DRE	00	COMMON UNIT

Systems

<u>Fac</u>	<u>System</u>	<u>Description</u>
DRE	41	FIRE PROTECTION

Engineering Change

Print Date: 05/23/2006

EC Number : 0000360923 000
Status/Date : CLOSED 05/15/2006
Facility : DRE
Type/Sub-type: EVAL PROG

Exelon

Page: 1

EC Title: 86-10 EVALUATION OF CLEAN & DIRTY OIL TANK ROOM FIRE
BARRIERS

Mod Nbr : KW1: FIRE KW2: 86-10 KW3: PENE KW4: KW5:

Master EC : N	Work Group :	Temporary : N
Outage : N	Alert Group: A8330NESTB	Aprd Reqd Date:
WO Required :	Image Addr :	Exp Insvc Date:
Adv Wk Appvd:	Alt Ref. :	Expires On : 02/02/2009
Auto-Advance: Y	Priority :	Auto-Asbuild : N
Caveat Outst:	Department :	Discipline :
Resp Engr : PAUL	G BEMBNISTER	
Location :		

Milestone	Date	PassPort	Name	Req By
110-PREPARE EC	05/10/2006	DRD08	BEMBNISTER	PAUL
Qualifications required to perform 86-10 eval: ENANPG14 Fire Protection				
120-REVIEW EC	05/10/2006	COXFX	COX	FRANKIE
Qualifications required to perform 86-10 eval: ENANPG14 Fire Protection				
ENANDG02 reviewer cert.				
300-APPROVE EC	05/10/2006	SIPEJV	SIPEK	JOSEPH
800-ATTR CLOSED	05/15/2006	DRDKZ	SIMMONS	KEVIN

Units

Fac	Unit	Description
DRE	00	COMMON UNIT

Systems

Fac	System	Description
DRE	41	FIRE PROTECTION

Planning/Scheduling Information

Planning Start : Level of Effort:

Planning Event	From Date	Thru Date
100-PREP EVAL		

Cross References

Ref.	Sub-	
Type	Number	Description
AR	00488654	CANNOT FIND 86-10 DOCUMENTATION FOR FIRE BARRI

Engineering Change

EC Number : 0000360923 000
Facility : DRE
Type/Sub-type: EVAL PROG

Print Date: 05/23/2006

Exelon

Page: 1

Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : SIPEJV
Last Updated Date: 05/10/2006
Text Status : UNLOCKED

Topic : MAINT NOTES
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 04/12/1994
Text Status : UNLOCKED

VCODE: H307

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

2.6 Attachments

None

3. CONCLUSION / FINDINGS

The fire doors and associated fusible linkage cable penetrations in the north and west walls of the Clean and Dirty Oil Tank Room do not contain qualified 3-hour fire barriers. Both of these walls are Appendix R three-hour rated fire barriers.

The above evaluation shows however that the existing configuration is acceptable as is for the following reasons.

- 1) The fire barriers do not separate redundant safe shutdown paths. In the unlikely event that a fire started outside of the Clean and Dirty Oil Room were to burn through the fire barrier into the room the Safe Shutdown of either Unit 2 or 3 would not be adversely affected as there is no components, equipment or cables located inside of the Clean and Dirty Oil Tank Room.
- 2) The low combustible loading in the Clean and Dirty Oil Tank Room would prevent a fire from occurring that would burn through the existing barriers.
- 3) Both sides of the penetrations are protected by automatic wet piping sprinkler suppression systems. In the unlikely event a fire did make through any of the penetrations the sprinkler systems would suppress it.

4. REFERENCES

- 1) NES-MS-5.1, Rev.2; Exelon Nuclear Combustible Loading Standard
- 2) Calculation DRE97-0105, Rev.6, Determination of Combustible Loading
- 3) Drawing F-10-1, Rev. F; Detection and Suppression Turbine Building Ground Floor Dresden Station Unit 2
- 4) Drawing F-450, Rev. E, Fire Barrier References Ground Floor Plan
- 5) Drawing F-142, Sheet 2, Rev. E, 3 Hour Fire Barrier Clean & Dirty Oil Tank Rm
- 6) Drawing F-143, Sheet 2, Rev. F, Section F-143 Turbine Building Clean & Dirty Oil Tank Room, West Wall 3 Hour Fire Barrier
- 7) Fire Protection Reports, Volume 1, Updated Fire Hazards Analysis, Amendment 15, Sections 4.8.2, 4.8.5 and 4.9.1.
- 8) Professional Loss Control Inc.; An Analysis of Fire Doors in Nuclear Safety Related Areas at Dresden Nuclear Power Station, Units 2 & 3 for Commonwealth Edison Company, Revision 2, Submitted April 15, 1988.
- 9) NFPA 80, Standard for Fire Doors and Fire Windows, 1975 Edition
- 10) Fire Protection Reports, Volume 2, Appendix R Conformance (Sections III.G, III.J, and III.L) Safe Shutdown Report, Amendment 15.

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

1. REASON FOR EVALUATION

This 86-10 evaluation is being performed to evaluate and document the adequacy of the penetration fire barriers in the Dresden Station Clean and Dirty Oil Tank Room north and west walls are acceptable to use as is. The fire doors have had engineering evaluations previously performed and the penetrations are shown on the associated drawings to be acceptable. However an 86-10 evaluation documenting their acceptability has not been located. The affected penetrations in the north Clean and Dirty Oil Tank Room wall are F-142-11, sliding Fire Door #46 and F-142-02, for the fire door's associated ¾" pipe for fusible link cable. The affected penetrations in the west Clean and Dirty Oil Tank Room wall are F-143-09, sliding Fire Door #12 and its' associated ¾" pipe for fusible link cable (No penetration number assigned.). This evaluation will provide that documentation. See IR 488654 for details.

1.1 Scope

This evaluation covers four penetrations in the north and west walls of the Clean and Dirty Oil Tank Room. The first two are the fire doors in each wall where the sliding fire door overlap does not meet NFPA 80 code requirements. The second two are the penetrations for the fusible link associated with the fire door. This link is attached to the door closing mechanism by a cable routed through a ¾" pipe above the doors. There is no fire barrier installed in the pipes containing the fusible link cables.

The penetrations are as follows:

North Wall

F-142-11	Sliding Fire Door #46
F-142-02	¾" pipe for fusible link cable

West Wall

F-143-09	Sliding Fire Door #12
No Pene#	¾" pipe for fusible link cable

1.2 Licensing & Design Bases

Dresden Station Fire Protection Reports
10CFR50 Appendix R
Generic Letter 86-10
Technical Requirements Manual (TRM) Section 3.7.n, Fire Rated Assemblies

1.3 Definitions

None

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

2. DETAILED EVALUATION

2.1 Description

Penetrations F-142-11 (Fire Door) and F-142-02 (3/4" pipe for fire door fusible link cable) are located in the north wall of the Clean and Dirty Oil Tank Room. This is an Appendix R 3-hour fire barrier yet the penetrations are not qualified 3-hour fire barriers because the fire door does not have the 4" over lap required by NFPA 80 when closed and the 3/4" pipe does not have a fire barrier installed. Note that installation of a barrier in penetration F-142-02 would prevent the fusible linkage from performing its design function of closing the door if it was open. Normally the door is closed.

The associated drawing F-142, Sheet 2 shows the penetrations as being acceptable as is and an engineering evaluation was performed (Ref. 8) noting the fire door is acceptable as is. However even though the penetrations are acceptable as installed, no approved 86-10 evaluation as been found for the two penetrations not having three-hour fire barriers installed.

Penetrations F-143-09 (Fire Door) and associated 3/4" pipe for fire door fusible link cable are located in the west wall of the Clean and Dirty Oil Tank Room. This is an Appendix R 3-hour fire barrier yet the penetrations are not qualified 3-hour fire barriers because the fire door does not have the 4" over lap required by NFPA 80 when it is closed and the 3/4" pipe does not have a fire barrier installed. Note that installation of a barrier in the 3/4" pipe penetration for the fusible linkage cable would prevent the fusible linkage from performing its' design function of closing the door if it was open. Normally the door is closed.

The associated drawing F-143, Sheet 2 shows the fire door as being acceptable as is and an engineering evaluation was performed (Ref. 11) noting the fire door is acceptable as is. However even though the penetrations are acceptable as installed no approved 86-10 evaluation as been found for the two penetrations not having three-hour fire barriers installed.

2.2 Assumptions

No documentation has been found qualifying the fire doors and associated fusible link cable penetrations as 3-hour fire barriers. Therefore the assumption has been made that the doors and fusible linkage penetrations are not qualified as nor do they contain 3-hour fire barriers. Thus an 86-10 evaluation is required to document the acceptability as installed.

All existing fire protection features are appropriately maintained to perform their intended design functions.

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

2.3 Safe Shutdown Capability

Security Related Information
Text Withheld Under 10 CFR 2.390

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

Security Related Information
Text Withheld Under 10 CFR 2.390

2.4 Fire Protection Equipment

Security Related Information
Text Withheld Under 10 CFR 2.390

2.5 Fire Hazards Analysis

Clean and Dirty Oil Tank Room (Fire Zone 8.1)

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

Security Related Information
Text Withheld Under 10 CFR 2.390

EC EVAL 360923
86-10 Evaluation of Clean & Dirty
Oil Tank Room Fire Barriers

- 11) EC EVAL 349956, Evaluation of Fire Door 46 West Sliding Door of the Clean and Dirty Oil Storage Room
- 12) NRC Safety Evaluation Report (SER) from B.L. Siegel to H.E. Bliss Dated January 5, 1989.

Tab H

Engineering Change

Print Date: 07/14/04

EC Number : 0000349956 000
Status/Date : CLOSED 07/14/04
Facility : DRE
Type/Sub-type: EVAL MECH



Page: 1

EC Title: FIRE DOOR 46 ACCEPTABILITY EVALUATION (CLEAN & DIRTY OIL TANK RM)

Mod Nbr : KW1: FIRE KW2: DOOR KW3: 46 KW4: KW5:

Master EC : N	Resp Engr : DRD08	Temporary : N
Outage : N	Work Group :	Aprd Reqd Date:
WO Required :	Alert Group: SEB	Exp Insvc Date:
Adv Wk Appvd:	Image Addr :	Expires On : 03/27/07
Auto-Advance: Y	Alt Ref. :	Auto-Asbuild : N
Caveat Outst:	Priority :	Discipline :
Department :		
Location :		

Milestone	Date	PassPort	Name		Req By
110-PREPARE EC	07/01/04	DRD08	BEMBNISTER	PAUL	APPROVED
120-REVIEW EC	07/01/04	DRD08	BEMBNISTER	PAUL	APPROVED
Dave Knox per phone conversation.					
300-APPROVE EC	07/01/04	DREUY	KISH	JOHN	APPROVED
900-ARCHIVE EC	07/14/04	ELGBC	COOLEY	BERLINDA	CLOSED

Units

02 UNIT TWO

Systems

41 FIRE PROTECTION

Cross References

Ref.	Sub-	
Type	Number	Description
AR	00231561	Fire door 46 failed DFPS 4175-07

Engineering Change Comments

Comments Last Updated By: DRD08 Last Updated Date: 06/29/04

Engineering Change

Number : 0000349956 000
ility : DRE
Type/Sub-type: EVAL MECH

Print Date: 07/14/04

Page: 1

Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : DREUY
Last Updated Date: 07/01/04
Text Status : UNLOCKED

EC-EVAL 349956

EVALUATION OF FIRE DOOR 46
WEST SLIDING DOOR OF THE CLEAN
AND DIRTY OIL STORAGE ROOM

Reason For Evaluation/Scope

During the performance DFPS 4175-07, Fire Door/Oil Spill Barrier Surveillance, it was noted that Fire Door 46, the sliding door on the west side of the Clean and Dirty Oil Storage Room, did not have 4" of over lap required by the procedure and NFPA 80 on the south or "front" side. CR 231561 was written to document the discrepancy found and despite the FIN Team working on the door the over lap on the bottom of the door would not exceed 3.25". This evaluation is being performed to determine if door is acceptable to use with an over lap of less than 4 inches.

Detailed Evaluation:

The purpose of fire door 46 is to prevent the spread of a fire between the Clean and Dirty Oil Storage Room (Fire Zone 8.1) and the Turbine Building ground floor between Units 2 & 3 (Fire Zone 8.2.5.C). NFPA 80 requires the door to over lap the opening by at least 4" on all sides. This requirement is met on all sides except the front (south) edge of the door. At the bottom half of the front edge the over lap falls off to only 3.25". The lack of the additional 7" may allow additional flame and heat to pass through the door.

There is no equipment or components in the clean and dirty oil storage room required for the safe shut down of the plant. If a fire were to occur in this area all methods of safe shut down would be available. (Ref. 4) If the fire were to occur in Turbine Building 517' elevation common area Appendix R Safe Shut Down Path, A2 or B2 would be used. (Ref. 7) Therefore even if a fire were to spread through the door it would not adversely affect the ability to safely shut down either unit at Dresden Station.

The purpose of the fire door is to contain a fire that may start in either area and prevent it from spreading as part of the fire protection system at Dresden Station. It is not a required Appendix R fire barrier. To the determine severity of any potential fire the combustible loading for each fire zone was obtained calculation DRE97-0105, Rev. 4, Determination of Combustible Loading (Ref. 2). The fire duration for each zone was then calculated using the Fire Severity Calculation given in Exelon Nuclear Combustible Loading Standard, NES-MS-5.1 (Ref. 01).

Fire Severity (min) = Fire Loading (BTU/ft2) x 60 min/hr
80,000 BTU/ft2/hr

With a combustible loading of 62 BTU/ft2 the Clean and Dirty Oil Storage Room, Fire Zone 8.1, has a fire load such that the fire would last less than a minute. The Turbine Building common area 517' elevation has a combustible loading of 34,721 BTU/ft2 and fire duration of 26 minutes. The above calculation shows that a fire in the Clean and Dirty Oil Storage

Engineering Change

Number : 0000349956 000
ility : DRE
Type/Sub-type: EVAL MECH

Print Date: 07/14/04

Page: 2

Room would not go past the fire door in its existing configuration. In addition if a fire in the Turbine Building Common Area was to get past the fire door it would find nothing to burn. Therefore the fire door is adequate in its present condition.

Additional assurance that a fire would not spread through the door is that automatic water sprinklers fire suppression systems are installed each area. Adequate cooling would be provided from these sprinklers to compensate for any heat passing through the fire door. The combination of fire door and sprinkler systems, and low combustible loading in each area will prevent a fire from spreading through Fire Door 46 with a minimum overlap of 3 inches.

Conclusion / Findings:

The existing Fire Door 46 is an acceptable fire barrier with a minimum of 3-inch overlap. The combination of the door, fire load in each area and the active automatic fire suppression system in each area will prevent a fire from spreading through the door.

References:

- 1) NES-MS-5.1, Rev.2; Exelon Nuclear Combustible Loading Standard
- 2) Calculation DRE97-0105, Rev.4, Determination of Combustible Loading
- 3) Drawing F-10-1, Rev. F; Detection and Suppression Turbine Building
and Floor Dresden Station Unit 2
- 4) Fire Protection Reports, Volume 1, Updated Fire Hazards Analysis, Amendment 13, Section 4.8.2 and Section 4.9.1
- 5) Professional Loss Control Inc.; An Analysis of Fire Doors in Nuclear Safety Related Areas at Dresden Nuclear Power Station, Units 2 & 3 for Commonwealth Edison Company, Revision 2, Submitted April 15, 1988.
- 6) NFPA 80, Standard for Fire Doors and Fire Windows, 1999 Edition
- 7) Fire Protection Reports, Volume 2, Appendix R Conformance (Sections III.G, III.J, and III.L) Safe Shutdown Report

Engineering Change

Number : 0000349956 000
ility : DRE
Type/Sub-type: EVAL MECH

Print Date: 07/14/04

Page: 3

Topic : MAINT NOTES
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 04/12/94
Text Status : UNLOCKED

VCODE: W120

Engineering Change

Number : 0000349956 000
ility : DRE
Type/Sub-type: EVAL MECH

Print Date: 07/14/04

Page: 4

Topic : XFR/EDS
From Panel : TIMD030

Last Updated By : EWCS
Last Updated Date: 05/27/99
Text Status : UNLOCKED

SEE DCR 990026 FOR BULK UPDATE OF EQ RELATED IND FIELD

Engineering Change

EC Number : 0000349956 000
ility : DRE
pe/Sub-type: EVAL MECH

Print Date: 07/14/04

Page: 1

Attributes

Attribute Sub-category: DAR

<u>Attribute Name</u>	<u>Value</u>	<u>PassPort</u>	<u>Date</u>
CC-AA-102 ATT 1A	FORM	DRD08	06/30/04

Tab I

Engineering Change

Company Name : EXELON GENERATION CO., LLC
EC Number : 0000400600 000
Status/Date : CLOSED 01/16/2015
Facility : DRE DRESDEN GENERATING STATION
Type/Sub-type: EVAL PROG

Print Date: 01/16/2015



Exelon.

Page: 1

EC Title: 86-10 EVALUATION ON FIRE DOORS 48A, 52A AND 116A

Mod Nbr : KW1: AQ KW2: 86-10 KW3: FIRE KW4: DOOR KW5:

Master EC : N Work Group : Temporary : N
Outage : N Alert Group: A8330NESTB Aprd Req'd Date:
WO Required : Image Addr : Exp Insvc Date:
Adv Wk Appvd: Alt Ref. : Expires On : 10/09/2017
Auto-Advance: Y Priority : Auto-Asbuild : N
Caveat Outst: Department : Discipline :
Resp Engr : HECTOR DATIL
Location :

Units

<u>Fac</u>	<u>Unit</u>	<u>Description</u>
DRE	00	COMMON UNIT

Systems

<u>Fac</u>	<u>System</u>	<u>Description</u>
DRE	41	FIRE PROTECTION

Engineering Change

EC Number : 0000400600 000
Status/Date : CLOSED 01/16/2015
Facility : DRE
Type/Sub-type: EVAL PROG



Print Date: 01/16/2015



Page: 1

EC Title: 86-10 EVALUATION ON FIRE DOORS 48A, 52A AND 116A

Mod Nbr : KW1: AQ KW2: 86-10 KW3: FIRE KW4: DOOR KW5:

Master EC : N	Work Group :	Temporary : N
Outage : N	Alert Group: A8330NESTB	Aprd Reqd Date:
WO Required :	Image Addr :	Exp Insvc Date:
Adv Wk Appvd:	Alt Ref. :	Expires On : 10/09/2017
Auto-Advance: Y	Priority :	Auto-Asbuild : N
Caveat Outst:	Department :	Discipline :
Resp Engr : HECTOR	DATIL	
Location :		

<u>Milestone</u>	<u>Date</u>	<u>PassPort</u>	<u>Name</u>	<u>Reg By</u>
110-PREPARE EC	01/13/2015	DATILHX	DATIL	HECTOR
Preparer is qualified PG-14, Fire Protection				
120-REVIEW EC	01/14/2015	SMERJX	SMERECKY	JACK
Independent Reviewer is PG-14 Qualified, Fire Protection				
210-DEPT RVW-EP	01/14/2015	BIEGJX	BIEGELSON	JASON
Approved by Programs Engineering Manager, qualified to ENANDG02				
300-APPROVE EC	01/14/2015	MADDBT	MADDEROM	BRIAN
All qualifications were reviewed and found appropriate for this Tech EVAL.				
The DG02 review of record was documented under the programs engineering interdisciplinary review. The requirement to complete a Design Attribute Review per CC-AA-102 has been waived by the DEM. HU-AA-1212 was completed SAT, with no requirement beyond station procedures.				
Brian T. Madderom 01/14/2015				
800-ATTR CLOSED	01/16/2015	VARNJN	VARNER	JENNIFER
				CLOSED

Units

<u>Fac</u>	<u>Unit</u>	<u>Description</u>
DRE	00	COMMON UNIT

Systems

<u>Fac</u>	<u>System</u>	<u>Description</u>
DRE	41	FIRE PROTECTION

Planning/Scheduling Information

Planning Start : Level of Effort:

<u>Planning Event</u>	<u>From Date</u>	<u>Thru Date</u>
100-PREP EVAL		

Engineering Change Comments

Engineering Change

EC Number : 0000400600 000
Facility : DRE
Type/Sub-type: EVAL PROG

Print Date: 01/16/2015



Exelon.

Page: 1

Topic : EVAL DETAILS
From Panel : TIME100

Last Updated By : DATIHX
Last Updated Date: 01/14/2015
Text Status : UNLOCKED

EC 400600
86-10 EVALUATION ON FIRE DOORS 48A, 52A AND 116A

1. Reason for evaluation

Security Related Information
Text Withheld Under 10 CFR 2.390

1.1 Scope

1.2 Licensing and Design Basis Security Related Information
Text Withheld Under 10 CFR 2.390

1.3 Definitions

2. Detailed evaluation

2.1 Description

Security Related Information
Text Withheld Under 10 CFR 2.390

2.2 Assumptions

Security Related Information
Text Withheld Under 10 CFR 2.390

2.3 Safe Shutdown Capability

Security Related Information
Text Withheld Under 10 CFR 2.390

Security Related Information
Text Withheld Under 10 CFR 2.390

2.5 Fire Hazards Analysis

Security Related Information
Text Withheld Under 10 CFR 2.390

EC 400600
86-10 EVALUATION ON FIRE DOORS 48A, 52A AND 116A

2.6 Attachments

None

3. Conclusion/Findings

Security Related Information
Text Withheld Under 10 CFR 2.390

4. References

Security Related Information
Text Withheld Under 10 CFR 2.390

EC 400600
86-10 EVALUATION ON FIRE DOORS 48A, 52A AND 116A

Prepared by: Hector Datil (see Passport for electronic signature) Dated: 01/13/15

Reviewed by: Jack Smerecky (see Passport for electronic signature) Dated: 01/14/15

Approved by: Jason Biegelson (see Passport for electronic signature) Dated: 01/14/15