APPENDIX 5.1

RESUMES OF FIRE PROTECTION ENGINEERS AND CONSULTANTS ON THE BYRON/BRAIDWOOD PROJECTS:

FIRE PROTECTION ENGINEERS

Carlos Javier Diaz

Thomas G. Hausheer

Eugene W. O'Donnell

CONSULTANTS

Ronald C. Adcock

James B. Biggins

Stanley J. Chingo

Noel F. Malicki

John A. Robinson

Robert J. Smith, Jr.

CARLOS JAVIER DIAZ

~~EDUCATION~~

9/81 to 12/83	~~Illinois Institute of Technology~~, Chicago, IL Degree/Major: Bachelor of Science in Fire Protection and Safety Engineering
9/79 to 5/81	~~Triton College~~, River Grove, IL Degree/Major: Associate of Science in Engineering

~~EXPERIENCE~~

6/2/86 to Present	~~Commonwealth Edison Company~~, Chicago, IL Nuclear Engineering Department Fire Protection Engineer - Responsibilities include monitoring the fire protection programs and activities at Braidwood, Byron and Zion Nuclear Stations to ensure compliance with NRC requirements, performing design reviews and working in the development and application of loss prevention and fire protection engineering applicable to the utility industry.
4/16/84 to 5/30/86	~~Commonwealth Edison Company, Byron Nuclear Station~~, Byron, IL Station Fire Protection Engineer - Responsibilities include the review of the Byron Station Branch Technical Position and applicable NFPA codes in order to ensure compliance of the station fire protection systems and programs. Required to interact directly with the Nuclear Regulatory Commission and offsite consultants during the licensing, startup and operational phases of Byron Units 1 and 2. Other responsibilities include reviewing and approving fire protection preoperational, acceptance and surveillance tests and modifications.
Summer of 1983	~~U.S. Department of Energy/Argonne National Laboratory~~, Argonne, IL Fire Prevention Engineer Trainee - Assisted in the testing of various smoke and heat detection systems throughout the site. Also participated in the inspection of site buildings to identify possible fire hazards and/or safety deficiencies. Involved in the development of preliminary design work for numerous automatic sprinkler systems.
~~PROFESSIONAL AFFILIATIONS~~	Member, National Fire Protection Association Member, Society of Fire Protection Engineers

EUGENE WILLIAM O'DONNELL

~~EDUCATION~~	~~Illinois Institute of Technology~~, Chicago, IL Degree/Major: Bachelor of Science in Fire Protection and Safety Engineering
9/81 - 5/82	~~Richard J. Daley College~~, Chicago, IL Major: Engineering
9/78 - 6/81	~~University of Illinois - Chicago~~, Chicago, IL Major: Engineering

~~EXPERIENCE~~

6/17/85 to Present	~~Commonwealth Edison Company, Braidwood Nuclear Station~~ Braidwood, IL Fire Protection Engineer - involved in development and implementation of the fire protection program. Write and review fire protection related procedures. Review applicable codes and regulations, including 10 CFR 50 Appendix R and identify any and all items of noncompliance. Witness fire brigade drills and assess effectiveness. Develop station pre-fire plans. Analyze and make recommendations for fire protection system impairments.
10/84 to 6/85	~~Kemper Group~~, Chicago, IL Technical Representative - responsible for HPR type inspections of various industrial and commercial facilities. Perform system testing to ensure compliance with applicable codes and insurance standards. Make recommendations as necessary.
5/83 to 10/84	~~Federal Signal Corporation~~, University Park, IL Systems Engineer - responsible for design of industrial, commercial, and municipal fire protection detection and alarm systems.

PROFESSIONAL AFFILIATIONS	Associate member, Chicago Chapter - Society of Fire Protection Engineers
	Member, National Fire Protection Association
	Member, National Fire Protection Association, Illiana chapter, Industrial Section
SEMINARS	Professional Loss Control:
	Fire Protection for Nuclear Power Plants (Oct. 1985) Fire Brigade Leadership (June 1985)

THOMAS G. HAUSHEER

EDUCATION

1979	Illinois Institute of Technology, Chicago, IL Degree/Major: B.S., Fire Protection and Safety Engineering
1970	Illinois Institute of Technology, Chicago, IL Degree/Major: B.S., Electrical Engineering

EXPERIENCE

12/79 to Present	Commonwealth Edison Company, Chicago, IL Nuclear Engineering Department Fire Protection Engineer - responsible for compliance with NRC and insurance company requirements, annual/triennial fire protection audits, and other associated fire protection activities at nuclear stations.
8/78 to 12/79	Attended Classes at IIT, received BS FPSE in December 1979.
10/74 to 8/78	Commonwealth Edison Company, Chicago, IL General Engineering/Principal Engineering, Technical Staff Crawford Station - responsible for conducting tests on various pieces of equipment at a fossil-fueled generating station.
1/71 to 10/74	Commonwealth Edison Company, Chicago, IL Engineering Department, Chicago North Division Engineering/General Engineer - designed 4-KV and 12-KV distribution facilities.
6/70 to 1/71	Commonwealth Edison Company, Chicago, IL Engineer - Industrial Relations Training Program

PROFESSIONAL AFFILIATIONS

Member, Chicago Chapter - Society of Fire Protection Engineers

Member, National Fire Protection Association, Industrial and Electrical Sections

Member, National Fire Protection Association, Illiana Chapter, Industrial Section

Member, Institute of Electrical and Electronics Engineers

Member, Society of Fire Protection Engineers

M&M Protection Consultants

PROFESSIONAL PROFILE

Ronald C. Adcock, P. E. - Fire Protection Consultant
M&M Consultants
A Risk Management Resource
of Marsh & McLennan, Inc.

PROFESSIONAL EXPERIENCE

Mr. Adcock is a member of the Gas and Electric Utility Unit-Midwest in the Chicago Office of M&M Protection Consultants. The Gas and Electric Utility Unit-Midwest provides fire protection consultation services to numerous utility companies which operate either fossil or nuclear fueled electric generating stations.

Mr. Adcock has expertise in both construction and operating station fire hazards for either fossil or nuclear generating stations. His experience includes conceptual design, fire hazards analysis preparation, review and revision, design document review, testing installed fire suppression systems and design modifications to installed systems. He has performed loss prevention inspections and design reviews for Nuclear Mutual Limited (NML). NML is a Bermuda based mutual insurance company providing property insurance for nuclear generating stations. He has a working knowledge of NFPA codes and also the U. S. Nuclear Regulatory Commission CMEB 9.5-1 "Guidelines for Fire Protection for Nuclear Power Plants."

Mr. Adcock's other experience includes two years with Rolf Jensen and Associates, Inc. where he provided fire protection consultation services to architects, developers, building owners and government agencies on a variety of projects including hospitals, libraries, military training facilities, office buildings and highway tunnel fire protection.

EDUCATIONAL EXPERIENCE

Mr. Adcock graduated with honors from Illinois Institute of Technology in 1979 with a B. S. in Fire Protection Engineering.

PROFESSIONAL ORGANIZATIONS

Mr. Adcock is a Registered Professional Engineer in the State of Illinois. He meets the qualifications of Member of the Society of Fire Protection Engineers and is also a member of the National Fire Protection Association.

January 1986

M&M Protection Consultants

PROFESSIONAL PROFILE

James B. Biggins - Fire Protection Associate
M&M Protection Consultants
A Risk Management Resource
of Marsh & McLennan, Inc.

PROFESSIONAL EXPERIENCE

Mr. Biggins joined M&M Protection Consultants in April 1985 and is a member of the Gas and Electric Utility Unit-Midwest in the Chicago Office of M&M Protection Consultants. This unit provides fire protection and boiler and machinery loss prevention services to major utilities. The services provided to those utilities include site surveys and fire protection consultation for new construction for both fossil and nuclear fueled generating stations. His responsibilities thus far include design review for various types of fire protection systems, loss prevention inspections and on-site reviews of fire protection systems for compliance with the applicable standards.

From 1980 to 1984, Mr. Biggins was employed by Millers National Insurance Company, under a cooperative education program. After completion of the company's management training program, he was assigned as a Loss Prevention Representative in the Chicago area. His responsibilities at this time included field inspections of risks, implementation of loss prevention activities and generation of related reports.

EDUCATIONAL EXPERIENCE

Mr. Biggins attended the Illinois Institute of Technology from 1979 to 1984 under a cooperative education program. In 1984 he received a Bachelor of Science Degree in Fire Protection and Safety Engineering.

PROFESSIONAL ASSOCIATION

Mr. Biggins is a registered Professional Engineer in Training in the State of Illinois. He was elected to the grade of Associate Member by the Society of Fire Protection Engineers in October 1985.

January 1986

M&M Protection Consultants

PROFESSIONAL PROFILE

Stanley J. Chingo - Fire Protection Consultant
M&M Protection Consultants
A Risk Management Resource
of Marsh & McLennan, Inc.

~~PROFESSIONAL EXPERIENCE~~

Mr. Chingo is a Fire Protection Consultant in the Gas and Electric Utility Unit-Midwest of M&M Protection Consultants (M&MPC) that services the electric and gas utility industries. He conducts loss prevention surveys, evaluates property and business interruption loss exposures and prepares engineering solutions to potential hazards. Foremost, he advises utility management in the development and implementation of loss control programs.

Since September 1984, M&MPC has been performing an evaluation of the fire protection program at the Braidwood Nuclear Station with Mr. Chingo supervising the project. He is responsible for managing the overall review in accordance with NRC requirements, NFPA codes, technical specifications, and the Fire Hazard Analysis. Mr. Chingo was also part of the M&MPC team that performed a similar review of Commonwealth Edison Company's Byron Station in 1984. Mr. Chingo has also participated in annual and triennial fire protection audits at several nuclear power plants.

Mr. Chingo is a Nuclear Generating Station Consultant to Nuclear Mutual Limited (NML) and Nuclear Electric Insurance Limited (NEIL). His responsibilities include design reviews, plant inspections and consultation on hazard control. He also assists the NML Loss Prevention Supervisor in developing loss prevention standards, reviewing reports, and conducting special studies on property loss prevention matters.

Mr. Chingo has given formal presentations and publications entitled:

"Fire Protection for Electrical Cables," Illiana Chapter of NFPA's Industrial Section (March 1982).

"Coal Characteristics - A Fire Protection Analyses," Coal Technology '82 Conference, Houston, Texas (December 1982).

IEEE Standard 690 - 1984, "Standard for the Design and Installation of Cable Systems for Class 1E Circuits in Nuclear Power Generating Stations."

M&M Protection Consultants

Professional Profile
Stanley J. Chingo
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Prior to joining M&MPC in August 1980, Mr. Chingo was previously employed from April 1977 to August 1980 by Industrial Risk Insurers as a Fire Protection Engineer. In March 1979 he was promoted to District Supervising Engineer and was responsible for managing field engineers, conducting underwriting account reviews, and coordinating loss investigation and adjustment. His overall administrative responsibility for loss prevention included a wide variety of industry such as steel mills, chemical manufacturing plants, and hospital facilities.

EDUCATIONAL EXPERIENCE

Mr. Chingo is a 1976 graduate from the University of Michigan with a Bachelor of Science Degree from the College of Engineering. He has continued education in the Insurance School of Chicago enrolling in risk management courses. He has completed in-house programs by Industrial Risk Insurers that included the Fire Protection Lab course (1978) and the American Management Association course in Supervisory Management (1979).

PROFESSIONAL ASSOCIATIONS

Mr. Chingo, a member of the National Fire Protection Association, has attained the grade of Member in the Society of Fire Protection Engineers.

He is also a member of several Institute of Electrical and Electronics Engineers (IEEE) Standard Writing Committees.

January 1986

M&M Protection Consultants

PROFESSIONAL PROFILE

Noel F. Malicki - Fire Protection Consultant
M&M Protection Consultants
A Risk Management Resource
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~~PROFESSIONAL EXPERIENCE~~

Mr. Malicki is a Fire Protection Consultant in the Gas and Electric Utility Unit-Midwest. This unit specializes in providing loss prevention services for fire protection and boiler and machinery activities. These services are provided to the nuclear and fossil fuel fired generating utilities and natural gas utilities. The responsibilities of this position are to coordinate and supervise loss prevention functions such as inspections, hazard analysis, design reviews, and other loss prevention activities for the utility industry.

Mr. Malicki is a qualified Inspector-Contractor for the Nuclear Mutual Limited.

Mr. Malicki joined M&M Protection Consultants in 1979 consulting to various highly protected risk corporations in property loss prevention activities and acting as a liaison in their dealings with engineering departments of the various insurance carriers.

Mr. Malicki was previously employed by Industrial Risk Insurance from 1976 to 1979 achieving the position of engineer. During this time he conducted field inspections of highly protected risk properties. He completed a six month training program which included a four-week laboratory course in Hartford, Connecticut, in fire protection engineering.

Prior to his experience with the IRI, Mr. Malicki worked with McCormick Place Convention Center dealing with the Fire Safety/Security Systems.

~~EDUCATION EXPERIENCE~~

Mr. Malicki attended the University of Illinois and received a Bachelor of Science Degree in Management.

M&M Protection Consultants

Professional Profile
Noel F. Malicki
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MILITARY EXPERIENCE

U.S. Air Force
Ground Radio Communication Technician
Active Duty 1968 to 1972
Honorable Discharge

PROFESSIONAL ASSOCIATIONS

Mr. Malicki is a member of the National Fire Protection Association.

January 1986

M&M Protection Consultants

PROFESSIONAL PROFILE

John A. Robinson - Fire Protection Consultant
M&M Protection Consultants
A Risk Management Resource
of Marsh & McLennan, Inc.

~~PROFESSIONAL EXPERIENCE~~

Mr. Robinson is located in the Chicago office of M&M Protection Consultants. He is a member of the Gas and Electric Utility Unit-Midwest which provides fire protection consultation for approximately twenty (20) utility companies, located throughout the United States.

He has a working knowledge of U.S. Nuclear Regulatory Commission APCSB - BTP 9.5-1 "Guidelines for Fire Protection for Nuclear Power Plants," Nuclear Mutual Limited and the American Nuclear Insurers requirements and philosophies.

Mr. Robinson has also appeared as an expert witness before the Nuclear Regulatory Commission and is a certified "Lead Auditor" in accordance with ANSI N 45.2.23, Appendix "A."

Mr. Robinson presented various papers among which are "Fire Hazard Analysis of Nuclear Power Stations - A Systems Approach," New Demands in Hazard Control in the Utility Industry," Fire Protection Considerations for Generating Stations Under Construction" which was published in Electric Light & Power magazine and "Property Loss Prevention Criteria as applied to Coal Gasification Projects." He participated in a national consensus standards writing group by his membership on the American Nuclear Society (ANS) 59.2 - HVAC Systems, Important to Safety, Located Outside Primary Containment.

From January 1971 to September 1973, Mr. Robinson was a Technical Representative in the Highly Protected Risk Department of the Kemper Insurance Company where he received extensive specialized training in fire protection engineering. He reviewed engineering drawings for various types of fire protection systems.

From September 1969 to January 1971, Mr. Robinson was a Product Engineer and Laboratory Supervisor for a specialized job production shop. In this capacity, he supervised the Engineering Laboratory, made product evaluations, developed methods used in the assembly of new products and developed quality control procedures.

M&M Protection Consultants

Professional Profile
John A. Robinson
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From March 1968 to September 1969, Mr. Robinson was an Assistant Metallurgist at a forging company. He was responsible for the quality assurance testing of various semi-finished drop forged products which included metallographic microscopic examinations, tensile testing, impact testing and various non-destructive testing.

EDUCATIONAL EXPERIENCE

Mr. Robinson attended Illinois Institute of Technology and received his B.S. in Interdisciplinary Engineering (Electrical and Metallurgical options) from Purdue University in 1978.

Mr. Robinson completed a course at Northwestern University entitled "Safety of Light-Water-Cooled Nuclear Power Plants" in September 1979.

Mr. Robinson completed a course at the Hartford Steam Boiler entitled "Reactor Plant Technology."

PROFESSIONAL ASSOCIATIONS

Mr. Robinson is a Registered Professional Engineer in the State of Illinois. He is a member of the Society of Fire Protection Engineers and National Fire Protection Association.

January 1986

M&M Protection Consultants

PROFESSIONAL PROFILE

Robert J. Smith, Jr. - Fire Protection Consultant
M&M Protection Consultants
A Risk Management Resource
of Marsh McLennan, Inc.

PROFESSIONAL EXPERIENCE

Mr. R. Smith, Jr. is a Fire Protection Consultant in the Gas and Electric Utility Unit-Midwest in the Chicago Office of M&M Protection Consultants.

The Gas and Electric Utility Unit specializes in providing fire protection and boiler and machinery engineering loss prevention services to the utility industry. These services are provided to the nuclear and fossil fuel fired electric generating utilities and natural gas utilities. Mr. Smith's responsibilities involve coordinating and supervising all consulting on account under his responsibility. These consulting activities consist of coordinating loss prevention inspections, performing hazard analysis and inspections, applying and recommending fire protection and loss pnevention engineering, performing design reviews and working in the development and application of loss prevention and fire protection engineering applicable to the utility industry.

Mr. Smith is a qualified Nuclear Generating Station Consultant and services the Nuclear Mutual Limited (NML) account. Mr. Smith's primary responsibilities as a qualified nuclear consultant servicing the NML account including coordinating and applying the NML Property Loss Prevention Standards, liaison with members within, and associated with, the Nuclear Mutual Limited concerning loss prevention related matters, perform plant inspections, witness, audit and approve plant testing and programs related to fire protection and loss prevention matters. His responsibilities also include design consultation and review of systems, equipment and construction and provide general loss prevention consultation.

Mr. Smith also consults to the Nuclear Electric Insurance Limited (NEIL) Account. This involves applying the NEIL Loss Prevention Standards related to property protection and loss prevention.

Mr. Smith was formerly employed at Factory Mutual Engineering Division as a Loss Prevention Consultant for two years prior to joining M&M Protection Consultants. His responsibilities included providing fire protection engineering and loss prevention consultation, relating to the various hazards and occupancies associated with the industrial community. Consulting included performing loss prevention inspections, recommending and making the fire protection analysis required for the various hazards and performing general design reviews as related to the property protection.

M&M Protection Consultants

Professional Profile
Robert J. Smith, Jr.
Page 2

Mr. Smith has also been involved with the training of Loss Prevention Consultants.

In 1978, Mr. Smith addressed the Annual Convention of American Physics Teachers, related to his research project which was under development during his senior year of college.

~~EDUCATIONAL EXPERIENCE~~

In May of 1978, Mr. R. Smith, Jr. received a Bachelor of Science Degree in Physics and Mathematics from Valparaiso University.

~~PROFESSIONAL ASSOCIATIONS~~

Mr. Smith is a member of the National Fire Protection Association and an Associate Member of the Society of Fire Protection Engineers. Mr. Smith is an alternate member on the NFPA 214 committee for the Standard on Water Cooling Towers.

January 1986

APPENDIX 5.2

CABLE SYSTEMS CRITERIA

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APPENDIX 5.2 CABLE SYSTEMS CRITERIA

A5.2.1 CABLE DERATING AND CABLE TRAY FILL

Cable Ampacities

The allowable current-carrying capacities (ampacities) for the various power cables and control cables are in accordance with IPCEA P-46-426, 1962, "Power Cable Ampacities - Volume I - Copper Conductors" and IPCEA P-54-440, 1972, "Ampacities - Cables in Open-Top Cable Trays." The ampacities listed in the IPCEA Standards are derated, as required, to account for cables installed in trays with solid covers and cables installed in areas with ambient temperatures greater than 40°C.

Cable Tray Loading

The quantity of cable in any cable tray (power, control, or instrumentation) does not exceed the maximum number determined by the simultaneous application of the following three restraints:

a. Conductor Temperature (Heat Generation)

The quantity of cable in any cable tray (power, control, or instrumentation) may be limited by the allowable conductor temperatures. The conductor temperatures are held within the cable rating by assigning conductor ampacities which include the effect of appropriate derating factors (as described under "Cable Derating").

b. Tray Capacity

The quantity of cable in any tray (power, control, or instrumentation) is limited by the net usable cross-sectional area of that tray. All cables are below the level of the top of the side rail of the tray.

Cable insulation is protected by an overall jacket. Calculations were performed (after the cable was selected and after the trays were designed) to demonstrate that there will be no failure of cable insulation of the bottom layers of cable due to compacting (plastic flow) over the design life of the plant. These calculations verified that the loading was conservative, and for the worst possible case, the stress produced in the cable is less than the allowable stress which the cable supplier recommended.

c. Structural (Load-Bearing) Capacity of Trays and Supports

The quantity of cable in any tray (power, control, or instrumentation) may be limited by the structural capacity of the trays and their supports. The trays are designed to carry a distributed load of 40 lb/ft^2, plus a 200-lb man (concentrated load) located in the middle of an 8-foot span, with a total deflection not to exceed 0.5 inch. Tests have been performed (and documented) to confirm the adequacy of the cable tray design. The total loading, when the installation is completed, will not exceed the allowable stress for the materials used under either the static or the seismic loading conditions and detailed in Chapter 3.0, Section 3.10 of the FSAR.

A5.2.2 FIRE DETECTION AND PROTECTION IN AREAS WHERE CABLES ARE INSTALLED

The plant's fire detection system consists of detectors which are required by the fire hazards analysis and located in zones covering strategic areas throughout the station. The cable spreading room, the control room, the battery room, cable penetration areas inside and outside the containment, and the computer room are included. Any fire (or fire detection system trouble) is annunciated in the main control room.

Fire Suppression for Cable Spreading Areas

a. upper cable spreading room

1. automatic Halon 1301 system,

2. manual carbon dioxide system and

3. manual water hose stations.

b. lower cable spreading room

1. automatic carbon dioxide system, and

2. manual water hose stations.

Cable trays located outside of the cable spreading rooms do not have special fire suppression or detection systems dedicated specifically to them. However, cable trays which are located in a hazardous area which has a fire suppression system or fire detection system will inherently receive fire protection.

Fire Stops

Details for fire stops for conduit, cable tray, and cable riser penetrations through walls and floors have been developed. Fire stops are provided wherever cables penetrate fire barrier walls or floors. The rating of the fire stop is determined by testing and is consistent with the fire rating associated with the wall or floor being penetrated as determined by the results of the fire hazard analysis. Documented records of inspections are used to verify that each fire stop and seal has been properly installed.

Relaxed criteria for installation of internal conduit seals may be utilized at Byron and Braidwood as follows:

a. Conduits that terminate in junction boxes, pull boxes, or other noncombustible closures need no additional sealing. Panels or Electrical Metallic Tubing (EMT) boxes should not be considered as an adequate closure. Conduits that run through an area but do not terminate in that area need not be sealed in that area.

b. Conduits smaller than 2" diameter that terminate 1 foot or greater from the barrier need not be sealed.

c. Conduits of 2" diameter that terminate 3 feet or greater from the barrier and have a cable fill of 25% or greater need not be sealed.

d. Conduits of greater than 2" diameter that terminate 3 feet or greater from the barrier and have a cable fill of 40% or greater need not be sealed.

e. An approved seal detail that is normally used on both sides of the barrier may be installed on one side only provided one of the above configurations (A through D) exists on the other side.

Conduit terminations that do not meet the above criteria should be sealed internally with a noncombustible seal, either at the barrier or on that side of the barrier. These criteria should be applied to the conduit terminations on both sides of fire-rated barriers that separate fire areas.

These criteria may be used for both initial installation of new internal conduit seals, or to relax surveillance and repair requirements for existing conduit seals. Noncombustible seals are not required to maintain the rating of a fire-rated barrier and, therefore, are not an integral component of a fire-rated assembly. Noncombustible seals are installed to limit the spread of smoke and hot gases.

A5.2.3 PHYSICAL INDEPENDENCE OF REDUNDANT SYSTEMS

A5.2.3.1 Criteria and Design Basis

The power, control, and instrumentation cables for redundant circuits associated with the engineered safety features (ESF) system and the reactor protection system are physically separated in accordance with IEEE Standards 279-1971, 317-1972, 384-1974, and NRC Regulatory Guides 1.32 and 1.75 to assure that no single design-basis event will prevent operation of redundant functions. Physical separation of cables is obtained by the division of the cable tray and conduit system into two ESF divisions, two non-Class 1E divisions, and four reactor protection and control channels. Class 1E equipment with redundant safety functions are physically separated in accordance with IEEE Standard 384-1974. Non-Class 1E components are electrically isolated from the Class 1E system by acceptable isolation devices.

A5.2.3.2 Cable Tray, Cable Penetrations, and Conduit System Design Basis

Steel cable trays are provided throughout the station. Cable ampacities were determined in accordance with the standards of the Insulated Power Cable Engineers Association (IPCEA) as detailed in Section A5.2.1. The cable trays are of the solid bottom, uncovered type and are generally 6 inches maximum in depth. Exceptions to the solid-bottom trays are the open-bottom, ladder-type tray construction that is used (1) to facilitate cable entry to equipment (e.g., switchgear, motor control centers, etc.), and (2) to allow the routing of cables from one tray to another directly above or below.

Trays with more than a 6-inch depth were installed in some instances (e.g., cable tray risers, tray intersections, at the interface between the tray systems, and the reactor containment electrical penetrations, etc.). The trays of increased depth were provided to allow for an orderly arrangement of cables within the trays. In each case, the deviations from the basic cable tray system design were limited by the allowable cable tray loading (for both physical and thermal considerations).

Solid covers were provided for all instrumentation cable trays. Solid covers were provided for power cable trays wherever (1) the power cable trays passed below control cable and/or instrumentation cable trays, or (2) the power cable trays were involved in approved reduced separation from the stated design objectives in Section A5.2.5.

A5.2.3.3 Cable Penetrations

The electrical penetrations are arranged in four groups, Groups 2 and 4 on the upper floor and Groups 1 and 3 on the lower floor, with a concrete floor between the upper and lower groups on the auxiliary building side. The two groups on each floor are spaced approximately 40 feet apart.

Cable separation criteria are applied as follows:

Group 1: ESF Division 11 Cables

Non-Safety-Related Division 11 Cables

Reactor Protection Channel I Instrumentation

Group 2: ESF Division 12 Cables

Non-Safety-Related Division 12 Cables

Reactor Protection Channel II Instrumentation

Group 3: ESF Division 11 Cables

Non-Safety-Related Division 11 Cables

Reactor Protection Channel III Instrumentation

Group 4: ESF Division 12 Cables

Non-Safety-Related Division 12 Cables

Reactor Protection Channel IV Instrumentation

The electrical penetrations meet the requirements of IEEE 317-1972 and IEEE 384-1974.

A5.2.4 CABLE DEFINITIONS AND RATING DESIGN BASIS

A5.2.4.1 Cable Definitions

a. Power Cables

Power cables are defined as those cables which provide electrical energy for motive power or heating to all 6600-Vac, 4000-Vac, 460-Vac, 208-Vac, 250-Vdc, and 125-Vdc loads. Cables which provide power from electrical energy sources to power distribution panels, regardless of voltage, are included in this definition. Generally, cables with #6 AWG and larger conductors are included in this category. Some 600-V, #10 and #14 AWG conductor cables are also included in this category; e.g., power feeds to valve motor operators.

b. Control Cables

Control cables are defined as those 120-Vac and 125-Vdc circuits (for example) between components responsible for the automatic or manual initiation of auxiliary electrical functions and the electrical indication of the state of auxiliary components. When applying this criterion, cables which supply electrical energy from distribution panels to 120-Vac and 125-Vdc instrumentation, control, and alarm circuits are treated as control cables. Generally, all 600-V cables with #10 and #14 AWG conductors, except those three-conductor cables which are power cables, are included in this category.

c. Instrumentation Cables

Instrumentation (signal) cables are defined as those cables conducting low-level instrumentation and control signals. These signals are either analog or digital. Typically, those cables which carry signals from thermocouples, resistance temperature detectors, transducers, neutron monitors, etc., to E/P converters, indicators, recorders, and computer input circuits, carrying signals of less than 50 milliamperes, are included in this category. Generally, instrumentation cables are one of the following types:

1. #16 AWG, twisted, shielded conductor pairs,

2. #20 AWG, chromel-constantan conductor pairs, and

3. coaxial or triaxial.

A5.2.4.2 Cable Derating (Cable Ampacities)

The allowable current-carrying capacities (ampacities) for the various power cables and control cables (where applicable) are in accordance with AIEE/IPCEA "Power Cable Ampacities - Volume I - Copper Conductors" (Section A5.2.1). The specific ampacity for each cable size was determined by applying the appropriate derating factors, thus obtaining the ampacity for cables in solid metal trays without maintaining spacing. For applications inside the containment, the ampacities were further adjusted (reduced) to account for the higher expected ambient temperature.

A5.2.5 PHYSICAL SEPARATION CRITERIA

A5.2.5.1 Class 1E Equipment Separation

Class 1E components of an ESF division are physically separated from Class 1E components of the unit's other ESF division as well as from non-Class 1E high energy components that could cause loss of redundancy as the result of a design-basis event effecting failure of these components. The separation of Class 1E components is in compliance with IEEE 384-1974. Redundant Class 1E power sources and electrical distribution equipment are located in physically separate Seismic Category I structures.

The main control board is segregated into separate section for control of the plant main power generation and auxiliary systems. Each section containing wiring and control equipment for a specific ESF division is physically separated by fireproof barriers from other sections of the MCB.

A5.2.5.2 Raceway Separation Criteria

Cable Tray Segregation

a. ESF and non-safety-related divisional trays are separated into four divisions per unit:

    1. ESF division 11 (21) (for segregation code 1E) (Note: 1A cables allowed in tray),

    2. ESF division 12 (22) (for segregation code 2E) (Note: 2A cables allowed in tray),

    3. non-safety-related division 11 (21) (for segregation code 1B cables), and

    4. non-safety-related division 12 (22) (for segregation code 2B cables). (Note: NIS signal (triaxial) cable shall be run in iron conduit)

b. Trays for reactor protection and reactor control (RPS) are separated into four channels, each separate from the other channels, and separated from all other trays, as follows:

    1. RPS channel I (for segregation code cables 1R and 1N),

    2. RPS channel II (for segregation code cables 2R and 2N),

    3. RPS channel III (for segregation code cables 3R and 3N), and

    4. RPS channel IV (for segregation code cables 4R and 4N).

c. Cable ladder (rack) trays are installed above 480-V MCCs and 480-V switchgear, rod position indication data cabinet and reactor head area, where top entry is required. Power and control cable segregation is maintained, where practical, to the point of entering this equipment.

Cable Tray Separation

a. Minimum spacing for engineered safety features (ESF) divisions and reactor protection system (RPS) channels are:

1. Between redundant ESF division or redundant RPS channels: vertical - (5 feet 0 inch) metal to metal, horizontal - (3 feet 0 inch) metal to metal. This separation requirement holds for general plant areas.

2. Between redundant ESF division or redundant RPS channels: vertical - (3 feet 0 inch) metal to metal, horizontal - (1 foot 0 inch) metal to metal. This separation requirement holds for the cable spreading areas and for those other areas where high energy electrical equipment (switchgear, transformers, rotating equipment, etc.) is excluded and power cables are installed in enclosed raceways that qualify as barriers or there are no power cables.

3. Between power trays within the same ESF division (or between control trays in the same ESF division or between instrument trays in the same ESF division or between trays in the same RPS channel): vertical - (1 foot 0 inch) metal to metal, horizontal - (3 inches) metal to metal.

4. Horizontal and vertical spacing between power and instrument trays within the same division are a minimum of (1 foot 8 inches) metal to metal.

5. Horizontal and vertical spacing between control and instrumentation trays within the same division are a minimum of (1 foot 0 inch) metal to metal.

6. In the case of a control cable tray passing (crosswise) over or under an instrument cable tray within the same division, the minimum vertical spacing is 6 inches.

b. Basic separation for non-safety-related cable trays is:

1. 3 inches horizontal, metal-to-metal; and 12 inches vertical, metal-to-metal;

2. horizontal and vertical spacing between power and instrument trays are a minimum of (1 foot 8 inches) metal to metal;

3. horizontal and vertical spacing between control and instrument trays are a minimum of (1 foot 0 inch) metal to metal; and

4. in the case of a control cable tray passing (crosswise) over or under an instrument cable tray, the minimum vertical spacing is 6 inches.

c. Where termination arrangements or space limitation preclude maintaining the above minimum space separations, the redundant cables are run in enclosed raceways that qualify as barriers, or other barriers shall be provided between redundant cables. The minimum distance between these redundant enclosed raceways and between barriers and raceways is 1 inch.

Conduit Segregation

All conduit qualify as barriers. The same rules have been applied to conduit segregation as were applied to cable tray segregation.

Conduit Separation

a. All power, control, and instrumentation cables are run in separate conduit.

b. The minimum allowable separation between conduit in redundant ESF divisions is 12 inches. However, where practical, the separation between conduits in redundant ESF divisions is the same as for cable trays.

c. For instrument conduit within the same ESF division, or related RPS channel, the following separation distances apply:

1. Minimum vertical and horizontal separation between instrument conduit and control cable conduit is 1 inch.

2. Minimum vertical and horizontal separation between instrument conduit and power cable conduit is:

a) Shielded instrument cables in conduit running parallel to power cables in conduit where the parallel run is less than 100 feet have 1 inch minimum separation. If the conduits run parallel for a distance greater than 100 feet, 1 inch separation is used in some cases for a distance not exceeding 100 feet, the remaining separation is 3 inches minimum. Where practicable, the 3-inch minimum separation has been maintained.

b) Unshielded instrument cables in conduit are run a minimum of 3 inches from control cables in conduit and 20 inches from power cables in conduit.

d. The minimum vertical and horizontal separation between conduit in redundant RPS and NIS channels is 24 inches.

Nuclear instrumentation system (NIS) signal (triaxial) cables are run in steel conduit. The conduit fill is limited to 25% and minimum bending radius is 12 inches. The maximum straight run of conduit is 100 feet, or, where a 90° bend occurs, the straight run is 10 feet maximum.

e. NIS triaxial cable conduit is separated from electrical noise sources by the following distances:

   1. control or low voltage power cable in conduit - 24 inches;

   2. medium voltage power cables in conduit - 6 feet (72 inches); and

   3. control, low, and medium voltage cables in trays - 6 feet (72 inches).

f. Where instrument cable (other than NIS triaxial) conduit and cable trays within the same division are installed adjacent to each other the following separations apply:

   1. instrument conduit to power cable tray - 20 inches,

   2. instrument conduit to control cable tray - 3 inches,

   3. control cable conduit to instrument cable tray - 12 inches; and

   4. power cable conduit to instrument cable tray - 20 inches.

A5.2.6 CABLE SEPARATION CRITERIA

A5.2.6.1 Cable Segregation

A segregation code assigned to each cable was used to check all cables routed in cable trays or conduit for compliance with the required segregation. This cable segregation code appears in the installation cable tabulation and on applicable physical installation drawings. The segregation code consists of one or more characters as indicated in the following table:

Unit Number	Type	Division	Category
1	P	1	E
2	C	2	B
	K	3	R
		4	N
		A	A

Type: P = Power
C = Control
K = Instrumentation

Division: ESF or non-safety-related divisions 1 or 2
RPS input channels 1, 2, 3 or 4
RPS output channels A or B
NIS channels 1, 2, 3 or 4

Category: E = engineered safety feature
B = non-safety-related
R = reactor protection
N = neutron monitoring
A = associated cables that share a power supply, enclosure, or raceway with Class 1E cables (cable category only).

Cable separation is accomplished using this segregation coding of each cable. Each cable associated with safety-related equipment is classified as Class 1E, and so segregated. These cables are assigned to ESF division 11 (21) or 12 (22). Each non-Class 1E cable which has any part of its length in a Division 11 (21) or 12 (22) tray, connects to a Class 1E power system, shares an enclosure with a Class 1E circuit, or is not physically separated from Class 1E cables by acceptable distance or barriers, is a division-associated cable (Category A).

A5.2.6.2 Cable Routing

Cables associated with the ESF equipment are routed only in cable trays associated with their respective division. A cable associated with ESF equipment of one division has no portion of its run in any cable tray assigned to another ESF division. The following cable and tray segregation code rules have been adhered to in the routing of all cables:

a. Unit number for a cable and the tray in which it is run must agree.

b. Type and division codes of a cable must agree with the corresponding codes for the tray.

c. Cable category code must agree with the tray category code insofar as the table below specifies:

Cable Category	Tray Category E	B	R	N
E	X			
B		X		
R			X	X
N			X	X
*A	X			

*All "A" cables in Safety Category II Structures shall be installed in conduit.

In the case of Class 1E cables associated with redundant ESF equipment enters a common switchboard, such as the unit's main control board, the installation of barriers and the physical separation of the board's internal wiring and in compliance with those procedures set forth in IEEE 384-174.

A5.2.7 REFERENCES

General Design Criteria

"Appendix A - General Design Criteria for Nuclear Power Plants," 10 CFR 50, U.S. Atomic Energy Commission (July 7, 1971).

a. GDC 17 - Electric Power Systems

b. GDC 21 - Protection System Reliability and Testability

c. GDC 22 - Protection System Independence

Regulatory Guides

Regulatory Guide 1.75 - "Physical Independence of Electric System," U.S. Nuclear Regulatory Commission, Rev. 1, January 1975.

Other Design Criteria - IEEE Standards

IEEE 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Station."

IEEE 317-1972, "Criteria for Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Station."

IEEE 384-1974, "IEEE Trail-Use Standard Criteria for Separation of Class 1E Equipment and Circuits."

APPENDIX 5.3

CLASSIFICATION CRITERIA FOR

SAFETY-RELATED

STRUCTURES, SYSTEMS, AND COMPONENTS

1.0 SCOPE

The purpose of this Criteria is to establish the scheme by which structures, systems and components are classified in relation to their importance to safety. This Criteria also sets the general classification of the major structures, systems and components and is to be used as the basis for establishing the more detailed classification required in project documents such as Design Criteria, Equipment, Valve and Piping Lists and Cable Tabulations.

2.0 REFERENCES

2.1 10 CFR 50 Appendix A
2.2 Regulatory Guide 1.29
2.3 10 CFR 50 Appendix B
2.4 Regulatory Guide 1.26
2.5 Byron/Braidwood FSAR, Chapter 3.0
2.6 Regulatory Guide 1.32
2.7 RESAR, Chapter 3
2.8 Byron EC 626662, Reclassify ASME III FP Piping/valves/components in seismically qualified areas

3.0 DEFINITIONS

3.1 Safety Classification - Structures, systems and components are classified for design purposes as either Safety Category I or Safety Category II. Systems and Components are further classified by the appropriate Quality Group (See 3.4 below) or Class IE designation (See 3.5 below) as applicable.

3.2 Category I structures , systems, and components are those necessary to assure: (a) the integrity of the reactor coolant pressure boundary, (b) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (c) the capability to prevent or mitigate the consequences of accidents which could result in off-site exposures comparable to the guideline exposures of 10 CFR 100 for accidents analyzed using TID-14844 and 10 CFR 50.67 for accidents analyzed using alternative source term in the postulated event of the safe shutdown earthquake (SSE) or other design basis events including tornado, probable maximum flood, operating basis earthquake (OBE), missile impact, or accident internal to the plant.

At Byron, the majority of the Fire Protection system piping and components previously classified as Safety Category I, Quality Group C have been reclassified as Safety Category II, Quality Group D (ref. EC 626662); and remains classified as Safety Category I. Categories I or II as indicated in the Fire Protection Report refer to Safety Category unless a specific reference to Seismic Category is made.

3.3 Category II - Those structures, systems, and components which are not designated as Safety Category I are designated as Safety Category II. This category has no public health or safety implication.

3.4 Quality Group Classification - The quality group classification system defined in Regulatory Guide 1.26, established for water-steam-containing components important to safety, is directly applicable.

3.5 Class IE - Electric Systems - Electric equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or otherwise are essential in preventing significant release of radioactive material to the environment.

3.6 Single Failure - A single failure is an occurrence which results in the loss of capability of a component to perform its intended safety functions when called upon. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electrical systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly); nor (2) a single failure of a passive component (assuming active components function properly) results in a loss of the design function.

3.7 Active Failure - An active failure is the failure of a powered component such as a piece of mechanical equipment, component of the electrical supply system or instrumentation and control equipment to act on command to perform its design function.

3.8 Passive Failure - A passive failure is the structural failure of a static component which limits the component's effectiveness in carrying out its design function.

3.9 Design Basis Event - A design basis event is a natural phenomenon or failure of a system, component or structure which is postulated to provide the basis for designing the safety-related aspects of the plant. Examples are safe shutdown earthquake (SSE), wind and tornadoes, probable maximum flood, missiles and loss of coolant accident (LOCA).

4.0 FUNCTIONAL REQUIREMENTS

4.1 Category I structures, systems and components shall perform their intended safety functions in the event of the safe shutdown earthquake (SSE) and other design basis events as identified in the applicable design criteria.

4.2 Category I structures, systems and components shall retain their own integrity and/or shall not constitute a hazard to other Category I structures, systems or components during the safe shutdown earthquake and other design basis events as identified in the applicable design criteria.

4.3 Category I systems and components shall perform their intended safety functions assuming a single failure and loss of off-site power.

4.4 The plant design shall ensure that Category II structures, systems or components do not constitute a hazard to Category I structures, systems or components during the safe shutdown earthquake and other design basis events.

5.0 DESIGN REQUIREMENTS

5.1 Category I systems and components shall not be located in Category II structures. Exceptions shall be evaluated on a case by case basis and design requirements established.

5.2 Systems or portions of systems which are designated Category I shall be identified as appropriate in the various design documents associated with that system.

5.3 The division between Category I and II portions of systems shall be in accordance with the intent of Regulatory Guide 1.29. The seismic design of Category I items is in accordance with the requirements of Regulatory Guide 1.29.

5.4 Quality Assurance Requirements for Category I systems or portions of systems and components shall meet the requirements of Appendix B to 10 CFR 50.

5.5 Category II structures, systems and components need not be specifically designed for dynamic operating basis-earthquake loadings; however, a reasonable margin of safety shall be considered in the design as dictated by local requirements, such as the Uniform Building Code.

5.6 Category II systems or portions of systems and components need not follow the requirements of Appendix B to 10 CFR 50; however, the Quality Assurance standards for these systems and components shall follow normal industrial standards and any other requirements deemed necessary.

6.0 SAFETY CLASSIFICATION

6.1 Table 1 indicates the overall correspondence between safety categories and Quality Groups and the general boundaries of systems to be considered part of each quality group.

6.2 FSAR Table 3.2-1 lists all major plant structures and components which shall be designated as Category I and their respective Quality Group/Electrical classifications. Table 3.2-1 also lists the major plant structures and components which shall be designated as Category II.

6.3 Table 2 gives a cross-reference which can be used to translate from the Westinghouse (RESAR or ANS) safety classification system to the classification system established in this document when utilizing more detailed Westinghouse documents such as the NSSS Standard Design Criteria.

7.0 TABLES

TABLE 1
RELATION BETWEEN QUALITY GROUP AND CATEGORY CLASSIFICATIONS

QUALITY GROUP	CATEGORY	GENERAL SYSTEM DESCRIPTION
A	I	Reactor coolant pressure boundary and extensions thereof.
B	I	Emergency core cooling, post-LOCA heat removal and cleanup, safe reactor shutdown and heat removal, portions of main steam and feedwater and other systems associated with containment isolation.
C	I	Systems required to support those in Quality Group B, spent fuel cooling, radioactive waste systems which normally contain a high level of radioactive material.
D	II	Parts of portions of systems which contain or may contain radioactive material and all other systems not characterized as Category I.

TABLE 2

CROSS REFERENCE FROM WESTINGHOUSE RESAR (ANS)

SYSTEM OF SAFETY CLASSIFICATION TO BYRON/BRAIDWOOD

SAFETY CLASSIFICATION SYSTEM

WESTINGHOUSE RESAR-3 (ANS SAFETY CLASS)	BYRON/BRAIDWOOD		ELECTRICAL EQUIPMENT SAFETY CLASSIFICATION
	QUALITY GROUP	SAFETY CATEGORY	
1	A	I	N/A
2	B	I	Class IE
3	C	I	Class IE/ Non-IE
NNS	D	II	Non-IE

NNS - Non Nuclear Safety

APPENDIX 5.4

FIRE PROTECTION SYSTEM DESCRIPTIONS

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APPENDIX 5.4 - FIRE PROTECTION SYSTEMS DESCRIPTIONS

The purpose of this appendix is to describe in detail the fire protection systems provided for Byron and Braidwood.

The fire protection systems have been designed in accordance with the applicable NFPA guidelines and any other codes and standards which apply to these systems. The overall fire protection is in agreement with NFPA Chapter 803 - "Fire Protection Guidelines for Nuclear Power Plants." This appendix is divided into eight sections. The sections deal with the fire sprinkler water supply system, deluge systems, automatic sprinkler systems, foam systems, Halon 1301 systems, carbon dioxide system, manual fire suppression systems, and the fire detection system.

The relationship of the fire protection systems to the electrical power supply is discussed in Appendix 5.2.

A single line electrical diagram of the fire protection system is provided in Figure A5.4-1. This diagram includes the automatic sprinkler, automatic deluge, Halon 1301, carbon dioxide and foam fire protection systems.

A matrix listing each fire protection zone, its primary and backup fire protection and fire detection is provided as Table A5.4-1.

References used in developing the fire protection systems discussions are listed below.

References

Mechanical Drawings
M-1 through M-22 General Arrangements
M-28 Fire Protection Piping and Outdoor Protection
M-52 Fire Protection
M-58 Carbon Dioxide and Hydrogen Systems
Sargent & Lundy Specifications
F/L-2811 Carbon Dioxide Storage Equipment
F/L-2817 Fire Protection Systems
F/L-2854 Fire Detection Systems
F/L-2869 Miscellaneous Vertical Pumps

A5.4.1 FIRE PROTECTION WATER SUPPLY SYSTEM

The fire protection water supply system is a direct pumping system with pumps taking suction from the basin of the natural draft cooling towers (at Byron) or the cooling lake (at Braidwood). This system supplies water to the plant fire hydrants, the water suppression systems, and the standpipe systems.

A cross-tie to the essential service water system is provided to ensure a seismically qualified backup water supply to only the Seismic Category I portions of the fire suppression (standpipe systems) located in safety-related areas. The system is designed such that the integrity of the ESW system will be maintained if the cross-tie is utilized.

The fire hydrant system is supplied by separate underground header connections from each of the two fire pumps. Divisional valves are provided to isolate each header. The system consists of a 12-inch ring header (14-inch ring header at Braidwood surrounding the main buildings with strategic placement of the fire hydrants located approximately 250 feet apart. At Braidwood, a dedicated fire response vehicle or cart(s) is maintained with hose equivalent to two hose houses and an inventory of equipment adequate for the fire brigade. At Byron, a dedicated fire response truck or cart is maintained with hoses and equipment equivalent to that supplied by three hose houses.

Freezing of the fire protection system is prevented by burying the piping below the frost line and by routing indoor piping through heated areas. Wet standpipe systems are provided for use inside the station. These are located so that any internal area of the station can be reached with 1-1/2-inch hose and combination nozzle.

Threads on hydrants, hose couplings, and standpipe risers are of standard size and compatible with those used by the local fire department.

The yard main which encircles the entire plant can be isolated into four segments by means of manually operated postindicator valves.

Automatic sprinkler systems and manual hose stations are supplied from interior loop mains. There are five connections between the yard main and the interior loops.

Sprinkler, foam, and deluge systems can be isolated from the interior loops by supervised and locked isolation gate valves in accordance with NFPA standards.

The system is normally kept pressurized by one of the two motor-driven fire protection jockey pumps. They are only used for system pressurization. If a system demand occurs, the pressure will decrease in the fire protection system, thereby automatically starting the motor-driven fire pump. If system demand is in excess of the motor-driven pump or if there is a pump failure, the diesel-driven fire pump will engage. Technical data on the fire pumps and jockey pumps are attached at the end of the section. The motor-driven fire pumps, diesel-driven fire pump, and jockey pumps are located in the circulating water pumphouse (Byron) or the lake screen house (Braidwood) and take suction directly from the intake bay.

The fire pumps cannot be operated from the control room. All fire pumps operate automatically on low system pressure. In case of emergency or maintenance, a locally mounted handswitch is provided for manual operation. The safety of the power supply for the pump motors is ensured since the power cabling enters only the switchgear spreading area in the main plant. The power cable is enclosed in rigid steel conduit along its entire length.

The following inputs to the control room are provided for the motor-driven fire pump: pump running, fail to start, auto trip, and pump locked out. All inputs have dedicated annunciator windows. Inputs from the diesel fire pump to the control room are as follows: ac power failure, battery 2 failure, low fuel, high water temperature, overspeed, fail to start, pump running, and control switch (CS) in OFF position. Inputs pump running, fail to start, and low fuel have dedicated annunciator windows. Inputs high water temperature, low lube oil pressure, overspeed, and CS in OFF position are combined into one "trouble" window. Inputs ac power failure, charger failure, battery 1 failure, and battery 2 failure are combined into one "Loss of Power" window.

The main control room is also provided with alarms for low fire main pressure and a low-low fire main pressure.

Whenever any of the inputs listed above are activated, alarms and annunciation in the control room are activated. As described above, many of the inputs are combined into a single "trouble" or "loss of power" alarm for the diesel fire pump. A local control cabinet will provide the necessary indication to isolate the malfunction or operating condition which activated the alarm.

The pumps are tested monthly per NFPA Standard 20 guidelines as described in Table 3-1 of this report. Fire pump data are given in Table A5.4-2.

A5.4.2 AUTOMATIC DELUGE SYSTEMS

Automatic deluge systems have been provided for the main, unit auxiliary and system auxiliary transformers, hydrogen seal oil units, and the turbine oil reservoir rooms. In all cases water is supplied through the turbine building ring header.

All deluge systems operate automatically in the same manner as described below.

a. Detector signal or pushbutton signal opens a solenoid valve on the deluge valve release line.

b. Pressure in the release line is relieved, permitting the deluge valve to open and water to flow to the nozzles.

c. As pressure in the discharge line increases, a pressure switch activates the local electric alarms and control room audible and visual alarms.

In case of electrical power failure, the deluge system may be operated manually by pulling the emergency relief lever on the deluge valve release line.

Additionally, preaction sprinkler systems have been provided for the turbine bearings. Water to these systems is supplied through the turbine building ring header.

Operation of this system combines some aspects of both the automatic deluge and automatic sprinkler systems. This system makes use of a deluge valve which operates in the same manner as discussed above with the exception that closed sprinkler heads have been used in place of deluge nozzles.

The preaction system operates as follows:

a. Actuation of thermal detectors, located near the sprinkler heads at the turbine bearings, or a pull station signal, opens a solenoid valve on the deluge valve release line.

b. Pressure in the release line is relieved, permitting the deluge valve to open thereby charging the system piping up to the sprinkler heads.

c. This increase in pressure actuates a pressure switch in the system piping which activates the local electric alarm and control room audible and visual alarms.

d. If the initiating condition continues unchecked, the sprinkler head fusible links fuse and water flows out of the open heads.

In case of an electrical power failure, the system may be activated manually by pulling the emergency relief valve lever on the deluge valve release line, provided the initiating condition fuses the sprinkler head fusible links.

Each "hazard area" is provided with a local control cabinet. All electrical equipment for that "hazard area" is wired to the cabinet. The cabinet is equipped with a white "power on" indicating lamp.

Each cabinet provides the following output signals to the control room: hazard area "fire" and hazard area "trouble." The trouble condition consists of detector circuit failures, power failure, electrical actuation system failure, and isolation valve closed.

All electrical circuits are supervised.

Contacts are also provided for local electric fire alarms.

Whenever any of the conditions noted under fire or trouble occurs, visual and audible alarms are activated in the control room.

Specific data on each deluge system can be found on the installation drawings kept at the stations.

The system can be tested by physically actuating the system and verifying that all components perform as required with the gate valves closed.

Periodically, surveillances are conducted to verify system operability. Preoperational and surveillance test data for these systems can be found on file at the stations.

A5.4.3 AUTOMATIC SPRINKLER SYSTEMS

Automatic sprinkler systems have been provided in most areas of the turbine building and in other areas where a significant fire hazard exists. Automatic sprinklers were not provided for areas containing safety-related equipment because inadvertent operation would disable them, thereby reducing plant safety margins.

The sprinkler systems provided in the turbine building take their water supply from the turbine building ring header. All sprinkler installations are basically the same and operation is totally automatic.

Specific data on each sprinkler system can be found on the installation drawings kept at the stations.

Each sprinkler system, except the Turbine Tower Sprinkler System, is provided with an isolation valve and alarms. The isolation valve is either supervised so that closure will result in a "trouble" alarm being activated in the control room or locked or sealed open. The Turbine Tower Sprinkler System does not alarm in the main control room, and does not have a supervised system isolation valve, but is equipped with a local fire alarm and has its isolation valve locked open.

System operation follows this order:

a. fire melts the fusible links on the sprinkler heads and water flows out the open heads and activates a flow switch which activates the local and control room alarms; or if an alarm check valve is provided,

b. as the water pressure drops, the alarm check valve opens, simultaneously opening an auxiliary line to the retarding chamber; and

c. pressure builds in the chamber until a pressure switch activates the local electric alarms and control room alarms.

Electricity is not required for the sprinkler system to function, however, it is required for the alarms to function.

Each sprinkler system may be tested at any time by use of the inspector's test connection. Each sprinkler system has a local control cabinet to which all electrical equipment for that hazard area is connected. Each cabinet provides the following outputs to the control room:

a. hazard area "fire" and

b. hazard area "trouble" (the trouble condition consists of isolation valve closed).

Contacts are provided to operate the local fire alarms. The sprinkler systems provided at the Byron circulating water pump house and Braidwood lake screen house are similar to the other sprinkler systems except the water supply is taken directly from the motor- or diesel-driven fire pump.

A5.4.4 FOAM SYSTEMS

Manual foam systems are provided for the 50,000-gallon diesel oil storage tank rooms in the auxiliary building. A balanced pressure foam system utilizing a 100- or 150-gallon diaphragm foam tank and 3% (double strength) fluoroprotein foam is used.

The 50,000-gallon diesel oil storage tank room foam systems are activated manually by isolation valves. Foam system operation is virtually identical to deluge system operation. When actuated, water flows through a proportioning controller where the foam concentrate is introduced into the water. The foam travels from the controller to the foam/water deluge heads where it is blown down into the room. The foam system for all tank rooms is actuated manually at the foam tank.

Two 100-gallon foam tanks have been provided to protect the indoor 50,000-gallon oil tank rooms. The foam tanks are located in the turbine building at grade level and are supplied with water from the turbine ring header. A 10-minute injection time is required by NFPA guidelines for the indoor tank. All "hazard areas" have some excess foam storage capacity and this permits from 5 to 11 extra minutes of foam injection depending on the "hazard area."

The foam systems do not require electricity in order to be operated.

Each "hazard area" is provided with a local control cabinet to which all electrical equipment for that "hazard area" is connected. The following outputs to the control room are provided:

a. hazard area "fire," and

b. hazard area "trouble" (the trouble condition may include detection circuit failure, loss of power, or isolation valve closed).

The local cabinet also provides contacts for the local area fire alarms. Whenever any of the above conditions occur, the control room audible and visual alarms are activated.

The foam system is tested in accordance with NFPA utilizing operating surveillances.

In the event that the operators decide to let the foam system operate for an extended period on a fire the foam system will continue injecting foam into or onto the fire until it is exhausted. After the foam is exhausted, water continues being injected onto the foam blanket in the same manner as a deluge system.

Specific data on each foam system can be found on the installation drawings kept at the stations. Test data for these systems can also be found on file at the stations.

A5.4.5 HALON 1301 SYSTEMS

Automatic Halon systems have been provided for the upper cable spreading areas and the QA vault. Both systems are actuated by ionization (or photoelectric) detectors. The upper cable spreading rooms have a train both of ionization (or photoelectric) and thermal detectors.

An automatic Halon system has been chosen as the primary fire suppression agent for the upper cable spreading area because of possible water damage to control room panels from leakage through floor penetrations.

Halon has been selected as the primary extinguishing agent for the QA vault because of the distance from the CO_2 storage tanks. Halon is less toxic than CO_2 in the concentrations required and there is no damage to records and furniture in the rooms which are not affected directly by the fire as there would be by using a deluge or sprinkler system.

The Halon supply for the upper cable spreading area is located at about L-23 on elevation 468 feet 4 inches and at H.9-45 on elevation 433 feet 0 inch for the QA vault.

Operation of both Halon systems is identical. If actuated automatically, an electrical signal is sent to a solenoid valve which releases the Halon from a storage cylinder into the manifold header. In the case of the QA vault, all the Halon is then discharged through the distribution nozzles onto the fire. For the upper cable spreading area system, only the solenoid valves of the cylinders assigned to the subject fire area are actuated.

The Halon then enters the manifold piping where it passes through the actuated deluge valve of the subject fire area and onto the fire. At Byron, the Halon supply for the cable spreading areas is sized only for the largest hazard. A reserve supply for either system is not provided. At Braidwood, the Halon supply is sized to provide double shot protection, and there is no extended discharge feature.

In response to a staff concern regarding potential adverse effects of active component failures on the automatic Halon primary suppression system for the upper cable spreading areas, the applicant has modified the system to provide resistance to single failures. The modifications made consist of the following changes. Additional detectors were added to provide two separate detection circuits. These circuits are designed that, under normal conditions, both circuits have to sense a fire in order to initiate the automatic suppression. Each circuit independently annunciates a fire detection (and circuit trouble) in the control room. If either circuit has a break or ground fault in one of the signalling line circuits, the remaining circuit could automatically activate the fire suppression system if a fire was present. A second train of actuation logic was added in parallel to the existing logic train. The Halon bottle discharge valve actuators which consisted of a single pilot valve were replaced with a pair of pilot valves, each connected to one of the two trains of actuation logic, and either of which can actuate the Halon bottle discharge valve. Additional zone discharge valves were added so that each cable spreading area has two parallel zone discharge valves to direct Halon from the discharge manifold to the zone

distribution piping. Additional Halon bottles were provided to add redundancy
to the Halon supply and to provide an increase in the duration of the design level concentration. For all zones, one additional bottle will be initially discharged to insure an adequate concentration in the event of a failure of one bottle to discharge. At Braidwood, the Halon system is designed for double shot protection. The second shot occurs automatically based on testing done prior to putting the system in operation. With these changes, the reliability of the automatic Halon suppression system will be significantly enhanced. A single failure of principle active components and subsystems of the fire detection and suppression system can now be tolerated without loss of function.

The QA vault Halon system may be operated by a manual electric pushbutton station which is located near the hazard area. In case of electrical failure, either system may be actuated manually at the bottles by pulling the manual release lever on each bottle and manually activating the control valve at the selector valve.

Specific data on the Halon systems can be found on the installation drawings kept at the stations.

One local control cabinet has been provided for the QA vault. Two local control cabinets have been provided for each upper cable spreading area.

Each local control cabinet has a white "power on" indicating light.

All electrical equipment used in the fire protection system for the hazard area is wired to the local cabinet.

Each local cabinet provides outputs for each of the following conditions to the control room: hazard area "fire" and hazard area "trouble" (the trouble condition includes failure of the automatic detection system, loss of power, or failure of the electrical actuation system).

Pre-discharge alarms are provided locally for the Upper Cable Spreading rooms and the Byron plant simulator. Pre-discharge timers delay the discharge to allow personnel time to leave the area. Egress time from the QA Records Vault is less than 60 seconds, no pre-discharge alarm is provided.

Each Halon system is tested periodically by subjecting each system to a "puff" test in accordance with NFPA guidelines.

Preoperational and surveillance test data for these systems can be found on file at the stations.

A5.4.6 CARBON DIOXIDE (CO_2) SYSTEM

The CO_2 system receives bulk deliveries of liquid carbon dioxide. It is stored in a temperature controlled CO_2 storage unit. Carbon dioxide is supplied from this storage unit to the CO_2 fire protection systems and for purging hydrogen from the main generators when the generators are shut down.

The Cardox storage unit contains a cylindrical all welded, steel storage tank and a refrigeration unit. The storage tank is enclosed in a steel shell. It is insulated and has a capacity of 10 tons. The working pressure of the tank is 300 psig.

The refrigeration unit consists of a refrigerating coil running lengthwise, near the top, inside the storage tank, and a compressor. The refrigerating unit cools the liquid carbon dioxide to 0°F to maintain a pressure between 295 and 305 psig.

The temperature is automatically controlled by a pressure switch on the Cardox unit. As the temperature of the carbon dioxide rises the pressure increases. When the pressure increases to 305 psig, the pressure switch starts the refrigerating unit. The unit continues to run until the pressure drops to 295 psig, then the pressure switch trips the refrigerating unit off. If the pressure drops to 275 psig, an alarm sounds in the control room.

The Cardox storage unit is protected against overpressure by a bleeder relief valve that opens at 341 psig. If this valve malfunctions, two pop-off valves open at 357 psig. The cardox storage unit would become overpressurized if the refrigerating unit malfunctions, permitting the carbon dioxide temperature to rise, thus increasing the pressure. In addition to these safety valves, the Cardox storage unit has a rupture disc that breaks open at 600 psig, releasing all of the liquid carbon dioxide. A pressure gauge is mounted on the Cardox unit to display tank pressure.

The Cardox storage unit is located inside the turbine building, at elevation 401 feet 0 inch. This is on the ground level, between columns 16 and 18 and rows K and L.

The fill pipe and equalizing pipe run from the Cardox unit to the 401 Unit 1 Turbine Building Trackway J-3, terminating in a Cardox transport truck hose connection.

A 4-inch line leaving the Cardox storage unit supplies carbon dioxide to the fire protection systems. Carbon dioxide flow out of this line is controlled by a master pilot control, mounted on the Cardox storage unit. The master pilot controls operate the master valve on the supply line. A 1-1/2-inch CO_2 supply line supplies carbon dioxide to the CO_2 vaporizer in the CO_2 generator hydrogen purge system for Units 1 and 2.

The installed carbon dioxide suppression system in the Upper Cable Spreading Rooms and Byron and Braidwood is a manually actuated back-up system to the automatic halon system. These systems were originally designed in the late 1970s to have a 50% concentration with a 10 minute holding time based on NFPA Standard No. 12-1977 (NFPA Fire Codes – 1978 Edition). During the licensing process, the stations committed to later editions of NFPA 12, which required a 50% concentration with a 20 minute holding time.

Since the installed systems were not provided with extended discharge piping, pre-operational testing verified that the systems were capable of meeting the 50% concentration with a 10 minute holding time. In order to satisfy the 20 minute holding time, the station procedures for the manual actuation of the back-up systems for these zones were revised to require an additional actuation after the initial 10 minute holding period. The system design, confituration, pre-op testing, and operating procedures were all reviewd by the Fire Protection Consultant (M&MPC), and were found to be acceptable.

Automatic initiation of the Cardox system is accomplished by Fenwal rate compensated detectors in areas other than cable spreading and cable tunnel areas, and by both ionization (or photoelectric) and Fenwal type compensated detectors in the cable spreading and cable tunnel areas.

Local pushbuttons adjacent to the CO_2 protected rooms provide manual electrical control for testing purposes, or to initiate the CO_2 in an emergency if thermostats should fail to actuate the CO_2 system.

In case of electrical failure, local electromanual pilot cabinets (EMPC) are provided for each protected room and at the main storage tank, which permit manual initiation of the system.

In response to an NRC concern, this system has been modified as described below to improve the reliability of the system for the lower cable spreading rooms.

The active components in the system are the tank and zone discharge valves. Redundant tank and zone discharge valves were provided. The new valves and associated equipment are UL listed. The modifications were implemented in accordance with NFPA 12. A redundant zone discharge valve is provided for the initial discharge line only. Redundant extended discharge valves are not required because the capacity of the storage tank is such that multiple shot capacity is provided for even the largest hazard zones, providing adequate redundancy for the zone discharge valves.

At Byron, the new tank discharge valve is manually actuated by a lever on the EMPC, which is located near the Cardox storage unit. The new zone discharge valves are also manually actuated by a lever on the appropriate EMPC. The new zone discharge valve EMPCs are located near the hazard zones they protect. These new valves are expected to be used only in the event of failure of the normal tank or zone discharge valves.

At Braidwood, the new tank discharge valve has two modes of operation: 1) it has manual pushbuttons located near each lower cable spreading room which it protects which will electrically operate its EMPC; and 2) it can be manually actuated by a lever on the EMPC. The new zone discharge valves are only operable by a manual lever on the EMPC, since they are located near the hazard zones which they protect. These new valves are expected to be used only in the event of failure of the normal tank or zone discharge valves.

A manual abort system is provided for each automatic total flooding area. The above consist of a supervised 1/4-inch Jamesbury ball valve on the pilot line and a "deadman" toggle switch. The toggle switch holds the predischarge timer so that a person may enter a room for an abbreviated survey of the area before the system discharges. Once the CO_2 discharge has begun, it cannot be aborted except by shutting off the tank gate valve. The ball valve may be used to positively prevent any discharge from occurring in the subject hazard area; however, it cannot stop a discharge that has already begun. The ball valve will be used whenever maintenance personnel will be present in an area for an extended period of time.

Areas protected by carbon dioxide are listed in Tables A5.4-1. Specific data on each carbon dioxide system can be found on the installation drawings kept at the stations.

Local control cabinets are provided by Cardox for each hazard area. Each cabinet has the following indicating lights:

a. Red "fire" light,

b. White "power on" light, and

c. Amber "trouble" lights.

The "trouble" lights are used to indicate trouble with the following supervised items. Amber lights are used for:

a. thermostats,

b. remote pushbutton switches,

c. local hazard alarms,

d. discharge valve solenoid, and

e. lock-out valve closed.

The local control cabinet furnishes the following output signals to the control room:

a. hazard area trouble,

b. hazard area fire, and

c. contacts for hazard area alarms.

For each hazard area, audible and visual alarms are provided in the control room to indicate "fire" and "trouble" for the CO_2 system.

The CO_2 storage unit is operated off the 480-V distribution system. The electrical actuation and detector circuits for the fire protection systems are supplied with power from the 125-Vdc distribution system except the cable spreading room and cable tunnel detector circuits which are fed from 120-Vac (ESF). In case of a bus failure, 125-Vdc battery power supply will be utilized for the 125-Vdc distribution system, and power supplied by the diesel generator will supply power to the 12-Vac ESF circuits. If this should fail, the CO_2 system may be actuated manually by the electromanual pilot cabinets at each protection area.

The Byron river screen house also contains a 2-ton carbon dioxide storage tank. Its features are identical to the 10-ton unit except that 3-inch gate valves, master valves, and selector valves are used. Electrical accessories are also identical to the main system.

Preoperational and surveillance test data for these systems can be found on file at the stations.

A5.4.7 MANUAL EXTINGUISHING CAPABILITY

This section deals with the manual hose stations and portable extinguishers provided for Byron and Braidwood.

Figure M-52, Sheets 11 and 12, gives the locations and important physical data on the hose stations. All hose stations except in the cable spreading areas are equipped with a minimum of 50 feet of 1-1/2-inch nylon jacket rubber hose. At Byron, most of the hoses and associated hose reels have been removed per EC 626870 as the fire brigade utilizes high-rise hose packs transported to the scene. Class ABC nozzles are provided in all areas except the fuel handling building which are Class A only. Hose stations located in the upper and lower cable spreading areas are provided with a minimum of 50 feet of hard rubber hose and Class ABC nozzles. This figure represents the final design of the hose stations, although hose stations may be added or moved as work progresses.

Interior hose stations have been placed so that all areas of the plant except portions of the steam and feedwater tunnels and the River Screen House can be reached by at least one hose station.

Portable extinguishers have been placed in accordance with NFPA 10 and additionally as necessary. In some areas, fire extinguishers with a lower rating than that required by NFPA 10 are utilized. This is due to more stringent UL testing criteria that reduces previous ratings of fire extinguishers. The NFPA 10 standards did not change to accommodate these new UL ratings. By reducing the rating of the extinguisher, the maximum allowable square foot coverage per extinguisher per NFPA 10 was also reduced. The change in UL testing criteria affects fire extinguishers purchased on or after 02/14/2011. The use of the revised UL rated 6A fire extinguisher in place of an original UL rated 10A fire extinguisher is acceptable. Fire extinguishers that are rated 6A per the revised UL standard are considered to be equivalent to fire extinguishers that were rated 10A per the previous UL standard. Reference EC/Eval 392896 for supporting details.

Portable extinguishers have been identified with a number and an approximate location is known. Quantities and types of extinguishers have been determined. Expected locations of portable extinguishers are shown on the Figure M-58, Sheets 5 and 6, which are included with the report.

Hose stations in the Byron Circulating Water Pump House and the Braidwood Lake Screen House are supplied with water directly from the fire pumps.

A5.4.8 FIRE DETECTION SYSTEM DESCRIPTION

Separate fire detection systems are provided for Units 1 and 2. The system for each unit consists of ionization (or photoelectric), ultraviolet and thermal detectors located in specific fire zones throughout the plant as listed in Table 2.2-3. The detectors and the control equipment used in the fire detection system are supplied or approved by Alison Control, Inc., and are Factory Mutual approved.

The design of the fire detection system generally meets the requirements for a Class B proprietary protective signalling system as defined in NFPA 72D-1975. Both audible and visual alarms are provided in the main control room for each zone of the fire detection system. Each zone has visual indication for zone "FIRE" and zone "TROUBLE." The system is electrically supervised in accordance with the requirements of NFPA 72D and is connected to the plant emergency power supply. In addition, the local fire detection panels 1PA39J, 1PA49J, 2PA39J, and 2PA49J are provided with battery-backed uninterruptible power supplies. Fire detectors are installed in accordance with the requirements of NFPA 72E.

The fire detection circuits associated with automatic fire suppression systems protecting areas which contain equipment or cables which perform a safety-related function (the Carbon Dioxide System, the water-foam system, and the Halon system) include the upper and lower cable spreading rooms, the cable tunnel, the diesel oil tank rooms, and the diesel-generator rooms are Class A supervised circuits. The fire detection circuits in the upper and lower cable spreading rooms and electrical cable tunnels have been modified to provide two cross-zoned Class B supervised circuits. Each detection circuit provides an independent alarm of a fire (or circuit trouble) to the control room. The circuits are designed that if either of the circuits has a break or a ground fault in one of its signalling line circuits, the remaining circuit can then automatically actuate the fire suppression systems if a fire was present. A circuit arrangement of this type satisfies the redundancy requirement of Class A circuits in that a fire alarm signal will still be annunciated in the control room even if one assumes a single break or ground fault in one of the signalling line circuits.

Figure A5.4-2 provides a typical schematic arrangement for the fire detection of each fire zone in the cable spreading rooms.

In addition to the system described previously, ionization (or photoelectric) detectors are installed in ventilation ducts. These detectors alarm and annunciate in the main control room. The air duct detector units are manufactured by Pyrotronics (or United Technologies Corporation) and are Factory Mutual approved.

TABLE A5.4-1

FIRE PROTECTION MATRIX

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
1.1-1	Portable extinguishers	Hose stations	Heat		
1.1-2	Portable extinguishers	Hose stations	Heat		
1.2-1	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
1.2-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
1.3-1	Portable extinguishers	Hose stations	Temperature Switch in Charcoal Adsorber Bank (Byron only)		Deluge system abandoned.
1.3-2	Portable extinguishers	Hose stations	Temperature Switch in Charcoal Adsorber Bank (Byron only)		Deluge system abandoned.
2.1-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
2.1-1	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
2.1-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
3.1-1 3.1-2	Automatic CO_2	Hose stations and portable extinguishers	See Comment 1	50%	1. The ionization and Fenwal thermal detectors are cross-zoned to require both an ionization and a heat detection of a fire to actuate the automatic fire suppression system. Each detection zone provides an independent alarm of a fire (or detector trouble) to the main control room. The circuits are designed that if either of the circuits has a break or a ground fault in one of the signalling line circuits, the remaining detection circuit could then automatically actuate the fire suppression system if a fire was present.
3.2-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
3.2A-1 3.2A-2	Automatic CO_2	Hose stations and portable extinguishers	See Comment 1	50%	
3.2B-1 3.2B-2	Automatic CO_2	Hose stations and portable extinguishers	See Comment 1	50%	
3.2C-1 3.2C-2	Automatic CO_2	Hose stations and portable extinguishers	See Comment 1	50%	
3.2D-1 3.2D-2	Automatic CO_2	Hose stations and portable extinguishers	See Comment 1	50%	

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
3.2E-1 3.2E-2	Automatic CO_2	Hose stations and portable extinguishers	See Comment 1	50%	
3.3A-1 3.3A-2	Halon 1301 Manual deluge system for charcoal units (See Comment 5)	Manual CO_2, portable extin- guishers, hose stations	See Comment 1	6% Halon 50% CO_2	
3.3A-1 3.3A-2	Halon 1301	Manual CO_2, portable extin- guishers, hose stations	See Comment 1	6% Halon 50% CO_2	
3.3B-1 3.3B-2	Halon 1301	Manual CO_2, portable extin- guishers, hose stations	See Comment 1	6% Halon 50% CO_2	
3.3C-1 3.3C.1	Halon 1301	Manual CO_2, portable extin- guishers, hose stations	See Comment 1	6% Halon 50% CO_2	
3.3D-l 3.3D-2	Halon 1301	Manual CO_2, portable extin- guishers, hose stations	See Comment 1	6% Halon 50% CO_2	
3.4A-1 3.4A-2	Portable extinguishers	Hose station	Ionization (or photoelectric)		---
4.1-1	Portable extinguishers	Hose station	Ionization (or photoelectric)		---
4.1-2	Portable extinguishers	Hose station	Ionization (or photoelectric)		---
5.1-1 5.1-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
5.2-1 5.2-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
5.3-1 5.3-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
5.4-1 5.4-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
5.5-1 5.5-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
5.6-1 5.6-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
7.1-1 7.1-2	Hose stations	Portable extin-guishers	Ionization (or photoelectric) (Braidwood)	---	
8.1-0	Automatic sprinklers	Hose stations and portable extin-guishers	Fusible links on sprinkler heads Ionization (or photoelectric) (Byron only)	0.3 gpm/ft²	2. Density is 0.3 gpm/ft² per any 3000 ft² area and 0.2 gpm/ft² for any 10,000 ft² area.
8.2-1 8.2-2	Automatic sprinklers	Hose stations and portable extin-guishers	Fusible link on sprinkler heads	See Comment 2	
8.3-1 8.3-2	Automatic sprinklers Automatic deluge (6)	Hose stations and portable extin-guishers	Fusible links sprinkler heads	See Comment 2	3. The deluge sys-tem is provide for the turbine bearings only, and is actuated by rate-compensating detectors.
8.4-1 8.4-2	Automatic sprinklers	Hose stations and portable extin-guishers	Fusible link sprinkler heads	0.3 gpm/ft²	
8.5-1 8.5-2	Automatic sprinklers Automatic deluge (4)	Hose stations and portable extin-guishers	Rate compensated detectors	See Comment 2	
8.6-0	Automatic deluge (3) Manual deluge (5) Portable Extinguishers Automatic Sprinklers (7)	Hose stations	None Temp. switch in Charcoal bank		4. The deluge system is for the hydro-gen seal oil units only and is actu-ated by rate com-pensated detectors.
8.7A-0 8.7B-0 system	Automatic sprinkler Automatic sprinkler	Hose stations and portable extin-guishers	Fusible link sprinkler heads		7. The automatic sprinkler Is provided for the Operator Ready room. Density is 0.10 Gpm/ft² per any 900 ft² area.
9.1-1 9.1-2	Automatic CO_2	Portable extin-guishers and hose stations	Rate compensation ultraviolet	34%	
9.2-1 9.2-2	Automatic CO_2	Portable extin-guishers and hose stations	Rate compensation ultraviolet	34%	6. The deluge system is for the Turbine oil storage Tank Room and is actuated by rate compensated detectors.
9.3-1 9.3-2	Automatic CO_2	Portable extin-guishers and hose stations	Rate compensation	34%	

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
9.4-1 9.4-2	Automatic CO2	Portable extin-guishers and hose stations	Rate compensation	34%	
10.1-1	Foam (Manual)	Portable extin-guishers and hose station	Rate compensated detectors Ionization (or photoelectric) (Byron)	.16 gpm/ft^2	
10.1-2	Foam (Manual)	Portable extin-guishers and hose station	Rate compensating Ionization (or photoelectric) (Byron)	.16 gpm/ft^2	
10.2-1	Foam (Manual)	Portable extin-guishers and hose station	Rate compensating Ionization (or photoelectric) (Byron)	.16 gpm/ft^2	
10.2-2	Foam (Manual)	Portable extin-guishers and hose station	Rate compensating Ionization (or photoelectric) (Byron)	.16 gpm/ft^2	
11.1A-0 11.1B-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.2-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.2A-1 11.2A-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.2B-1 11.2B-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.2C-1 11.2C-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.2D-1 11.2D-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.3-0	Portable extinguishers and automatic sprinklers	Hose stations	Ionization (or photoelectric)		N/A The sprinklers cover the component cooling pumps and stairway.
11.3-1 11.3-2	Portable extinguishers and automatic sprinklers	Hose stations	Ionization (or photoelectric)		N/A Sprinklers protect pipe penetrations.
11.3A-1 11.3A-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
11.3B-1 11.3B-2	Portable extinguishers	Hose stations	None	---	
11.3C-1 11.3C-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.3D-1 11.3D-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.3E-1 11.3E-2	Portable extinguishers	Hose stations	None	---	
11.3F-1 11.3F-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		
11.3G.1 11.3G.2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.4-0	Portable extinguishers Automatic sprinkler	Hose stations	Ionization (or photoelectric)		N/A Automatic sprinkler cover stairway hatch.
ll.4A-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.4A-1 11.4A-2	Automatic CO^2	Portable extin-guishers and hose stations	Rate compensation Ionization (or photoelectric) Byron	34%	
11.4B-0	Portable extinguishers	Hose stations	None	---	
11.4B-1 ll.4B-2	Portable extinguishers	Hose stations	None	---	
11.4C-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.4C-1 11.4C-2	Portable extinguishers	Hose stations	None	---	
11.4D-1 11.4D-2	Portable extinguishers	Hose stations	None	---	
11.5-0	Portable extinguishers Automatic sprinkler	Hose stations	Ionization (or photoelectric)		N/A Sprinklers protect stairway and hatch and waste oil tank.
11.5-1 11.5-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.5A-0	Portable extinguishers	Hose stations	None-Byron Ionization-Braidwood	---	

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
11.5A-1 11.5A-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.5B-1	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.5B-2	Portable extinguishers	Hose stations	lonization (or photoelectric)		---
11.6-0	Portable extinguishers Automatic sprinkler	Hose stations	Ionization (or photoelectric)	---	N/A Sprinkler protect stairway and hatch.
11.6-1 11.6-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.6A-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.6A-1 11.6A-2	Portable extinguishers	Hose stations	None	---	
11.6B-0	Portable extinguishers	Hose stations	None	---	
11.6C-0	Portable extinquishers	Hose stations	None-Byron Ionization-Braidwood	---	
11.6D-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.6E-0	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
11.7-0	Manual deluge (See Comment 5)	Hose stations and portable extin-guishers	Temp. switch in charcoal bank; Ionization (or photoelectric)	N/A	5. The deluge system is provided for the charcoal filters only manually actuated.
11.7-1	Hose stations	Portable extin-guishers	Temp. switch in charcoal bank;	N/A	
11.7-2	Manual deluge (5)	Portable extin-guisher	Ionization (or photoelectric)		
12.1-0	Hose stations	Portable extin-guishers	Ionization (or photoelectric)		---
13.0-0	Automatic Halon	Hose stations and portable extin-guishers	Ionization (or photoelectric)		5%
14.1-0	Hose stations	Portable extinguishers	None	---	
14.2-0	Hose stations	Portable extinguishers	None		
14.3-0	Hose stations	Portable extinguishers	None		

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
14.4-0	Hose stations	Portable extinguishers	None		
14.5-0	Hose stations	Portable extinguishers	None		
14.6-0	Partial automatic sprinklers Manual deluge (5)	Hose stations and Portable extinguishers	Ionization (or photoelectric) Temp. switch in charcoal bank		N/A
16.1-1 16.1-2	Hydrants	---	None	---	
16.2-1 16.2-2	Hydrants	---	None		
17.1-0	---	---	None	---	Not required
17.1-1	Hydrants	---	None	---	
17.1-2	(Byron only)	---	---	---	
17.2-1 17.2-2	Hydrants (Byron only)	---	None	---	
18.1-1 18.1-2	Hose stations	Portable extinguishers	Ionization (or photoelectric)n ducts		---
18.2-1 18.2-2	Hose stations	Portable extinguishers	Ionization (or photoelectric)in ducts		---
18.3-1 18.3-2	Portable extinguisher	Hose station	Ionization (or photoelectric)		---
18.4-1 18.4-2	Portable extinguisher Manual deluge (5)	Hose station	Ionization (or photoelectric) Temp. switch in charcoal bank		N/A Over charcoal filters
18.5-1	Portable extinguishers	Hose stations	None	---	
18.5-2	Portable extinguishers	Hose stations	Ionization (or photoelectric)		---
18.6-0	Automatic sprinklers	Portable extinguishers and hose stations	Fusible link sprinkler heads	.2 gpm/ft^2 in storeroom and .3 gpm/ft^2 in paint and oil room	For the storeroom and paint and oil room only.
18.7-0	Portable Extinguishers	Hose stations	None		

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
18.8-0	Portable Extinguishers	Hose stations	None		
18.9-0	Portable extinguishers	Hose stations	None	---	
18.10A-1 18.10B-1 18.10C-1 18.10D-1 18.10E-1 18.10F-1	Automatic and manual deluge	Hydrants switch, differential relay	Thermistor wire, sudden pressure		Manual deluge from thermistor, automatic deluge from relay
18.10A-2 18.10B-2 18.10C-2 18.10D-2 18.10E-2 18.10F-2	Automatic and manual deluge	Hydrants	Thermistor wire, sudden pressure switch, differential relay		Manual deluge from thermistor, automatic deluge from relay
18.11-0 (Byron)	Automatic CO_2	Portable extinguishers	Ionization (or photoelectric)		34% For oil tank room and ESW makeup pump area
18.11-0 (Braidwood)	Local Fire Department	Portable extinguishers	Ionization (or photoelectric) Ultraviolet		---
18.11-1 18.11-2 (Byron only)	Automatic CO_2	Portable extinguishers	Rate of rise		
18.12-0	Hose stations	Portable extinguishers	Ionization (or photoelectric)-B/B and ultraviolet (Braidwood)		
18.13-0	Automatic sprinklers	Hose stations and portable extinguishers	Fusible link sprinkler heads Ionization (or photoelectric) (Byron)	.2 gpm/ft^2	
18.14A-1 (Byron)	Hose Stations	---	Ionization (or photoelectric)		---
18.14A-2	Hose Stations	---	Ionization (or photoelectric)		---
18.14B-1 (Byron)	Hose Stations	---	Ionization (or photoelectric)		---
18.14B-2 (Byron)	Hose Stations	---	Ionization (or photoelectric)		---

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
18.15-0 (Braidwood)	Hose stations extinguishers	Portable	None	---	
18.16-1 18.16-2	Hydrants	Dikes	None	---	
18.17-0	Hydrants	---	None	---	
There is no Zone 18.18-0					
18.19-0	Hydrants	Dikes	None	---	
18.20-0	Hydrants	Dikes	---	---	
18.22-0 (Byron)	Hose stations	---	None	---	
18.23-0	Hydrants	---	None	---	
18.24-0	Hose station	Portable extinguishers	None	---	
18.25-1	Hose stations	---	None	---	
18.25-2	Hose stations	---	None	---	
18.26-0	Hose stations Manual Deluge(5)	---	Temp switch in charcoal bank	N/A	
18.27-0	Hose stations	---	None	---	
18.28-0	Overhead sprinkler (partial coverage)	Hose stations Fire Hydrants	None	N/A	Protects waste oil tank
18.29-0	Fire hydrants	Portable extinguishers	None	---	
18.30-0	Fire hydrants	---	None	---	
18.31-0	Fire hydrant	---	None	---	
18.32-0	Automatic sprinkler	Portable extinguisher and hose stations	None	0.33 gpm/ft^2 (0.39 gpm/ft^2 for warehouse addition on south side of warehouse - Byron only)	

TABLE A5.4-1 (Cont'd)

FIRE ZONE	PRIMARY PROTECTION	BACKUP PROTECTION	FIRE DETECTION	DENSITY OR CONCENTRATION	COMMENTS
18.33-0	Hose stations	Fire hydrants	None	---	
18.34-0	Fire hydrant	---	None	---	
18.35-0	Hose stations	Portable extinguishers	Ionization (or photoelectric)		---
18.36-0	None	---	None	---	

TABLE A5.4-2

FIRE PUMP DATA

MOTOR-DRIVEN FIRE PUMPS

Horsepower – 350

Voltage, phase, frequency - 4160-V, 3-phase, 60 Hz

Pump

Stages - 4

gpm – 2500

Labeled lead - 388 feet

Code - NFPA 20

Approval authority - UL

DIESEL-DRIVEN FIRE PUMP

Pump

Same as motor-driven

GEAR REDUCER

Type - right angle

Ratio - 1:1

Coupling - Watson-Spicer

Diesel Engine

Manufacturer - Cummins

Engine speed - 1760 rpm

Number of cylinders - 12

Displacement - 1710 in^3

Cycles - 4

Horsepower (max. continuous) - 522 hp

Starting signal to full load - 5-15 seconds

Fuel consumption: Component Demonstration: 0.29 gpm.
Manufacturer's Normal: 0.47 gpm.
Manufacturer's Maximum: 0.55 gpm.

Note: Fuel consumption data based on original vendor information. Fuel consumption may be slightly higher (1%) as a result of changes in diesel fuel to Ultra Low Sulfur Diesel fuel. Sufficient excess capacity exists in the day tank storage requirements to account for the change in consumption.

Lube oil capacity - 75 quarts

JOCKEY PUMPS (2)

Motor

TABLE A5.4-2 (Cont'd)

Horsepower - 15 hp

Voltage, phase, frequency - 460-V, 3-phase, 60 Hz

Pump

Stages - 21

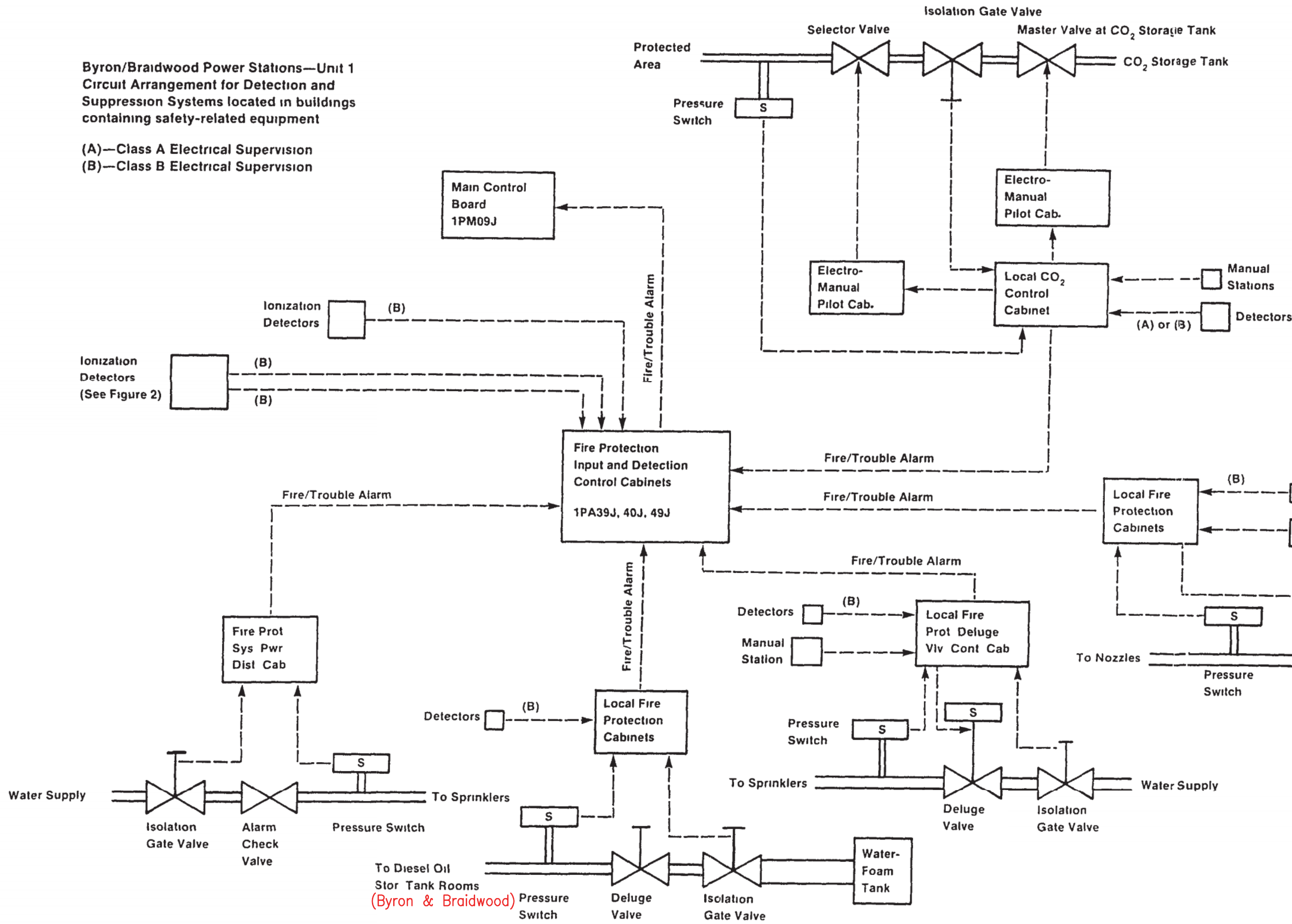
rpm - 1800

gpm - 100

Labeled head - 335 feet

Byron/Braidwood Power Stations—Unit 1
Circuit Arrangement for Detection and Suppression Systems located in buildings containing safety-related equipment

(A)—Class A Electrical Supervision
(B)—Class B Electrical Supervision



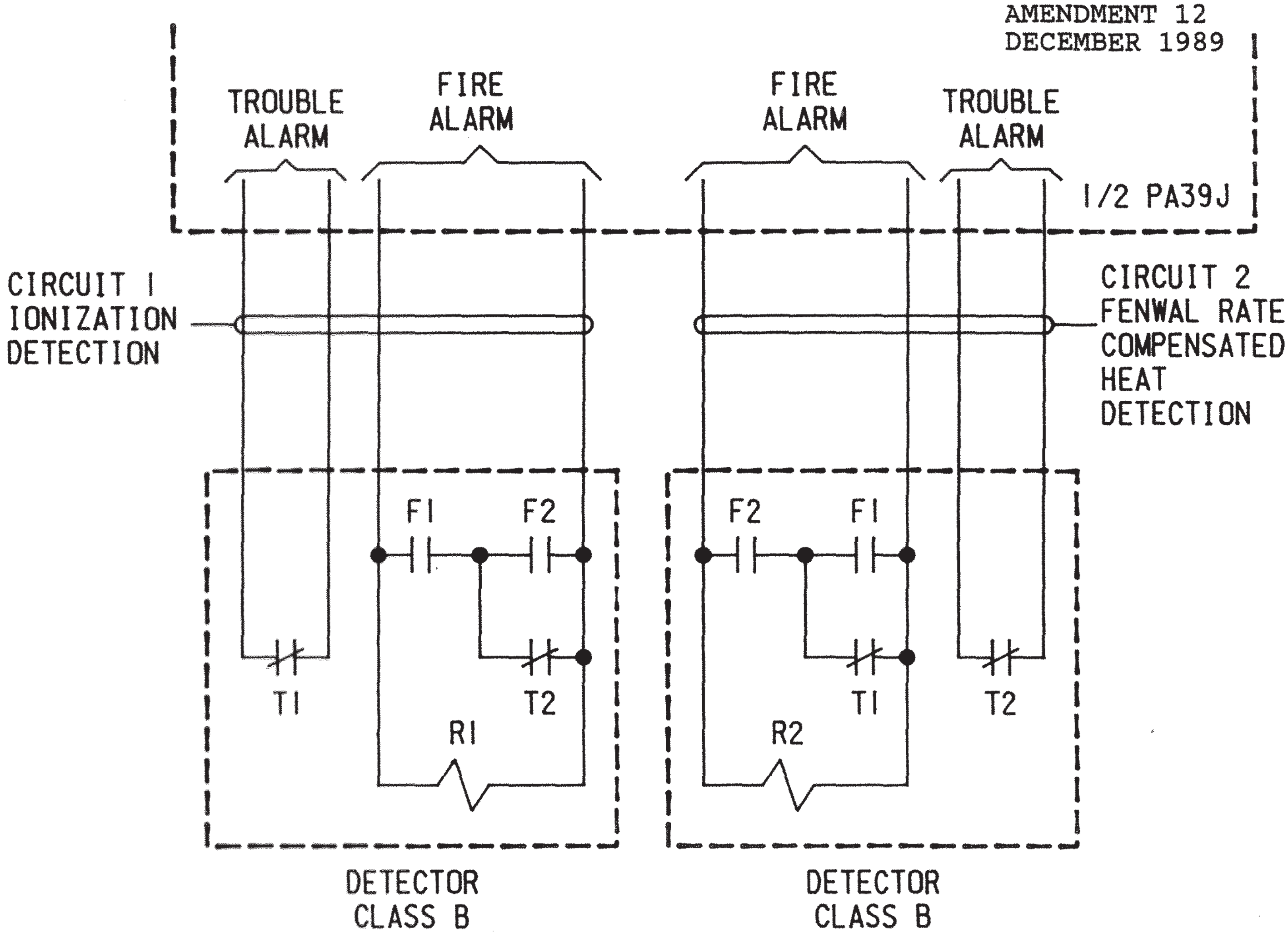
NOTE:

1. THIS FIGURE IS PROVIDED FOR REFERENCE ONLY AND IS INTENDED TO PROVIDE A GENERAL, HIGH LEVEL REPRESENTATION OF THE PLANT FIRE PROTECTION FEATURES AND FIRE HAZARDS. THESE FIGURES ARE NOT INTENDED TO PROVIDE SPECIFIC DETAILS FOR FEATURES SUCH AS FIRE BARRIERS, DETECTORS, HOSE STATIONS, FIRE EXTINGUISHERS AND SUPPRESSION SYSTEM COVERAGE. APPLICABLE DESIGN DRAWINGS AND DOCUMENTS SHOULD BE REVIEWED FOR SPECIFIC DESIGN DETAILS, INCLUDING LOCATION OF EQUIPMENT.

BYRON/BRAIDWOOD STATIONS
FIRE PROTECTION REPORT

FIGURE A5 4-1

UNIT 1 FIRE PROTECTION SYSTEM
SINGLE LINE DIAGRAM

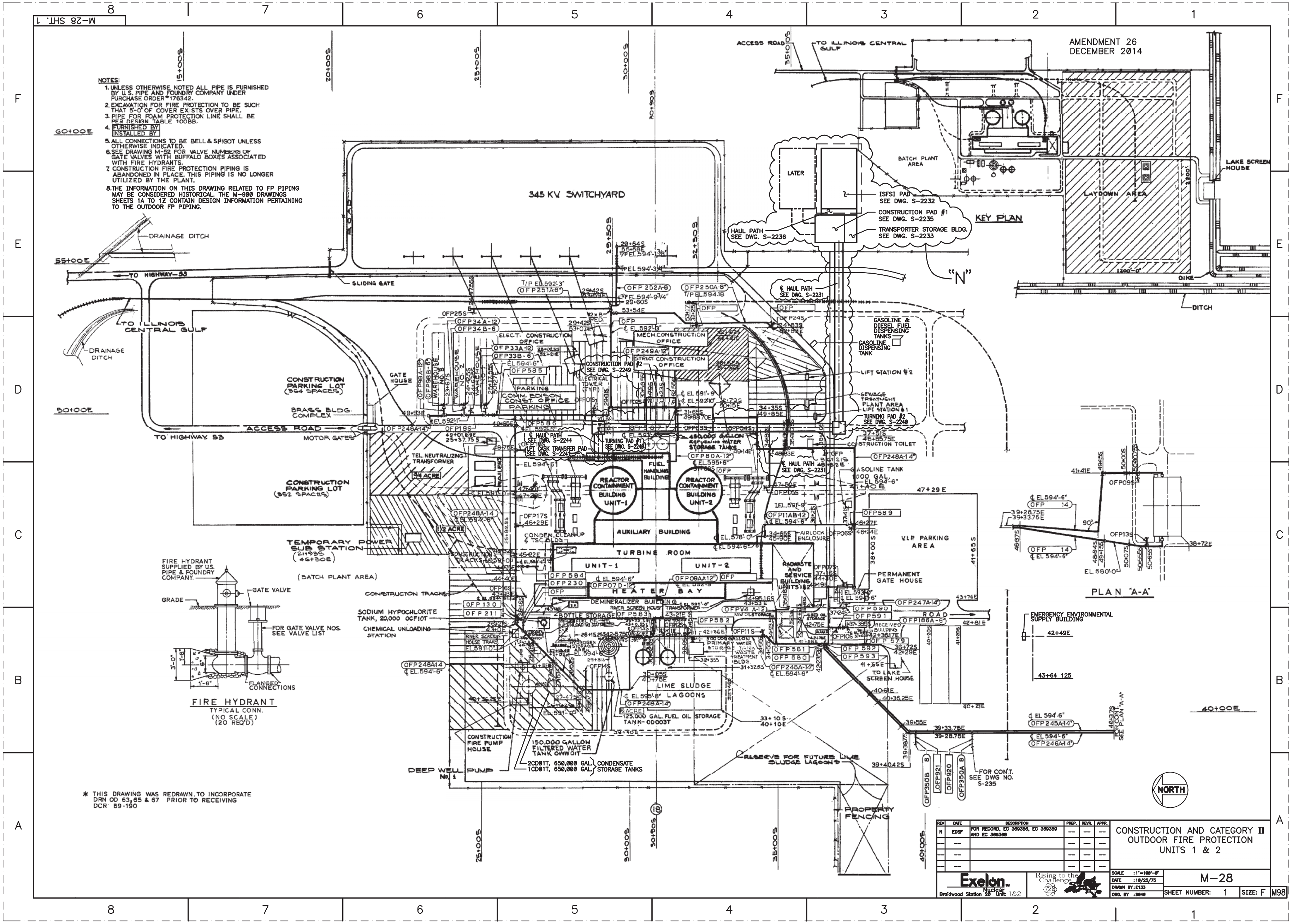


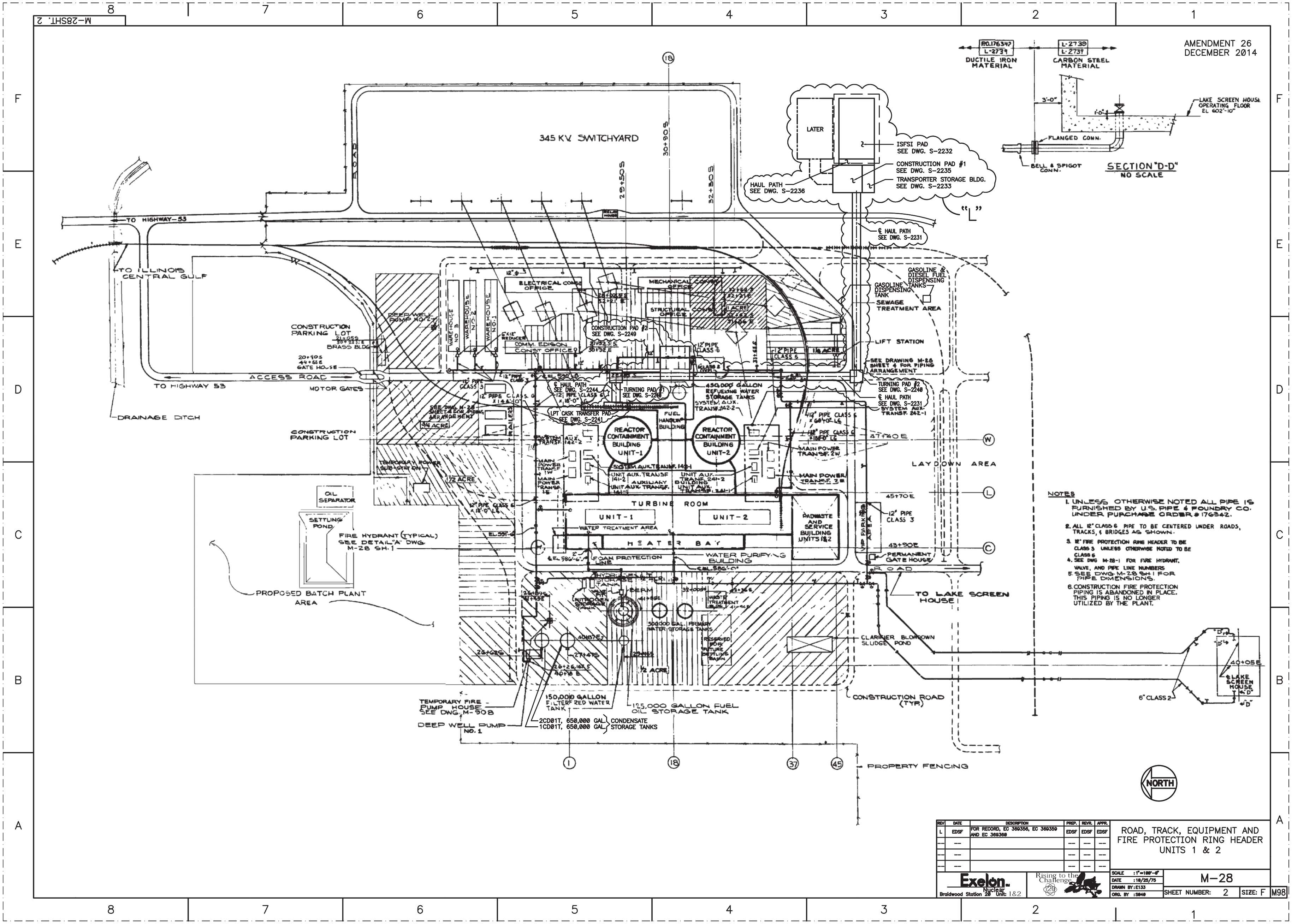
F = FIRE ALARM CONTACT (SHOWN IN THE ABSENCE OF A FIRE)
T = TROUBLE CONTACT (SHOWN IN TROUBLE CONDITION)
R = END OF LINE RESISTOR

CIRCUITS 1 & 2 PROVIDE FIRE ALARM RECEIPT CAPABILITY FOR A COMMON LOCATION. AN OPEN CIRCUIT ON EITHER CIRCUIT WILL NOT AFFECT THE INITIATION OF THE AUTOMATIC FIRE SUPPRESSION SYSTEMS.

BYRON/BRAIDWOOD STATIONS FIRE PROTECTION REPORT
FIGURE A5.4-2 UNIT 1 FIRE DETECTION SCHEMATIC DIAGRAM FOR CABLE SPREADING ROOMS

S&L ECAD F7 REISC.9


M-28 SHT. 1
AMENDMENT 26
DECEMBER 2014
NOTES:
1. UNLESS OTHERWISE NOTED ALL PIPE IS FURNISHED BY U.S. PIPE AND FOUNDRY COMPANY UNDER PURCHASE ORDER #176342.
2. EXCAVATION FOR FIRE PROTECTION TO BE SUCH THAT 5'-0" OF COVER EXISTS OVER PIPE.
3. PIPE FOR FOAM PROTECTION LINE SHALL BE PER DESIGN TABLE 100BB.
4. FURNISHED BY / INSTALLED BY
5. ALL CONNECTIONS TO BE BELL & SPIGOT UNLESS OTHERWISE INDICATED.
6. SEE DRAWING M-52 FOR VALVE NUMBERS OF GATE VALVES WITH BUFFALO BOXES ASSOCIATED WITH FIRE HYDRANTS.
7. CONSTRUCTION FIRE PROTECTION PIPING IS ABANDONED IN PLACE. THIS PIPING IS NO LONGER UTILIZED BY THE PLANT.
8. THE INFORMATION ON THIS DRAWING RELATED TO FP PIPING MAY BE CONSIDERED HISTORICAL. THE M-900 DRAWINGS SHEETS 1A TO 1Z CONTAIN DESIGN INFORMATION PERTAINING TO THE OUTDOOR FP PIPING.
345 KV SWITCHYARD
DRAINAGE DITCH
TO HIGHWAY-53
SLIDING GATE
TO ILLINOIS CENTRAL GULF
CONSTRUCTION PARKING LOT (364 SPACES)
GATE HOUSE
BRASS BLDG. COMPLEX
ACCESS ROAD
TO HIGHWAY 53
MOTOR GATES
CONSTRUCTION PARKING LOT (352 SPACES)
TEMPORARY POWER SUB STATION
(BATCH PLANT AREA)
CONSTRUCTON TRACKS
SODIUM HYPOCHLORITE TANK, 20,000 GAL
CHEMICAL UNLOADING STATION
DEEP WELL PUMP No. 1
REACTOR CONTAINMENT BUILDING UNIT-1
REACTOR CONTAINMENT BUILDING UNIT-2
FUEL HANDLING BUILDING
AUXILIARY BUILDING
TURBINE ROOM
UNIT-1
UNIT-2
HEATER BAY
DEMINERALIZER BUILDING
LIME SLUDGE LAGOONS
125,000 GAL. FUEL OIL STORAGE TANK-0D003T
150,000 GALLON FILTERED WATER TANK
2CD01T, 650,000 GAL.
1CD01T, 650,000 GAL.
CONDENSATE STORAGE TANKS
CONSTRUCTION FIRE PUMP HOUSE
RESERVE FOR FUTURE LIME SLUDGE LAGOONS
PROPERTY FENCING
RADWASTE AND SERVICE BUILDING UNITS 1&2
V.I.P. PARKING AREA
PERMANENT GATE HOUSE
GASOLINE & DIESEL FUEL DISPENSING TANKS
LIFT STATION #2
SEWAGE TREATMENT PLANT AREA
FIRE HYDRANT SUPPLIED BY U.S. PIPE & FOUNDRY COMPANY
GATE VALVE
GRADE
FOR GATE VALVE NOS. SEE VALVE LIST
FLANGED CONNECTIONS
FIRE HYDRANT
TYPICAL CONN.
(NO SCALE)
(20 REQ'D)
ACCESS ROAD
TO ILLINOIS CENTRAL GULF
LATER
BATCH PLANT AREA
ISFSI PAD SEE DWG. S-2232
CONSTRUCTION PAD #1 SEE DWG. S-2235
TRANSPORTER STORAGE BLDG. SEE DWG. S-2233
HAUL PATH SEE DWG. S-2236
KEY PLAN
"N"
LAYDOWN AREA
LAKE SCREEN HOUSE
DIKE
DITCH
PLAN "A-A"
EMERGENCY ENVIRONMENTAL SUPPLY BUILDING
FOR CON'T. SEE DWG NO. S-235
TO LAKE SCREEN HOUSE
NORTH
* THIS DRAWING WAS REDRAWN TO INCORPORATE DRN OD 63, 65 & 67 PRIOR TO RECEIVING DCR 89-190
REV | DATE | DESCRIPTION | PREP. | REVR. | APPR.
N | EDSF | FOR RECORD, EC 369356, EC 369359 AND EC 369360 | -- | -- | --
CONSTRUCTION AND CATEGORY II
OUTDOOR FIRE PROTECTION
UNITS 1 & 2
Exelon Nuclear
Braidwood Station 20 Unit: 1&2
Rising to the Challenge
SCALE : 1"=100'-0"
DATE : 10/25/75
DRAWN BY: E133
ORG. BY : S040
M-28
SHEET NUMBER: 1
SIZE: F
M98


M-28SHT. 2
AMENDMENT 26
DECEMBER 2014
P.O.176347
L-2739
DUCTILE IRON MATERIAL
L-2738
L-2737
CARBON STEEL MATERIAL
LAKE SCREEN HOUSE OPERATING FLOOR EL 602'-10"
FLANGED CONN.
BELL & SPIGOT CONN.
SECTION "D-D"
NO SCALE
345 K.V. SWITCHYARD
LATER
ISFSI PAD SEE DWG. S-2232
CONSTRUCTION PAD #1 SEE DWG. S-2235
TRANSPORTER STORAGE BLDG. SEE DWG. S-2233
HAUL PATH SEE DWG. S-2236
"L"
℄ HAUL PATH SEE DWG. S-2231
TO HIGHWAY-53
TO ILLINOIS CENTRAL GULF
GASOLINE & DIESEL FUEL DISPENSING TANKS
GASOLINE DISPENSING TANK
SEWAGE TREATMENT AREA
LIFT STATION
SEE DRAWING M-28 SHEET 4 FOR PIPING ARRANGEMENT
ELECTRICAL CONST. OFFICE
MECHANICAL CONST. OFFICE
STRUCTURAL CONST. OFFICE
CONSTRUCTION PAD #2 SEE DWG. S-2249
COMM. EDISON CONST. OFFICE
CONSTRUCTION PARKING LOT
BRASS BLDG.
GATE HOUSE
ACCESS ROAD
TO HIGHWAY 53
MOTOR GATES
DRAINAGE DITCH
CONSTRUCTION PARKING LOT
TURNING PAD #1 SEE DWG. S-2248
LPT CASK TRANSFER PAD SEE DWG. S-2241
450,000 GALLON REFUELING WATER STORAGE TANKS
TURNING PAD #2 SEE DWG. S-2240
℄ HAUL PATH SEE DWG. S-2231
SYSTEM AUX. TRANSF. 242-1
REACTOR CONTAINMENT BUILDING UNIT-1
REACTOR CONTAINMENT BUILDING UNIT-2
FUEL HANDLING BUILDING
MAIN POWER TRANSF. 2W
MAIN POWER TRANSF. 1E
MAIN POWER TRANSF. 2E
LAYDOWN AREA
TEMPORARY POWER SUB-STATION
OIL SEPARATOR
SETTLING POND
FIRE HYDRANT (TYPICAL) SEE DETAIL "A" DWG M-28 SH. 1
PROPOSED BATCH PLANT AREA
TURBINE ROOM
UNIT-1
UNIT-2
WATER TREATMENT AREA
HEATER BAY
FOAM PROTECTION LINE
WATER PURIFYING BUILDING
RADWASTE AND SERVICE BUILDING UNITS 1&2
PERMANENT GATE HOUSE
ROAD
TO LAKE SCREEN HOUSE
CLARIFIER BLOWDOWN SLUDGE POND
LAKE SCREEN HOUSE
40+05E
6" CLASS 2
500,000 GAL. PRIMARY WATER STORAGE TANKS
RESERVED FOR FUTURE SETTLING BASIN
1/2 ACRE
TEMPORARY FIRE PUMP HOUSE SEE DWG. M-908
150,000 GALLON FILTERED WATER TANK
125,000 GALLON FUEL OIL STORAGE TANK
2CD01T, 650,000 GAL. CONDENSATE STORAGE TANKS
1CD01T, 650,000 GAL.
DEEP WELL PUMP NO. 1
CONSTRUCTION ROAD (TYP.)
PROPERTY FENCING
NORTH
NOTES
1. UNLESS OTHERWISE NOTED ALL PIPE IS FURNISHED BY U.S. PIPE & FOUNDRY CO. UNDER PURCHASE ORDER #176342.
2. ALL 12" CLASS 6 PIPE TO BE CENTERED UNDER ROADS, TRACKS, & BRIDGES AS SHOWN.
3. 12" FIRE PROTECTION RING HEADER TO BE CLASS 3 UNLESS OTHERWISE NOTED TO BE CLASS 6
4. SEE DWG M-28-1 FOR FIRE HYDRANT, VALVE, AND PIPE LINE NUMBERS
5. SEE DWG M-28 SH. 1 FOR PIPE DIMENSIONS.
6. CONSTRUCTION FIRE PROTECTION PIPING IS ABANDONED IN PLACE. THIS PIPING IS NO LONGER UTILIZED BY THE PLANT.
L EDSF FOR RECORD, EC 389356, EC 389359 AND EC 389360 EDSF EDSF EDSF
ROAD, TRACK, EQUIPMENT AND FIRE PROTECTION RING HEADER UNITS 1 & 2
Exelon. Nuclear
Braidwood Station Unit: 1&2
M-28
SHEET NUMBER: 2
SIZE: F
M98

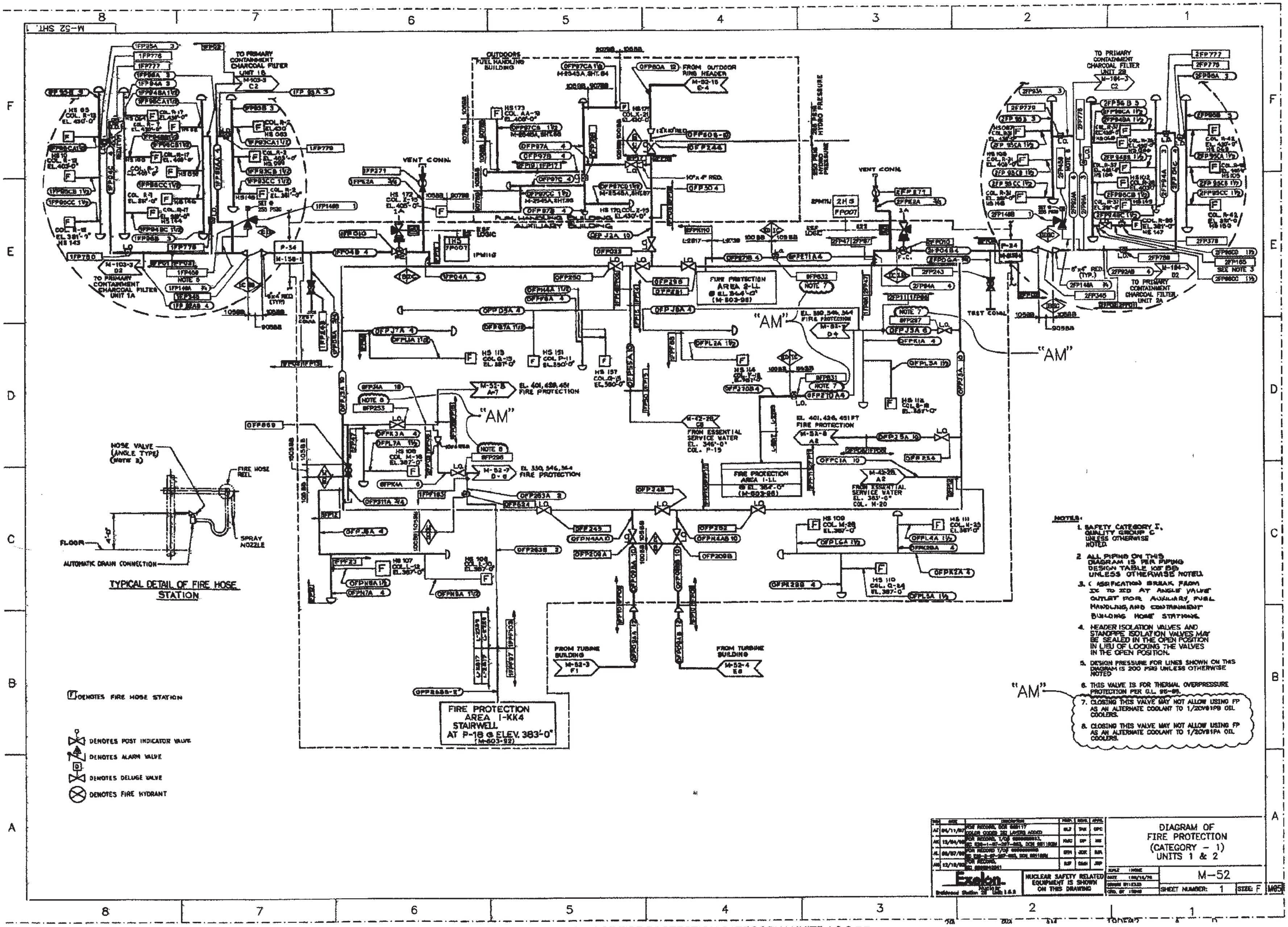
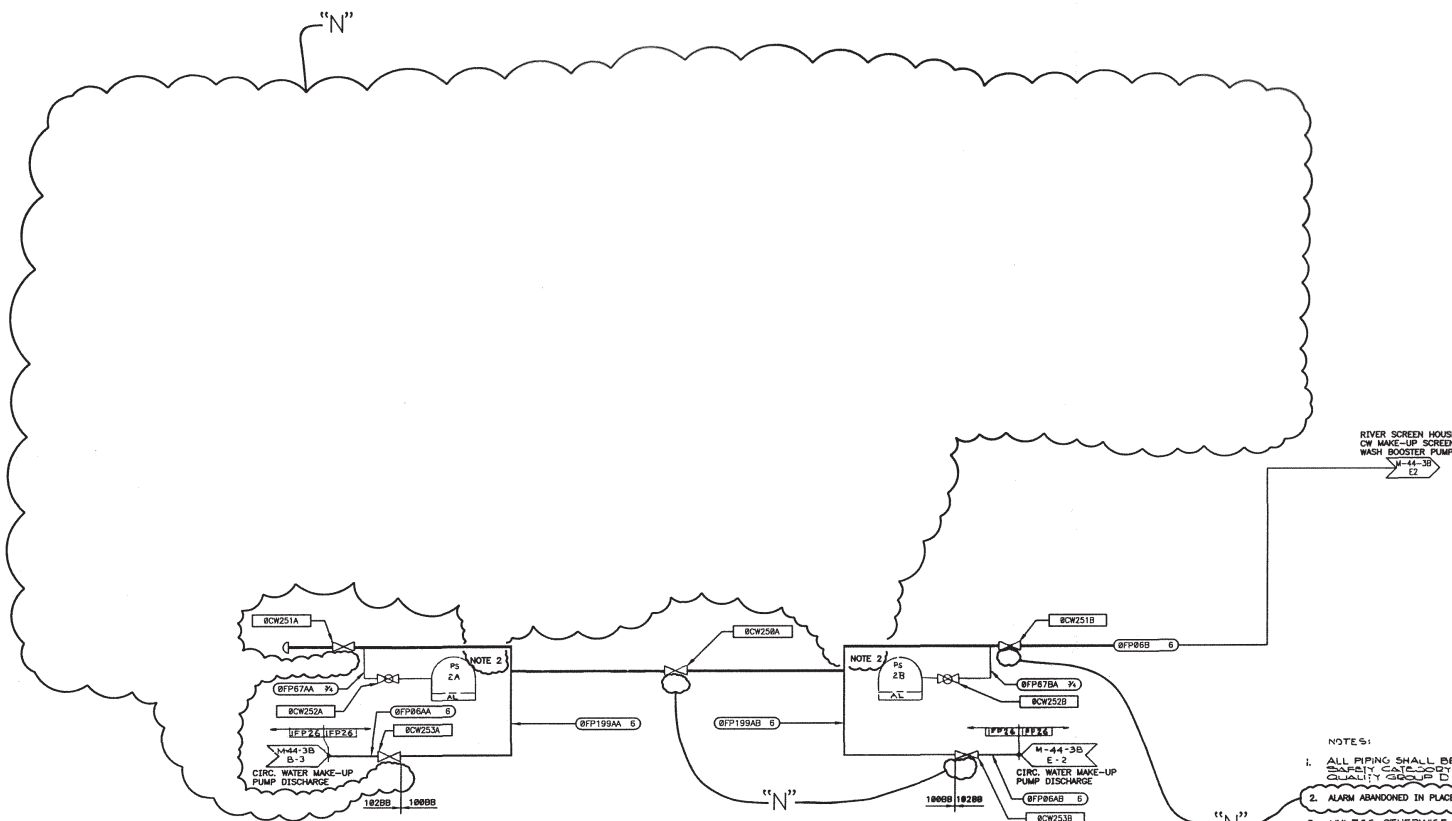


DIAGRAM OF FIRE PROTECTION CATEGORY I UNITS 1 & 2

M-52 SHT. 2

AMENDMENT 20
DECEMBER 2002



NOTES:

1. ALL PIPING SHALL BE SAFETY CATEGORY II QUALITY GROUP D
2. ALARM ABANDONED IN PLACE.
3. UNLESS OTHERWISE INDICATED ALL PIPING SHALL BE PER PIPING DESIGN TABLE 100BB
4. SECTION TO BE REMOVED WHEN TROLLEY IS IN OPERATION
7. THIS SYSTEM FUNCTIONS AS THE SCREEN WASH BOOSTER PUMPS SUPPLY HEADER AND NO LONGER AS THE FIRE PROTECTION SYSTEM FOR THR RSH [PER D20-0-99-375-001 (002)].

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
L	06/30/93	L-2730 FOR RECORD, DWG. REISSUED PER LETTER JRM 1632	S040	S040	S040
M	06/17/00	FOR RECORD, T/O [illegible], DCP TYPE/ D20-0-99-375-001, FCR 990111, DCN 001401M	RJF	DMH	DVR
N	06/05/01	FOR RECORD, EC [illegible]42581, FCR 990124, DCN 001406M	RJF	DMH	BMV
—	—		—	—	—

ComEd
Chicago, Illinois
Braidwood Station 20 Unit: 1&2

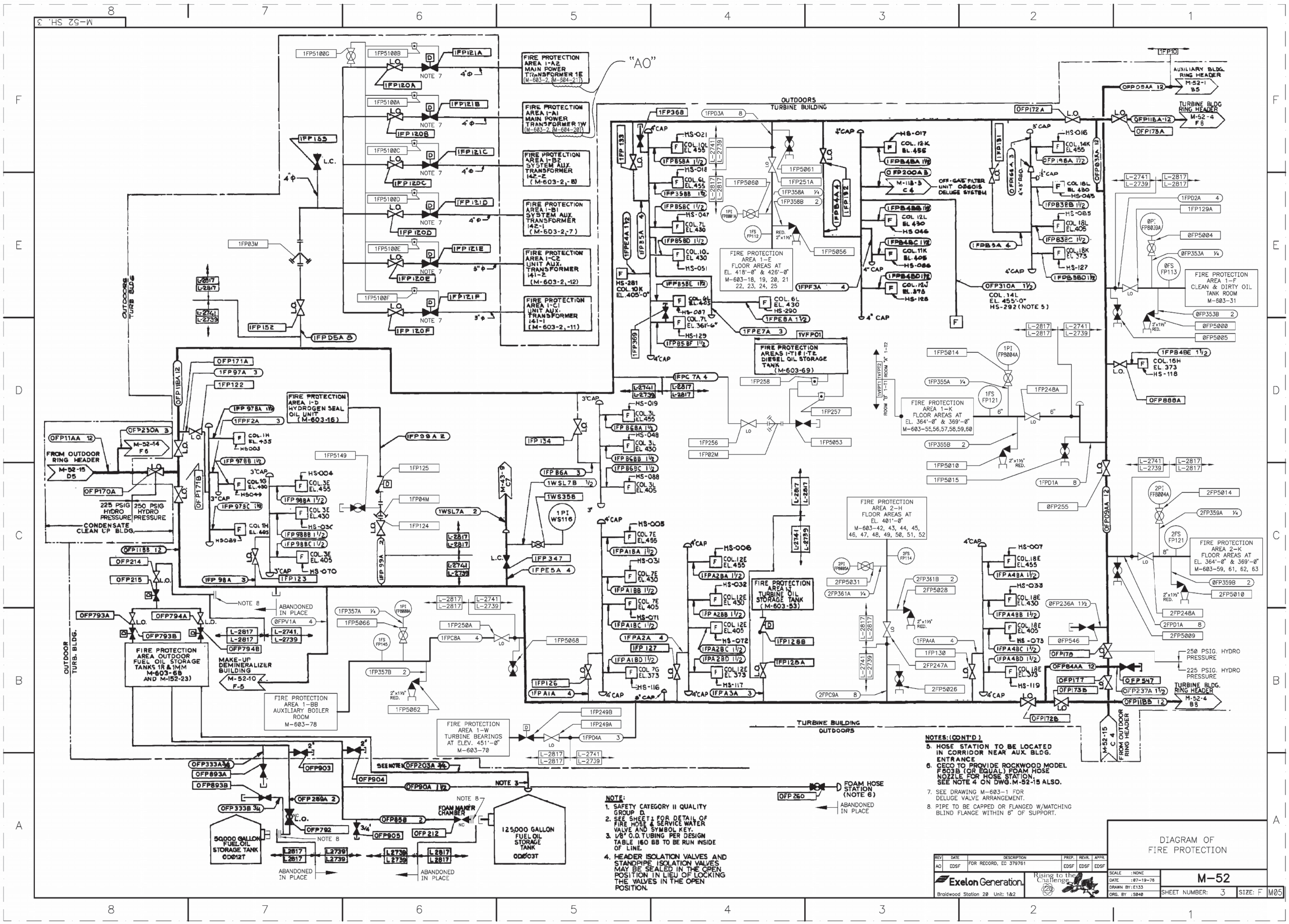
Rising to the Challenge

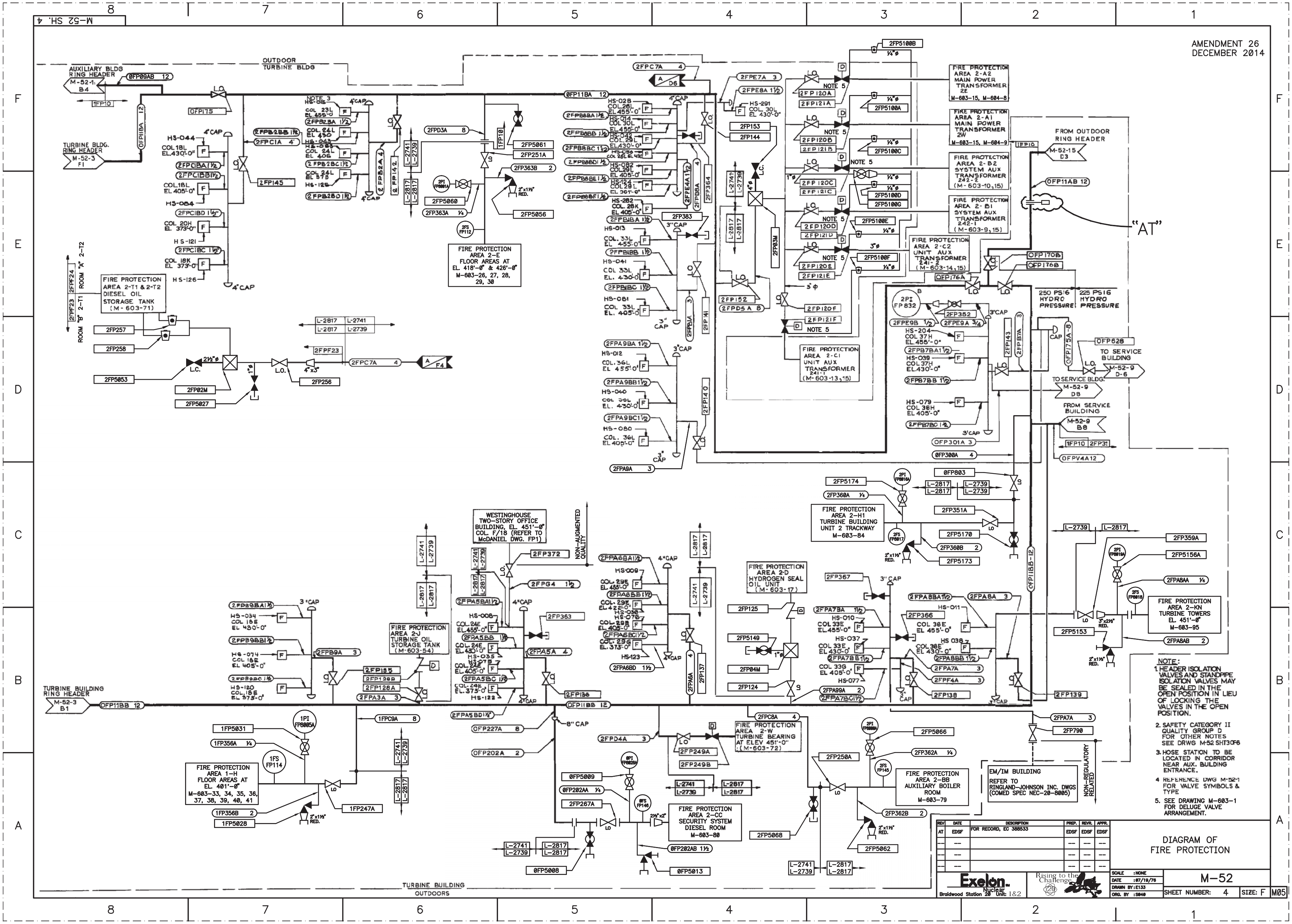
DIAGRAM OF
FIRE PROTECTION SYSTEM
RIVER SCREEN HOUSE
UNITS 1 & 2

SCALE : NONE
DATE : [illegible]
DRAWN BY : C[illegible]
CHG. BY : S040

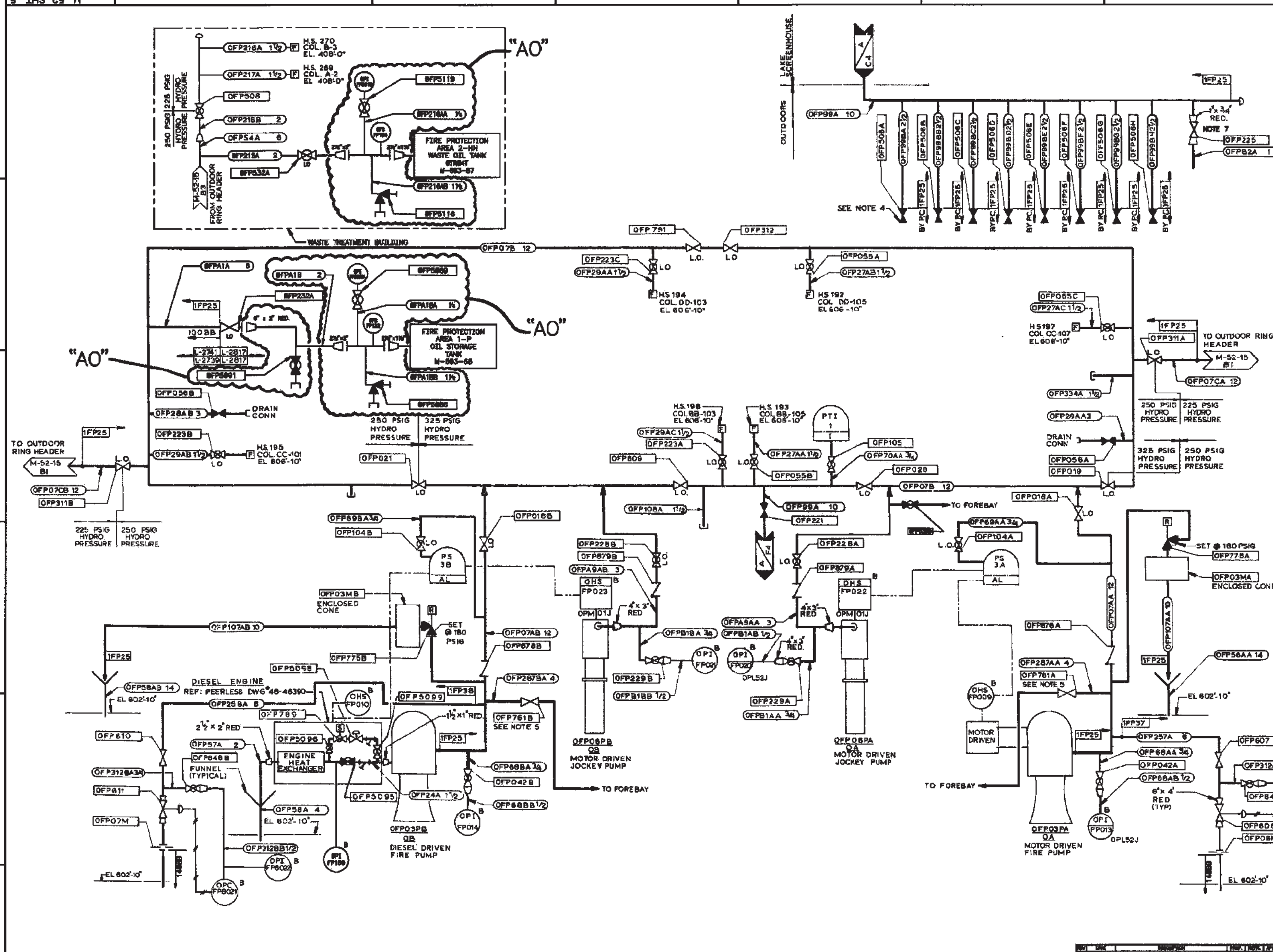
M-52

SHEET NUMBER: 2 | SIZE: F | M05


M-52 SH. 3
FIRE PROTECTION AREA 1-A2 MAIN POWER TRANSFORMER 1E (M-603-2, M-604-21)
FIRE PROTECTION AREA 1-A1 MAIN POWER TRANSFORMER 1W (M-603-2, M-604-20)
FIRE PROTECTION AREA 1-B2 SYSTEM AUX. TRANSFORMER 142-2 (M-603-2,-8)
FIRE PROTECTION AREA 1-B1 SYSTEM AUX. TRANSFORMER 142-1 (M-603-2,-7)
FIRE PROTECTION AREA 1-C2 UNIT AUX. TRANSFORMER 141-2 (M-603-2,-12)
FIRE PROTECTION AREA 1-C1 UNIT AUX. TRANSFORMER 141-1 (M-603-2,-11)
"A0"
OUTDOORS
TURBINE BUILDING
AUXILIARY BLDG. RING HEADER M-52-1 B5
TURBINE BLDG RING HEADER M-52-4 F8
FIRE PROTECTION AREA 1-E FLOOR AREAS AT EL. 418'-0" & 426'-0" M-603-18, 19, 20, 21 22, 23, 24, 25
OFF-GAS FILTER UNIT 0G601S DELUGE SYSTEM
FIRE PROTECTION AREA 1-F CLEAN & DIRTY OIL TANK ROOM M-603-31
FIRE PROTECTION AREAS 1-T1 & 1-T2 DIESEL OIL STORAGE TANK (M-603-69)
FIRE PROTECTION AREA 1-K FLOOR AREAS AT EL. 364'-0" & 369'-0" M-603-55,56,57,58,59,60
FIRE PROTECTION AREA 1-D HYDROGEN SEAL OIL UNIT (M-603-16)
FROM OUTDOOR RING HEADER M-52-15 D5
225 PSIG HYDRO PRESSURE
250 PSIG HYDRO PRESSURE
CONDENSATE CLEAN UP BLDG.
FIRE PROTECTION AREA 2-H FLOOR AREAS AT EL. 401'-0" M-603-42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52
FIRE PROTECTION AREA 1-J TURBINE OIL STORAGE TANK (M-603-53)
FIRE PROTECTION AREA 2-K FLOOR AREAS AT EL. 364'-0" & 369'-0" M-603-59, 61, 62, 63
FIRE PROTECTION AREA OUTDOOR FUEL OIL STORAGE TANKS 1R & 1MM M-603-68 AND M-152-23)
MAKE-UP DEMINERALIZER BUILDING M-52-10 F-5
FIRE PROTECTION AREA 1-BB AUXILIARY BOILER ROOM M-603-78
FIRE PROTECTION AREA 1-W TURBINE BEARINGS AT ELEV. 451'-0" M-603-70
ABANDONED IN PLACE
250 PSIG. HYDRO PRESSURE
225 PSIG. HYDRO PRESSURE
TURBINE BLDG. RING HEADER M-52-4 B8
TURBINE BUILDING
OUTDOORS
FROM OUTDOOR RING HEADER M-52-15 C4
50,000 GALLON FUEL OIL STORAGE TANK 0D012T
125,000 GALLON FUEL OIL STORAGE TANK 0D003T
FOAM MAKER CHAMBER
FOAM HOSE STATION (NOTE 6)
NOTE:
1. SAFETY CATEGORY II QUALITY GROUP D.
2. SEE SHEET 1 FOR DETAIL OF FIRE HOSE & SERVICE WATER VALVE AND SYMBOL KEY.
3. 1/8" O.D. TUBING PER DESIGN TABLE 160 BB TO BE RUN INSIDE OF LINE.
4. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
NOTES: (CONT'D)
5. HOSE STATION TO BE LOCATED IN CORRIDOR NEAR AUX. BLDG. ENTRANCE
6. CECO TO PROVIDE ROCKWOOD MODEL F603B (OR EQUAL) FOAM HOSE NOZZLE FOR HOSE STATION. SEE NOTE 4 ON DWG. M-52-15 ALSO.
7. SEE DRAWING M-603-1 FOR DELUGE VALVE ARRANGEMENT.
8. PIPE TO BE CAPPED OR FLANGED W/MATCHING BLIND FLANGE WITHIN 6" OF SUPPORT.
REV | DATE | DESCRIPTION | PREP. | REVR. | APPR.
A0 | EDSF | FOR RECORD, EC 379761 | EDSF | EDSF | EDSF
Exelon Generation.
Braidwood Station 20 Unit: 1&2
Rising to the Challenge
DIAGRAM OF FIRE PROTECTION
M-52
SCALE : NONE
DATE : 07-19-76
SHEET NUMBER: 3
SIZE: F
M05


M-52 SH. 4
AMENDMENT 26
DECEMBER 2014
AUXILIARY BLDG RING HEADER M-52-1 B4
OUTDOOR
TURBINE BLDG
TURBINE BLDG. RING HEADER M-52-3 F1
FIRE PROTECTION AREA 2-T1 & 2-T2 DIESEL OIL STORAGE TANK (M-603-71)
FIRE PROTECTION AREA 2-E FLOOR AREAS AT EL. 418'-0" & 426'-0" M-603-26, 27, 28, 29, 30
FIRE PROTECTION AREA 2-A2 MAIN POWER TRANSFORMER 2E M-603-15, M-604-8
FIRE PROTECTION AREA 2-A1 MAIN POWER TRANSFORMER 2W M-603-15, M-604-9
FIRE PROTECTION AREA 2-B2 SYSTEM AUX TRANSFORMER 242-2 (M-603-10,15)
FIRE PROTECTION AREA 2-B1 SYSTEM AUX TRANSFORMER 242-1 (M-603-9,15)
FIRE PROTECTION AREA 2-C2 UNIT AUX TRANSFORMER 241-2 (M-603-14,15)
FIRE PROTECTION AREA 2-C1 UNIT AUX TRANSFORMER 241-1 (M-603-13,15)
FROM OUTDOOR RING HEADER M-52-15 D3
"AT"
250 PSIG HYDRO PRESSURE
225 PSIG HYDRO PRESSURE
TO SERVICE BUILDING M-52-9 D-6
TO SERVICE BLDG M-52-9 D8
FROM SERVICE BUILDING M-52-9 B8
FIRE PROTECTION AREA 2-H1 TURBINE BUILDING UNIT 2 TRACKWAY M-603-84
WESTINGHOUSE TWO-STORY OFFICE BUILDING, EL. 451'-0" COL. F/18 (REFER TO McDANIEL DWG. FP1)
NON-AUGMENTED QUALITY
FIRE PROTECTION AREA 2-D HYDROGEN SEAL OIL UNIT (M-603-17)
FIRE PROTECTION AREA 2-J TURBINE OIL STORAGE TANK (M-603-54)
FIRE PROTECTION AREA 2-KN TURBINE TOWERS EL. 451'-0" M-603-95
TURBINE BUILDING RING HEADER M-52-3 B1
FIRE PROTECTION AREA 1-H FLOOR AREAS AT EL. 401'-0" M-603-33, 34, 35, 36, 37, 38, 39, 40, 41
FIRE PROTECTION AREA 2-W TURBINE BEARING AT ELEV 451'-0" (M-603-72)
FIRE PROTECTION AREA 2-CC SECURITY SYSTEM DIESEL ROOM M-603-80
FIRE PROTECTION AREA 2-BB AUXILIARY BOILER ROOM M-603-79
EM/IM BUILDING REFER TO RINGLAND-JOHNSON INC. DWGS (COMED SPEC NEC-20-8005)
NON-REGULATORY RELATED
TURBINE BUILDING
OUTDOORS
NOTE:
1. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
2. SAFETY CATEGORY II QUALITY GROUP D FOR OTHER NOTES SEE DRWG M-52 SHT3OF6
3. HOSE STATION TO BE LOCATED IN CORRIDOR NEAR AUX. BUILDING ENTRANCE.
4. REFERENCE DWG M-52-1 FOR VALVE SYMBOLS & TYPE
5. SEE DRAWING M-603-1 FOR DELUGE VALVE ARRANGEMENT.
REV | DATE | DESCRIPTION | PREP. | REVR. | APPR.
AT | EDSF | FOR RECORD, EC 388533 | EDSF | EDSF | EDSF
DIAGRAM OF FIRE PROTECTION
Exelon Nuclear
Braidwood Station 2 Unit: 1&2
Rising to the Challenge
SCALE: NONE
DATE: 07/19/76
M-52
SHEET NUMBER: 4
SIZE: F
M05

AMENDMENT 23
DECEMBER 2008



NOTES:

1. SAFETY CATEGORY II, QUALITY GROUP D.
2. FIRE PROTECTION AREA 1-P FURNISHED AND INSTALLED BY SPEC L-2817
3. UNLESS OTHERWISE INDICATED, ALL PIPING SHALL BE PER PIPING DESIGN TABLE 100 BB
4. FIRE PUMP TEST HEADER SHALL DISCHARGE TO LAKE SCREEN HOUSE FOREBAY.
5. INDICATES AIR RELEASE VALVE TO BE LOCATED AT HIGH POINT IN PIPING BETWEEN FIRE PUMP AND DISCHARGE CHECK VALVE
6. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION
7. 0FP225 IS NORMALLY OPEN TO PROVIDE FREEZE PROTECTION FOR THE FIRE PUMP TEST HEADER. THE VALVE IS CLOSED, AS NECESSARY TO MAINTAIN SYSTEM PRESSURE BOUNDARY.

DIAGRAM OF FIRE PROTECTION AT LAKE SCREEN HOUSE UNITS 1 & 2

Exelon Nuclear
Braidwood Station Units 1&2

M-52

SHEET NUMBER: 5 SIZE: F M05

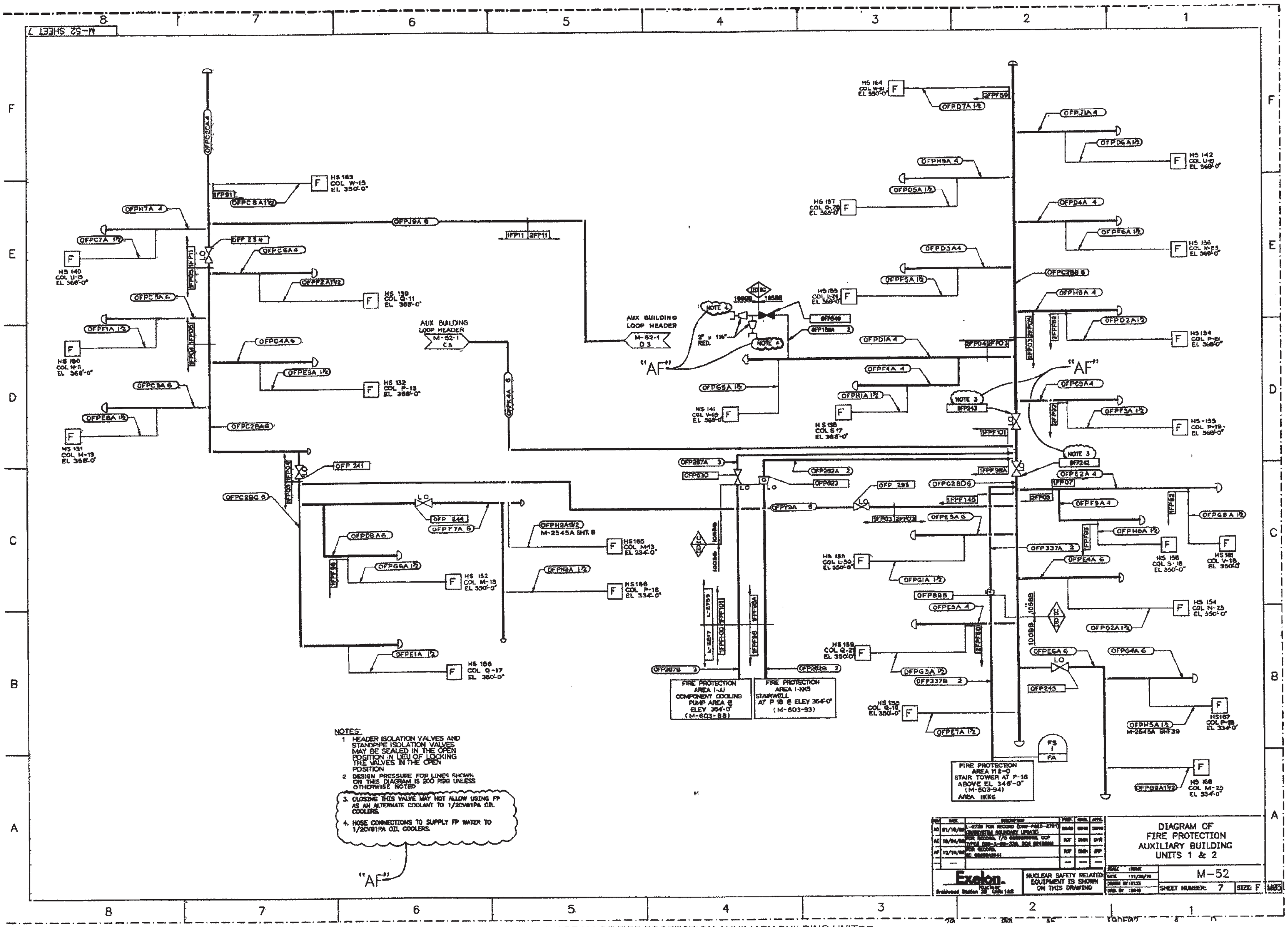
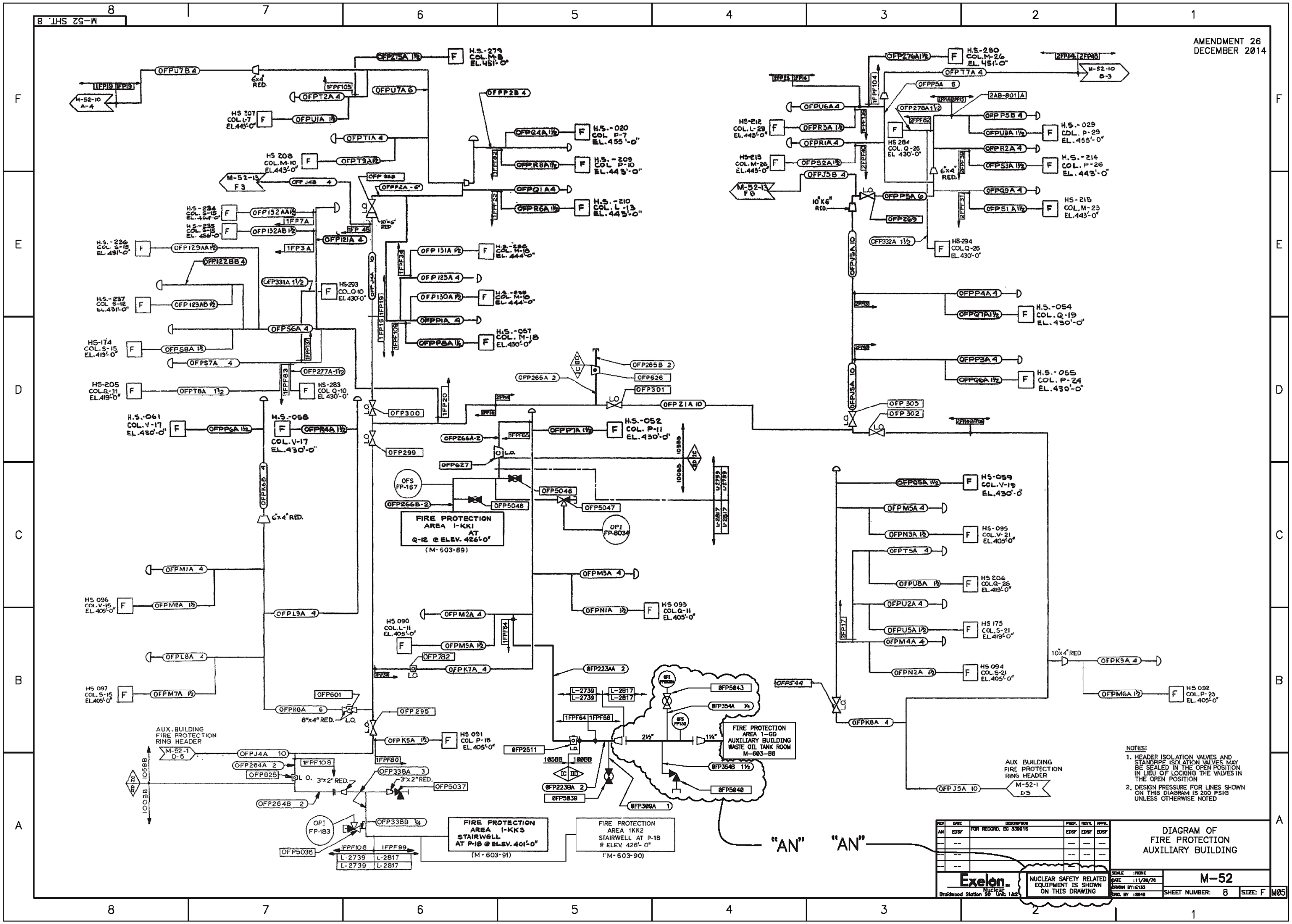
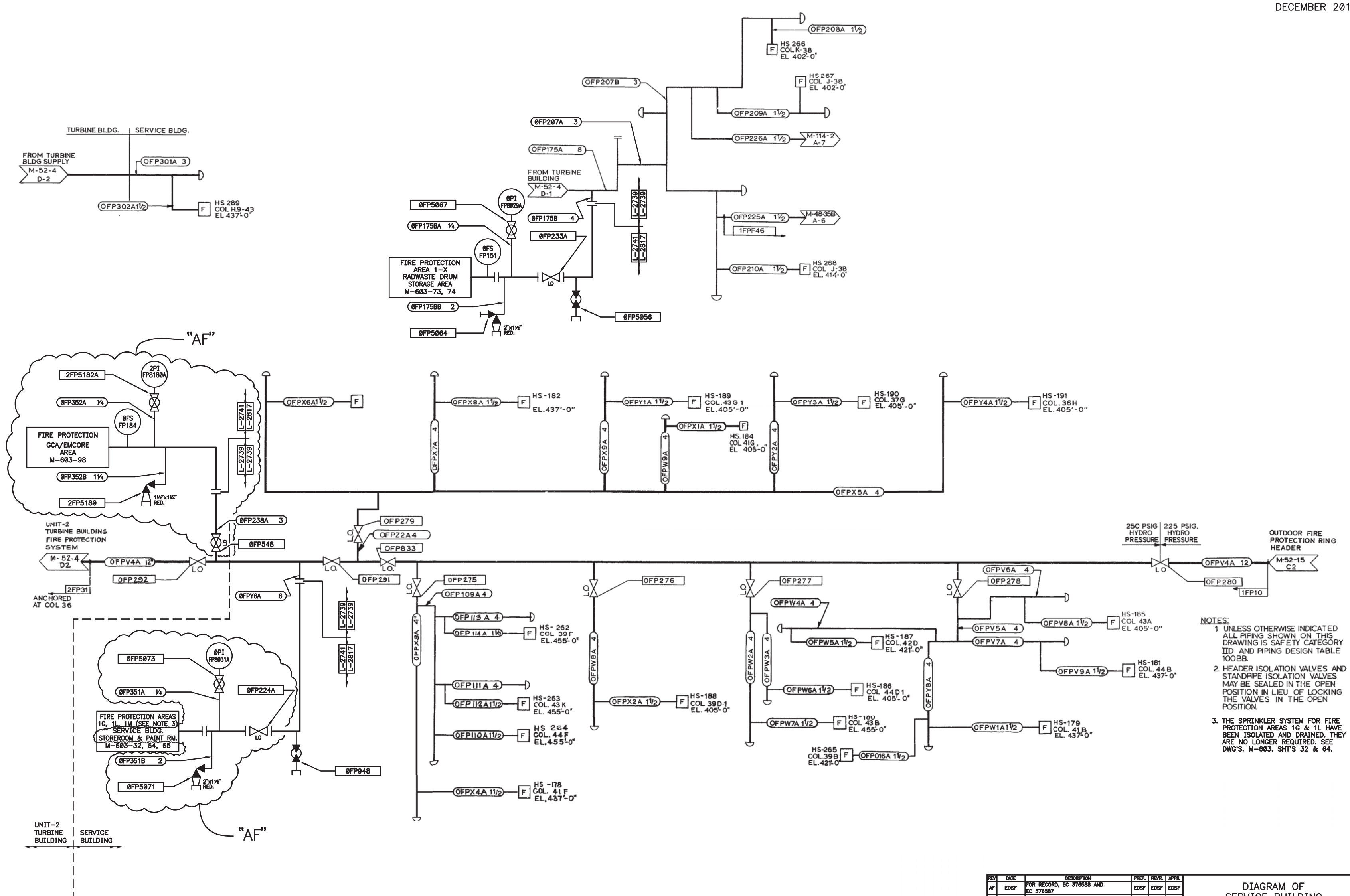


DIAGRAM OF FIRE PROTECTION AUXILIARY BUILDING UNIT□□


M-52 SHT. 8
AMENDMENT 26
DECEMBER 2014
FIRE PROTECTION
AREA 1-KK1
AT
Q-12 @ ELEV. 426'-0"
(M-603-89)
FIRE PROTECTION
AREA 1-GG
AUXILIARY BUILDING
WASTE OIL TANK ROOM
M-603-86
FIRE PROTECTION
AREA 1-KK3
STAIRWELL
AT P-18 @ ELEV. 401'-0"
(M-603-91)
FIRE PROTECTION
AREA 1KK2
STAIRWELL AT P-18
@ ELEV. 426'-0"
(M-603-90)
AUX. BUILDING
FIRE PROTECTION
RING HEADER
AUX BUILDING
FIRE PROTECTION
RING HEADER
"AN"
"AN"
NOTES:
1. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION
2. DESIGN PRESSURE FOR LINES SHOWN ON THIS DIAGRAM IS 200 PSIG UNLESS OTHERWISE NOTED
REV | DATE | DESCRIPTION | PREP. | REVR. | APPR.
AN | EDSF | FOR RECORD, EC 339916 | EDSF | EDSF | EDSF
DIAGRAM OF
FIRE PROTECTION
AUXILIARY BUILDING
Exelon Nuclear
Braidwood Station 20 Unit: 1&2
NUCLEAR SAFETY RELATED
EQUIPMENT IS SHOWN
ON THIS DRAWING
SCALE :NONE
DATE :11/30/78
DRAWN BY:E133
CHG. BY :S848
M-52
SHEET NUMBER: 8
SIZE: F
M05

M-52, SHT. 9

AMENDMENT 26
DECEMBER 2014



NOTES:

1. UNLESS OTHERWISE INDICATED ALL PIPING SHOWN ON THIS DRAWING IS SAFETY CATEGORY IID AND PIPING DESIGN TABLE 100BB.
2. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
3. THE SPRINKLER SYSTEM FOR FIRE PROTECTION AREAS 1G & 1L HAVE BEEN ISOLATED AND DRAINED. THEY ARE NO LONGER REQUIRED. SEE DWG'S. M-603, SHT'S 32 & 64.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AF	EDSF	FOR RECORD, EC 376588 AND EC 376587	EDSF	EDSF	EDSF
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

Exelon Nuclear
Braidwood Station 20 Unit: 1&2

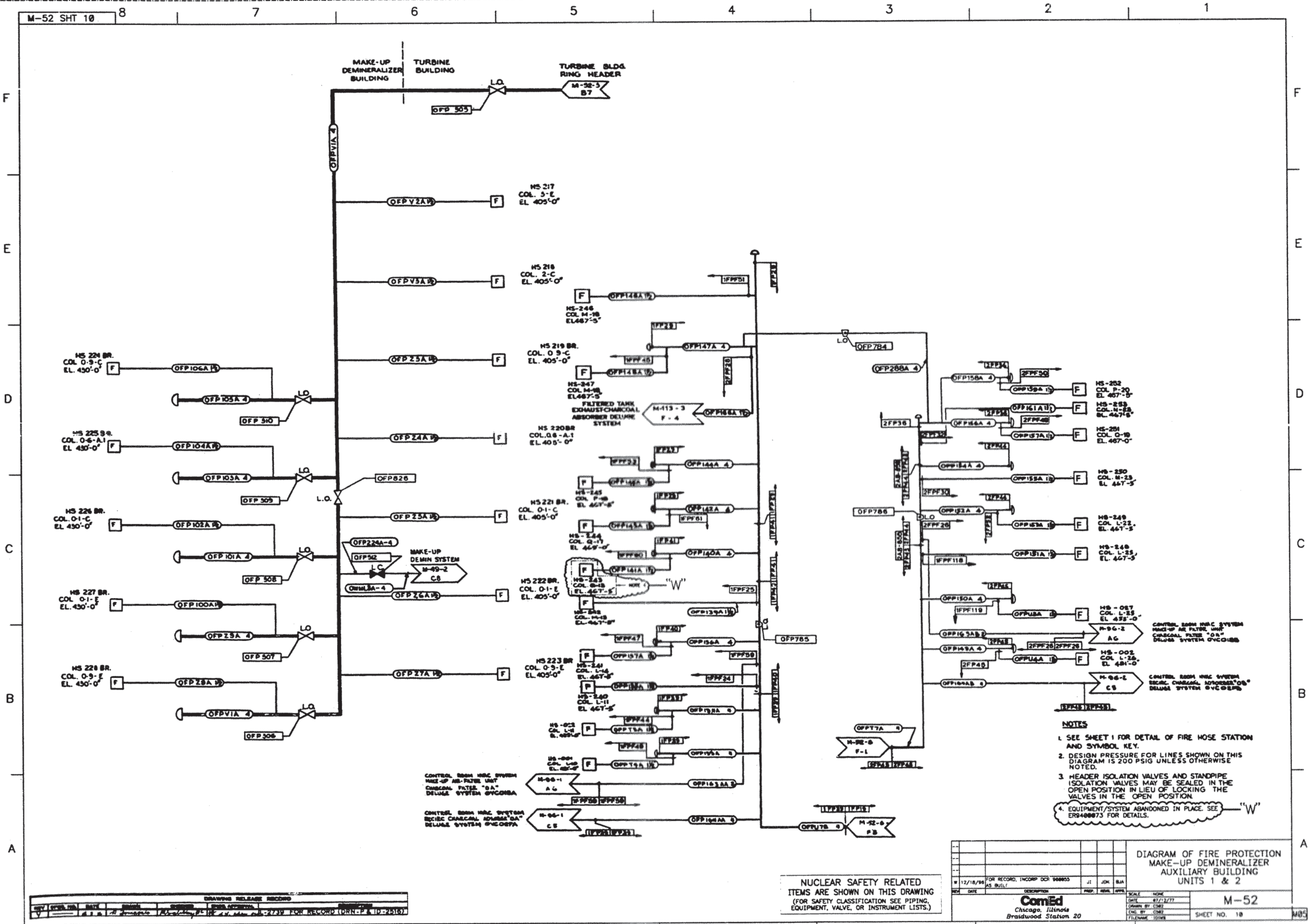
Rising to the Challenge

SCALE : NONE
DATE : 06/06/77
DRAWN BY: E133
ORG. BY : S840

DIAGRAM OF SERVICE BUILDING FIRE PROTECTION SYSTEM

M-52

SHEET NUMBER: 9 SIZE: F M05


M-52 SHT 10
MAKE-UP DEMINERALIZER BUILDING
TURBINE BUILDING
TURBINE BLDG. RING HEADER
M-52-3 B7
OFP 505
OFPV1A 4
OFPV2A
HS 217 COL. 3-E EL 405'-0"
OFPV3A
HS 218 COL. 2-C EL. 405'-0"
OFP25A
HS 219 BR. COL. 0.9-C EL. 405'-0"
OFP24A
HS 220BR COL. 0.6-A.1 EL. 405'-0"
OFP826
OFP23A
HS 221 BR. COL. 0.1-C EL. 405'-0"
OFP224A-4
OFP512
MAKE-UP DEMIN SYSTEM
M-49-2 C8
OFP26A
HS 222 BR. COL. 0.1-E EL. 405'-0"
OFP27A
HS 223 BR COL. 0.9-E EL. 405'-0"
HS 224 BR. COL. 0.9-C EL. 430'-0"
OFP106A
OFP105A 4
OFP 510
HS 225 BR. COL. 0.6-A.1 EL 430'-0"
OFP104A
OFP103A 4
OFP 509
HS 226 BR. COL. 0.1-C EL 430'-0"
OFP102A
OFP101A 4
OFP 508
HS 227 BR. COL. 0.1-E EL. 430'-0"
OFP100A
OFP29A 4
OFP 507
HS 228 BR. COL. 0.9-E EL. 430'-0"
OFP28A
OFPV1A 4
OFP 506
L.O.
1FPF51
OFP148A
OFP147A 4
OFP784
OFP288A 4
M-413-3 F-4
FILTERED TANK EXHAUST CHARCOAL ABSORBER DELUGE SYSTEM
OFP144A 4
OFP142A
OFP140A
OFP786
OFP139A
OFP785
OFP136A 4
OFP137A
"W"
2FP36
2FPF50
2FPF49
2FPF26
2FP49
OFP158A 4
OFP159A
OFP161A
OFP166A 4
OFP157A
OFP154A 4
OFP155A
OFP152A 4
OFP153A
OFP151A
OFP150A 4
OFP165AB
OFP149A 4
OFPU4A
OFP164AB
HS-252 COL P-20 EL 467'-5"
HS-251 COL Q-19 EL 467'-0"
HS-250 COL. N-25 EL 467'-5"
HS-249 COL. L-22 EL 467'-5"
HS-248 COL. L-25 EL 467'-5"
HS-002 COL. L-26 EL 481'-0"
M-96-2 AG
M-96-2 C8
M-96-1 A6
M-96-1 C5
M-52-6 F8
M-92-6 F-1
OFPT7A 4
OFPU7B 4
NOTES
1. SEE SHEET 1 FOR DETAIL OF FIRE HOSE STATION AND SYMBOL KEY.
2. DESIGN PRESSURE FOR LINES SHOWN ON THIS DIAGRAM IS 200 PSIG UNLESS OTHERWISE NOTED.
3. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
4. EQUIPMENT/SYSTEM ABANDONED IN PLACE. SEE ER9400073 FOR DETAILS.
"W"
NUCLEAR SAFETY RELATED ITEMS ARE SHOWN ON THIS DRAWING
(FOR SAFETY CLASSIFICATION SEE PIPING, EQUIPMENT, VALVE, OR INSTRUMENT LISTS.)
W 12/18/96 FOR RECORD, INCORP DCR 960055 AS BUILT JI JDK BJA
REV. DATE DESCRIPTION PREP. REVW. APPR.
ComEd
Chicago, Illinois
Braidwood Station 20
DIAGRAM OF FIRE PROTECTION
MAKE-UP DEMINERALIZER
AUXILIARY BUILDING
UNITS 1 & 2
SCALE NONE
DATE 07/12/77
M-52
SHEET NO. 10
W05

M-52 SH. 11

AMENDMENT 26
DECEMBER 2014

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT NO	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS
1	L-10	481'-0"	A,B,C	10	100	AUX. BLDG ROOF	OFP 331
2	L-26	481'-0"	A,B,C	10	100	AUX. BLDG ROOF	OFP 338
3	1-H	455'-0"	A,B,C	3	50	TURBINE	1FP166
4	3-E	455'-0"	A,B,C	3	75	TURBINE	1FP169
5	7-E	455'-0"	A,B,C	3	50	TURBINE	1FP 175
6	12-E	455'-0"	A,B,C	3	75	TURBINE	1FP190
7	18-E	455'-0"	A,B,C	3	50	TURBINE	1FP198
8	24-E	455'-0"	A,B,C	4	75	TURBINE	2FP205
9	29-E	455'-0"	A,B,C	4	50	TURBINE	2FP209
10	33-E	455'-0"	A,B,C	4	75	TURBINE	2FP213
11	36-E	455'-0"	A,B,C	4	50	TURBINE	2FP216
12	36-L	455'-0"	A,B,C	4	50	TURBINE	2FP224
13	33-L	455'-0"	A,B,C	4	50	TURBINE	2FP227
14	30-L	455'-0"	A,B,C	4	75	TURBINE	2FP232
15	23-L	455'-0"	A,B,C	4	100	TURBINE	2FP237
16	14-K	455'-0"	A,B,C	3	100	TURBINE	1FP194
17	12-L	455'-0"	A,B,C	3	100	TURBINE	1FP185
18	6-L	455'-0"	A,B,C	3	75	TURBINE	1FP180
19	3-L	455'-0"	A,B,C	3	50	TURBINE	1FP172
20	P-7	455'-0"	A,B,C	8	50	AUXILIARY	OFP324
21	10-L	455'-0"	A,B,C	3	100	TURBINE	1FP179
22	11-L	455'-0"	A,B,C	10	100	AUXILIARY	OFP332
27	25-L	455'-0"	A,B,C	10	100	AUXILIARY	OFP335
28	26-L	455'-0"	A,B,C	4	100	TURBINE	2FP233
29	P-29	455'-0"	A,B,C	8	50	AUXILIARY	OFP339
30	3-E	430'-0"	A,B,C	3	50	TURBINE	1FP170
31	7-E	422'-0"	A,B,C	3	75	TURBINE	1FP176
32	12-E	422'-0"	A,B,C	3	50	TURBINE	1FP191
33	18-E	430'-0"	A,B,C	3	75	TURBINE	1FP199
34	18-E	430'-0"	A,B,C	4	75	TURBINE	2FP202
35	24-E	430'-0"	A,B,C	4	50	TURBINE	2FP206
36	29-E	430'-0"	A,B,C	4	75	TURBINE	2FP210
37	33-E	430'-0"	A,B,C	4	50	TURBINE	2FP214
38	36-E	430'-0"	A,B,C	4	50	TURBINE	2FP217
39	37-H	430'-0"	A,B,C	4	50	TURBINE	2FP220
40	36-L	430'-0"	A,B,C	4	50	TURBINE	2FP223
41	33-L	430'-0"	A,B,C	4	50	TURBINE	2FP226
42	29-L	430'-0"	A,B,C	4	100	TURBINE	2FP231
43	24-L	430'-0"	A,B,C	4	50	TURBINE	2FP236
44	18-L	430'-0"	A,B,C	4	75	TURBINE	2FP241
45	18-L	430'-0"	A,B,C	3	75	TURBINE	1FP195
46	12-L	430'-0"	A,B,C	3	50	TURBINE	1FP186
47	7-L	430'-0"	A,B,C	3	100	TURBINE	1FP181
48	3-L	430'-0"	A,B,C	3	75	TURBINE	1FP173
49	1-G	430'-0"	A,B,C	3	50	TURBINE	1FP167
51	10-L	430'-0"	A,B,C	3	100	TURBINE	1FP182
52	P-11	430'-0"	A,B,C	8	100	AUXILIARY	OFP313
54	Q-19	430'-0"	A,B,C	8	100	AUXILIARY	OFP342
55	P-24	430'-0"	A,B,C	8	50	AUXILIARY	OFP343
56	26-L	430'-0"	A,B,C	4	100	TURBINE	2FP230
57	M-18	430'-0"	A,B,C	8	75	AUXILIARY	OFP323
58	V-17	430'-0"	A,B,C	8	100	AUXILIARY	OFP319
59	V-19	430'-0"	A,B,C	8	100	AUXILIARY	OFP 344

MANUAL HOSE STATIONS

HOSE REEL NO	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS
61	V-17	430'-0"	A,B,C	8	50	AUXILIARY	OFP320
62	R-17	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP163
63	R-2	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP154
64	R-7	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP160
65	R-12	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP157
66	R-26	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP163
67	R-31	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP154
68	R-37	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP160
69	R-42	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP157
70	3-E	405'-0"	A,B,C	3	100	TURBINE	1FP171
71	7-E	405'-0"	A,B,C	3	75	TURBINE	1FP177
72	12-E	405'-0"	A,B,C	3	50	TURBINE	1FP192
73	18-E	405'-0"	A,B,C	3	75	TURBINE	1FP200
74	18-E	405'-0"	A,B,C	4	75	TURBINE	2FP203
75	24-E	405'-0"	A,B,C	4	50	TURBINE	2FP207
76	20 E	405'-0"	A,B,C	4	100	TURBINE	2FP211
77	33-G	405'-0"	A,B,C	4	100	TURBINE	2FP215
79	36-H	405'-0"	A,B,C	4	50	TURBINE	2FP219
80	36-L	405'-0"	A,B,C	4	50	TURBINE	2FP222
81	33-L	405'-0"	A,B,C	4	100	TURBINE	2FP225
82	29-L	405'-0"	A,B,C	4	100	TURBINE	2FP229
83	24-L	405'-0"	A,B,C	4	50	TURBINE	2FP235
84	18-L	405'-0"	A,B,C	4	75	TURBINE	2FP240
85	18-L	405'-0"	A,B,C	3	75	TURBINE	1FP196
86	11-K	405'-0"	A,B,C	3	50	TURBINE	1FP187
87	6-L	405'-0"	A,B,C	3	100	TURBINE	1FP183
88	3-L	405'-0"	A,B,C	3	50	TURBINE	1FP174
89	1-H	405'-0"	A,B,C	3	50	TURBINE	1FP168
90	L-11	405'-0"	A,B,C	8	50	AUXILIARY	OFP315
91	P-10	405'-0"	A,B,C	8	50	AUXILIARY	OFP318
92	P-23	405'-0"	A,B,C	8	100	AUXILIARY	OFP349
93	Q 11	405'-0"	A,B,C	8	75	AUXILIARY	OFP314
94	S-21	405'-0"	A,B,C	8	50	AUXILIARY	OFP348
95	V-21	405'-0"	A,B,C	8	75	AUXILIARY	OFP345
96	V-15	405'-0"	A,B,C	8	75	AUXILIARY	OFP316
97	S-15	405'-0"	A,B,C	8	50	AUXILIARY	OFP317
98	R-17	403'-0"	A,B,C	1	100	CONTAIN #1	1FP164
99	R-2	403'-0"	A,B,C	1	100	CONTAIN #1	1FP155
100	R-7	403'-0"	A,B,C	1	100	CONTAIN # 1	1FP161
101	R-12	403'-0"	A,B,C	1	100	CONTAIN # 1	1FP158
102	R-26	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP164
103	R-31	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP155
104	R-37	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP161
105	R-42	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP158
106	L-10	387'-0"	A,B,C	1	50	AUXILIARY	OFP385
107	L-12	387'-0"	A,B,C	1	50	AUXILIARY	OFP384
108	M-18	387'-0"	A,B,C	1	50	AUXILIARY	OFP383
109	M-26	387'-0"	A,B,C	1	50	AUXILIARY	OFP377
110	Q-24	387'-0"	A,B,C	1	75	AUXILIARY	OFP375
111	N-23	387'-0"	A,B,C	1	75	AUXILIARY	OFP376
112	S-19	387'-0"	A,B,C	1	50	AUXILIARY	OFP378
113	Q-15	387'-0"	A,B,C	1	50	AUXILIARY	OFP382
114	V-18	387'-0"	A,B,C	1	50	AUXILIARY	OFP379
116	7-G	373'-0"	A,B,C	3	75	TURBINE	1FP178
117	12-E	373'-0"	A,B,C	3	50	TURBINE	1FP193
118	16-H	373'-0"	A,B,C	3	50	TURBINE	1FP189
119	18-E	373'-0"	A,B,C	3	50	TURBINE	1FP201
120	18-E	373'-0"	A,B,C	4	50	TURBINE	2FP204

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT NO	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS
121	20-H	373'-0"	A,B,C	4	50	TURBINE	2FP238
122	24-E	373'-0"	A,B,C	4	50	TURBINE	2FP208
123	29-G	373'-0"	A,B,C	4	75	TURBINE	2FP212
124	29-L	364'-0"	A,B,C	4	200	TURBINE	2FP228
125	24-L	373'-0"	A,B,C	4	50	TURBINE	2FP234
126	18-K	373'-0"	A,B,C	4	50	TURBINE	2FP239
127	18-K	373'-0"	A,B,C	3	50	TURBINE	1FP197
128	12-J	373'-0"	A,B,C	3	50	TURBINE	1FP188
129	7-L	361'-6"	A,B,C	3	200	TURBINE	1FP184
130	N-11	368'-0"	A,B,C	7	50	AUXILIARY	OFP373
131	M-13	368'-0"	A,B,C	7	50	AUXILIARY	OFP374
132	P-13	368'-0"	A,B,C	7	50	AUXILIARY	OFP369
133	P-19	368'-0"	A,B,C	7	50	AUXILIARY	OFP355
134	P-21	368'-0"	A,B,C	7	50	AUXILIARY	OFP356
135	L-25	368'-0"	A,B,C	7	50	AUXILIARY	OFP361
136	N-25	368'-0"	A,B,C	7	75	AUXILIARY	OFP357
137	Q-26	368'-0"	A,B,C	7	50	AUXILIARY	OFP360
138	S-17	368'-0"	A,B,C	7	50	AUXILIARY	OFP362
139	Q-11	368'-0"	A,B,C	7	50	AUXILIARY	OFP368
140	U-15	368'-0"	A,B,C	7	100	AUXILIARY	OFP372
141	V-18	368'-0"	A,B,C	7	100	AUXILIARY	OFP366
142	U-21	368'-0"	A,B,C	7	100	AUXILIARY	OFP358
143	R-12	381'-0"	A,B,C	1	100	CONTAIN #1	1FP159
144	R-17	381'-0"	A,B,C	1	100	CONTAIN #1	1FP162
145	R-2	381'-0"	A,B,C	1	100	CONTAIN #1	1FP156
146	R-7	381'-0"	A,B,C	1	100	CONTAIN #1	1FP165
147	R-26	381'-0"	A,B,C	1	100	CONTAIN #2	2FP165
148	R-31	381'-0"	A,B,C	1	100	CONTAIN #2	2FP156
149	R-37	381'-0"	A,B,C	1	100	CONTAIN #2	2FP162
150	R-42	381'-0"	A,B,C	1	100	CONTAIN #2	2FP159
151	P-11	350'-0"	A,B,C	1	75	AUXILIARY	OFP381
152	M-13	350'-0"	A,B,C	7	50	AUXILIARY	OFP370
153	L-30	350'-0"	A,B,C	7	50	AUXILIARY	OFP363
154	N-23	350'-0"	A,B,C	7	100	AUXILIARY	OFP352
155	Q-19	350'-0"	A,B,C	7	50	AUXILIARY	OFP365
156	Q-17	350'-0"	A,B,C	7	75	AUXILIARY	OFP371
157	Q-15	350'-0"	A,B,C	1	50	AUXILIARY	OFP380
158	S-18	350'-0"	A,B,C	7	75	AUXILIARY	OFP354
159	Q-21	350'-0"	A,B,C	7	50	AUXILIARY	OFP364
161	V-18	350'-0"	A,B,C	7	100	AUXILIARY	OFP353
163	W-15	350'-0"	A,B,C	7	100	AUXILIARY	OFP367
164	W-21	350'-0"	A,B,C	7	100	AUXILIARY	OFP359
165	M-13	334'-0"	A,B,C	7	50	AUXILIARY	OFP448
166	P-18	334'-0"	A,B,C	7	50	AUXILIARY	OFP449
167	P-18	334'-0"	A,B,C	7	50	AUXILIARY	OFP351
168	M-23	334'-0"	A,B,C	7	50	AUXILIARY	OFP350
170	Z-15	430'-0"	A	1	75	FUEL HANDLING	OFP389
171	X-21	430'-0"	A	1	75	FUEL HANDLING	OFP386
172	Z-15	405'-0"	A, B, C	1	75	FUEL HANDLING	OFP388
173	AA-19	405'-0"	A	1	100	FUEL HANDLING	OFP387
174	S-15	419'-0"	A,B,C	8	75	AUXILIARY	OFP322
175	S-21	419'-0"	A,B,C	8	75	AUXILIARY	OFP 347
176	S-15	471'-0"	A,B,C	13	100	AUXILIARY	OFP 329
177	S-21	471'-0"	A,B,C	13	100	AUXILIARY	OFP334
178	41-F	437'-0"	A,B,C	9	50	RW/SERVICE	OFP415
179	41-B	437'-0"	A,B,C	9	50	RW/SERVICE	OFP410
180	43-B	455'-0"	A,B,C	9	75	RW/SERVICE	OFP412

NOTES:— 1. ANGLE VALVES, FIRE HOSE, FIRE HOSE REELS, AUTOMATIC DRAIN VALVES AND HOSE COUPLINGS ARE TO BE PURCHASED BY SPEC L -2739 PER LETTER SLHC-930/ SLPG-878 DATED APRIL 4,1977. FIRE HOSE PURCHASED AFTER OCT.15,1985 MUST BE TESTED TO 500 PSI

2. ALL NOZZLES FOR HOSE STATIONS LISTED ON THIS DRAWING ARE TO BE PURCHASED BY SPEC L-2739 PER PIPING SPECIALTY RELEASE # 81

"T"

3. HOSE LENGTHS SPECIFIED ON THIS DRAWING ARE A MINIMUM LENGTH. HOSE LENGTHS GREATER THAN THOSE ARE ACCEPTABLE BUT NOT TO EXCEED 100FT. UNLESS OTHERWISE SPECIFIED.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
T	EDSF	FOR RECORD, EC 395461	EDSF	EDSF	EDSF

Exelon Generation.
Braidwood Nuclear Power Station #20 Unit: 1&2
Rising to the Challenge 20

DIAGRAM OF FIRE PROTECTION MANUAL HOSE STATIONS

SCALE : NONE
DATE : N/A
DRAWN BY: E133
ORG. BY : S040

M-52

SHEET NUMBER: 11 SIZE: F M05

M-52 SH. 12

AMENDMENT 26
DECEMBER 2014

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS
181	44-B	437'-0"	A,B,C	9	75	RW/SERVICE	OFP 411
182	44-G.1	437'-0"	A,B,C	9	75	RW/SERVICE	OFP 405
183	39-G.1	437'-0"	A,B,C	9	75	RW/SERVICE	OFP 406
184	41-G.1	405'-0"	A,B,C	9	50	RW/SERVICE	OFP413
185	43-A	405'-0"	A,B,C	9	50	RW/SERVICE	OFP 409
186	44-D.1	405'-0"	A,B,C	9	50	RW/SERVICE	OFP407
187	42-D	421'-0"	A,B,C	9	100	RW/SERVICE	OFP 408
188	39-D 1	405'-0"	A,B,C	9	50	RW/SERVICE	OFP414
189	43-G	405'-0"	A,B,C	9	50	RW/SERVICE	OFP 404
190	37-G	405'-0"	A,B,C	9	100	RW/SERVICE	OFP403
191	36-H	405'-0"	A,B,C	9	50	RW/SERVICE	OFP 402
192	DD-105	606'-10"	A,B,C	5	50	LAKE SCREEN HSE.	OFP 400
193	BB-105	606'-10"	A,B,C	5	50	LAKE SCREEN HSE	OFP399
194	DD-103	606'-10"	A,B,C	5	50	LAKE SCREEN HSE	OFP396
195	CC-101	606'-10"	A,B,C	5	50	LAKE SCREEN HSE.	OFP397
196	BB-103	606'-10'	A,B,C	5	50	LAKE SCREEN HSE	OFP 398
197	CC-107	606'-10"	A,B,C	5	50	LAKE SCREEN HSE	OFP401
198							
199							
200							
201							
202							
203							
204	37-H	455-0"	A,B,C	4	100	TURBINE	2FP221
205	Q-11	419'-0"	A,B,C	8	100	AUXILIARY	OFP321
206	Q-26	419'-0"	A,B,C	8	75	AUXILIARY	OFP346
207	L-7	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP330
208	M-10	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP327
209	P-10	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP525
210	L-13	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP326
211	P-13	443'-0"	A,B,C	13	100 (3)	AUXILIARY	OFP328
212	L-29	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP 336
213	M-26	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP337
214	P-26	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP340
215	M-23	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP341
216	P-21	443'-0"	A,B,C	13	100 (3)	AUXILIARY	OFP333
217	E-3	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP416
218	C-2	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP417
219	C-0.9	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP418
220	A.1-0.6	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP419
221	C-0.1	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP420
222	E-0.1	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP421
223	E-0.9	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP422
224	C-0.9	430'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP423
225	A.1-0.6	430'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP424
226	C-0.1	430'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP425
227	E-0.1	430'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP426
228	E-0.9	430'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP 427

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS
229	S-21	431'-0"	A,B,C	13	75	AUXILIARY	OFP454
230	S-24	431'-0"	A,B,C	13	75	AUXILIARY	OFP455
231	S-21	456'-0"	A,B,C	13	75	AUXILIARY	OFP456
232	S-21	464'-0"	A,B,C	13	75	AUXILIARY	OFP457
233	S-18	480'-6"	A,B,C	13	75	AUXILIARY	OFP458
234	S-15	464'-0"	A,B,C	8	75	AUXILIARY	OFP459
235	S-15	456'-0"	A,B,C	8	75	AUXILIARY	OFP460
236	S-15	431'-0"	A,B,C	8	75	AUXILIARY	OFP461
237	S-12	431'-0"	A,B,C	8	75	AUXILIARY	OFP462
238	M-18	444'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP463
239	M-18	444'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP464
240	L-11	467'-5"	A,B,C	10	75	AUXILIARY	OFP465
241	L-14	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP466
242	M-13	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP467
243(5)	Q-13	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP468
244	Q-17	469'-0"	A,B,C	10	100 (3)	AUXILIARY	OFP469
245	P-18	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP470
246	M-18	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP471
247	M-18	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP472
248	L-25	467'-5"	A,B,C	10	75	AUXILIARY	OFP473
249	L-22	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP474
250	M-23	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP475
251	Q-19	467'-0"	A,B,C	10	100 (3)	AUXILIARY	OFP476
252	P-20	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP477
253	N-23	467'-5'	A,B,C	10	100 (3)	AUXILIARY	OFP478
254	D-2	405'-6"	A,B,C	14	75	GATE HOUSE	OFP479
255	B-3	405'-6"	A,B,C	14	75	GATE HOUSE	OFP480
256	C-19	421'-6"	A,B,C	14	75	GATE HOUSE	OFP481
257	B-3	421'-6"	A,B,C	14	75	GATE HOUSE	OFP482
258	B-50	408'-0"	A,B,C	14	50	RECEIVING	OFP483
259	B-52	408'-0"	A,B,C	14	50	RECEIVING	OFP484
260	D-50	408'-0"	A,B,C	14	50	RECEIVING	OFP485
261	D-52	408'-0"	A,B,C	14	50	RECEIVING	OFP486
262	F-39	455'-0"	A,B,C	9	75	RW/SERVICE	OFP489
263	K-43	455'-0"	A,B,C	9	100	RW/SERVICE	OFP490
264	F-44	455'-0"	A,B,C	9	75	RW/ SERVICE	OFP491
265	B-39	421'-0"	A,B,C	9	100	RW/ SERVICE	OFP492
266	K-38	402-0"	A,B,C	9	50	RW/SERVICE	OFP499
267	J-38	402-0"	A,B,C	9	50	RW/SERVICE	OFP500
268	J-38	414-0"	A,B,C	9	50	RW/SERVICE	OFP501
269	A-2	408'-0"	A,B,C	5	50	WASTE TREAT. BLDG.	OFP 513
270	B-3	408'-0"	A,B,C	5	50	WASTE TREAT. BLDG.	OFP 514
271	E.6-.7	405'-0"	A,B,C	14	50	COND. CLEAN-UP AREA	OFP537
272	J.1-.8	405'-0"	A,B,C	14	50	COND. CLEAN-UP AREA	OFP538
273	H.3-.2	405'-0"	A,B,C	14	50	COND. CLEAN-UP AREA	OFP539
274	E.6-.7	439'-0"	A,B,C	14	75	TSC	OFP597
275	G.8-.7	454'-0"	A,B,C	14	75	TSC	OFP598
276	J.1-.7	439'-0"	A,B,C	14	75	TSC	OFP599
277	D-3.1	405'-6"	A,B,C	14	75	GATE HOUSE	OFP636
278	B-3.1	421'-6"	A,B,C	14	75	GATE HOUSE	OFP637
279	M-8	451'-0"	A,B,C	8	50	AUXILIARY	OFP638
280	M-26	451'-0"	A,B,C	8	50	AUXILIARY	OFP639
281	K-10	405'-0"	A,B,C	3	100	TURBINE	1FP275
282	K-28	405'-0"	A,B,C	4	100	TURBINE	2FP275
283	Q-10	430'-0"	A,B,C	8	100	AUXILIARY	OFP640 (SEE NOTE 4)
284	Q-26	430'-0"	A,B,C	8	100	AUXILIARY	OFP641 (SEE NOTE 4)

(NOTE 7)

"AH"

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS
285	SEE M-589	405'-0"	A,B,C	14	75	RECEIV. WAREHOUSE	OFP766
286	SEE M-589	405'-0"	A,B,C	14	75	RECEIV WAREHOUSE	OFP767
287	SEE M-589	405'-0"	A,B,C	14	75	RECEIV WAREHOUSE	OFP768
288	SEE M-589	405'-0"	A,B,C	14	75	RECEIV WAREHOUSE	OFP769
289	H9-43	437'-0"	A,B,C	9	100	RW/SERVICE	1FP830
290	L-6	430'-0"	A,B,C	3	100(3)	TURBINE	1FP350
291	L-30	430'-0"	A,B,C	4	100(3)	TURBINE	2FP350
292	L-14	455'-0"	A,B,C	3	100	TURBINE	OFP843
293	Q-10	430'-0"	A,B,C	8	100(3)	AUXILIARY	OFP888 (SEE NOTE 4)
294	Q-26	430'-0"	A,B,C	8	100(3)	AUXILIARY	OFP889 (SEE NOTE 4)

NOTES:

1. ANGLE VALVES, FIRE HOSE, FIRE HOSE REELS, AUTOMATIC DRAIN VALVES AND HOSE COUPLINGS ARE TO BE PURCHASED BY SPEC. L-2739 PER LETTER SLHC-930/SLPG-878 DATED APRIL 4, 1977. FIRE HOSE PURCHASED AFTER OCT. 15, 1985 MUST BE TESTED TO 500 PSI.
2. ALL NOZZLES FOR HOSE STATIONS LISTED ON THIS DWG. ARE TO BE PURCHASED BY SPEC. L-2739 PER LETTERS SLHC-4890/SLPG-8049 DATED MAY 7, 1979 AND R. J. RAKOWSKI'S LETTER TO MR. J. T. WESTERMEIER OF MAY 9, 1977.
3. HOSE TO BE HARD RUBBER TYPE PER PIPING SPECIALTY DATA SHEET S-0148.
4. BALL VALVE TO BE USED INSTEAD OF ANGLE VALVE
5. EQUIPMENT/SYSTEM ABANDONED IN PLACE. SEE ER9400073 FOR DETAILS.
6. HOSE LENGTHS SPECIFIED ON THIS DRAWING ARE A MINIMUM LENGTH. HOSE LENGTHS GREATER THAN THOSE ARE ACCEPTABLE BUT NOT TO EXCEED 100FT. UNLESS OTHERWISE SPECIFIED.
7. FIRE HOSE REEL # HS 248 SUPPORT FRAME SHALL BE RESTRAINED TO THE ADJACENT WALKWAY HAND RAIL USING AWG # 9 GAGE WIRE, OR QUICK RELEASE 1 INCH WIDE HIGH STRENGTH NYLON WEBBING WITH METAL CAM BUCKLE, (OR EQUIVALENT) TO PREVENT INADVERTENT LATERAL MOVEMENT OF THE HOSE REEL.

"AH"

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AH	EDSF	FOR RECORD, EC 395461 & EC 389634	EDSF	EDSF	EDSF

Exelon Generation. Rising to the Challenge

Braidwood Nuclear Power Station #20 Unit: 1&2

DIAGRAM OF FIRE PROTECTION MANUAL HOSE STATIONS UNITS 1 & 2

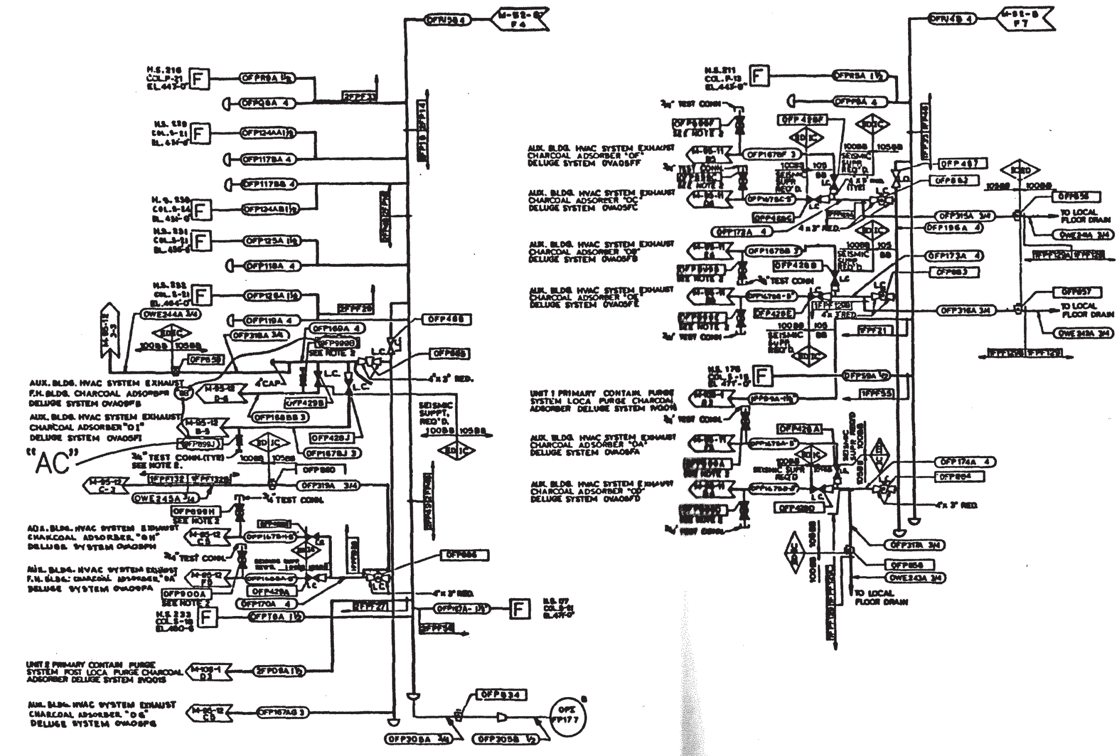
SCALE: NONE
DATE: 10/17/77
DRAWN BY: E133
ORG. BY: S840

M-52

SHEET NUMBER: 12 SIZE: F M05

M-52 SH. 13

AMENDMENT 19
DECEMBER 2000



NOTES:

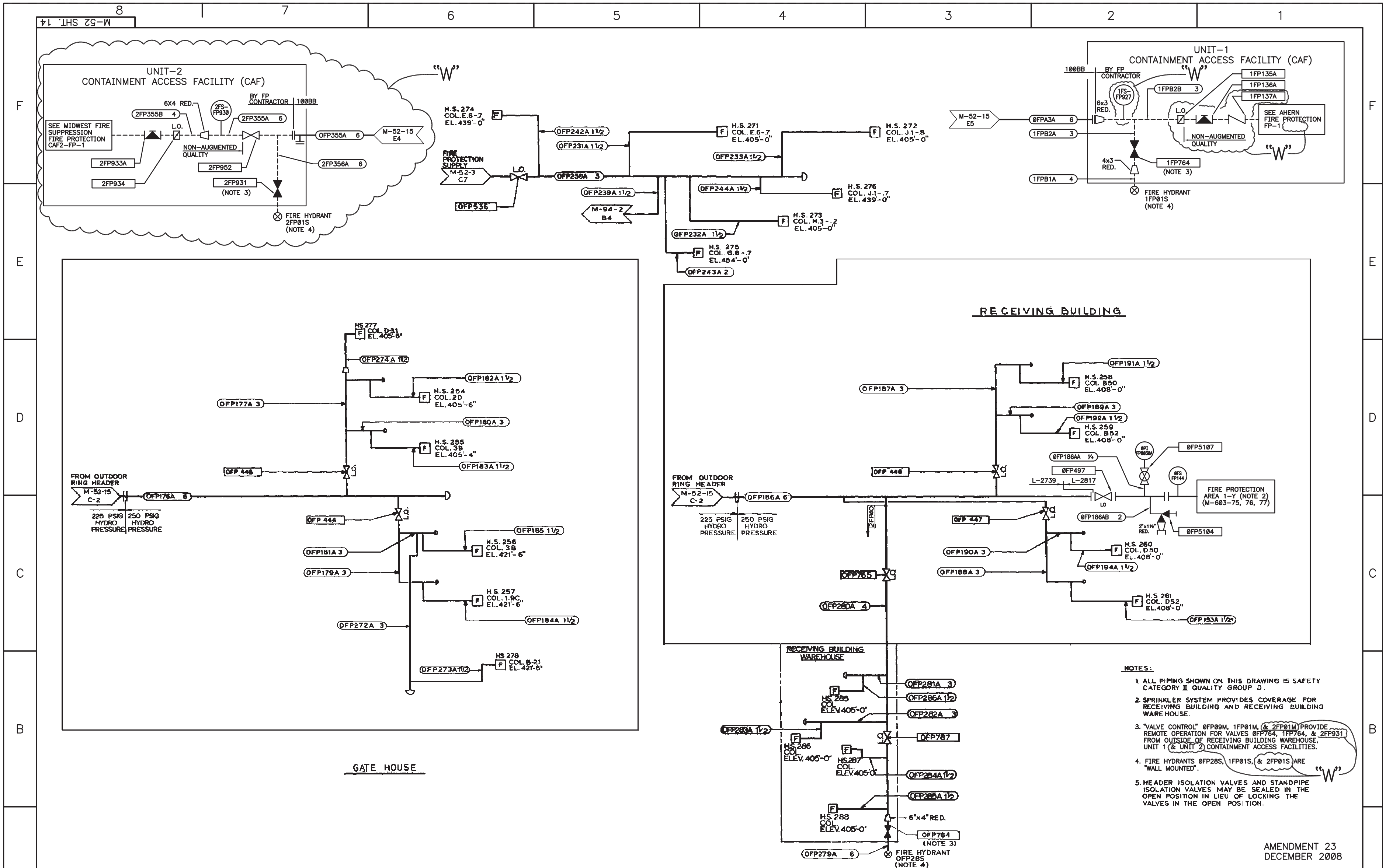
1. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION
2. TEST CONNECTION TO BE INSTALLED IN ACCORDANCE WITH M-839, NOTE "44" DETAIL "A".

DIAGRAM OF FIRE PROTECTION
AUXILIARY BUILDING

ComEd
Braidwood Station Units 1&2

M-52

SHEET NUMBER 13



NOTES:

1. ALL PIPING SHOWN ON THIS DRAWING IS SAFETY CATEGORY II QUALITY GROUP D.
2. SPRINKLER SYSTEM PROVIDES COVERAGE FOR RECEIVING BUILDING AND RECEIVING BUILDING WAREHOUSE.
3. "VALVE CONTROL" 0FP09M, 1FP01M, & 2FP01M PROVIDE REMOTE OPERATION FOR VALVES 0FP764, 1FP764, & 2FP931 FROM OUTSIDE OF RECEIVING BUILDING WAREHOUSE, UNIT 1 & UNIT 2 CONTAINMENT ACCESS FACILITIES.
4. FIRE HYDRANTS 0FP28S, 1FP01S, & 2FP01S ARE "WALL MOUNTED".
5. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.

"W"

AMENDMENT 23
DECEMBER 2008

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
W	EDSF	FOR RECORD, EC 368927	EDSF	EDSF	EDSF
--	--		--	--	--
--	--		--	--	--
--	--		--	--	--

DIAGRAM OF FIRE PROTECTION

Exelon Nuclear
Braidwood Station 20 Unit: 1&2
Rising to the Challenge 20

SCALE : NONE
DATE : N/A
DRAWN BY: E133
ORG. BY : S040

M-52
SHEET NUMBER: 14 SIZE: F M05

M-52 SHEET 15

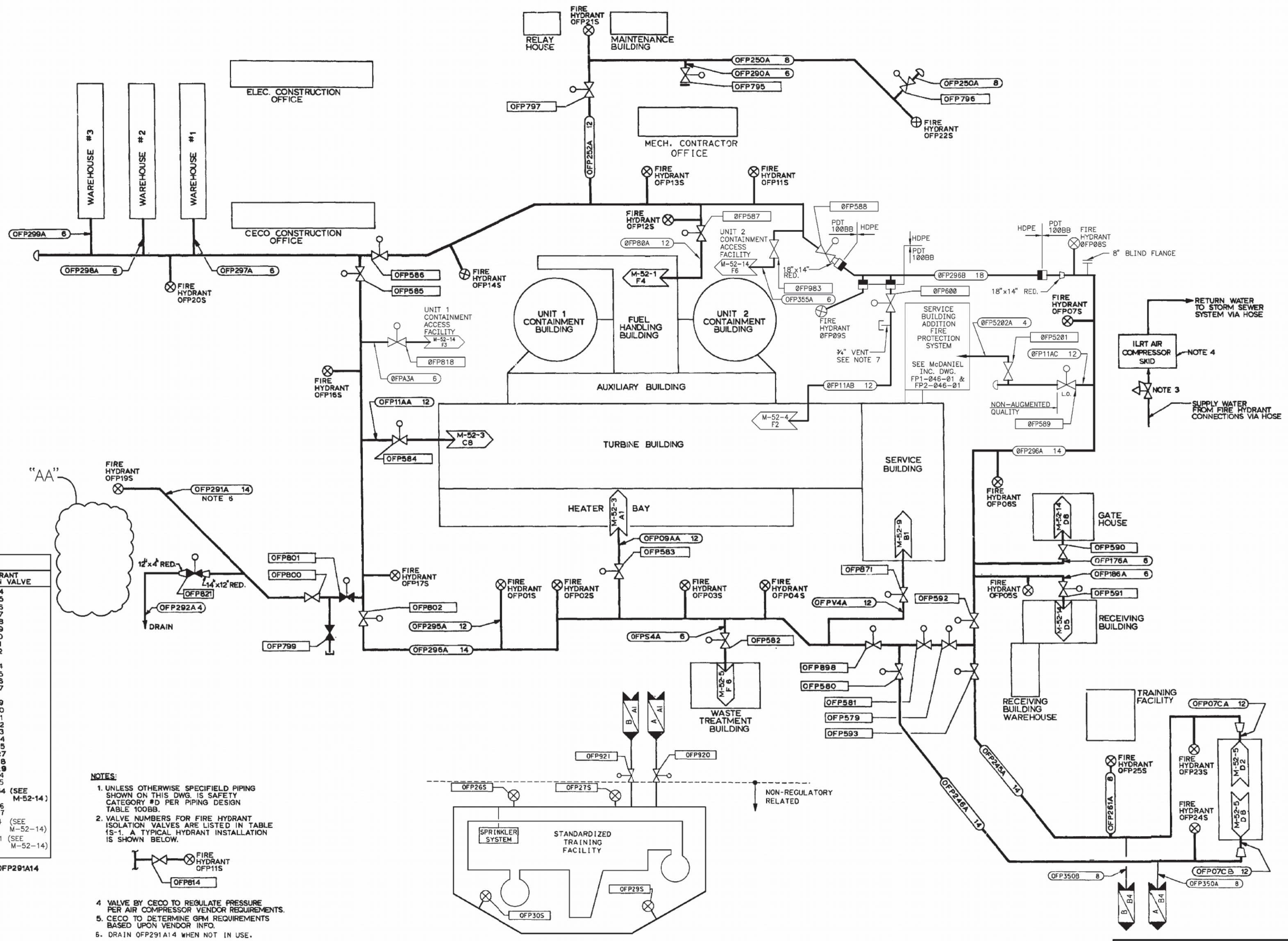


TABLE 1S-1	
FIRE HYDRANT	FIRE HYDRANT ISOLATION VALVE
OFP01S	OFP804
OFP02S	OFP805
OFP03S	OFP806
OFP04S	OFP807
OFP05S	OFP808
OFP06S	OFP809
OFP07S	OFP810
OFP08S	OFP811
OFP09S	OFP812
OFP11S	OFP814
OFP12S	OFP815
OFP13S	OFP816
OFP14S	OFP817
OFP16S	OFP819
OFP17S	OFP820
*	OFP821
OFP19S	OFP822
OFP20S	OFP823
OFP21S	OFP824
OFP22S	OFP825
OFP23S	OFP827
OFP24S	OFP828
OFP25S	OFP829
OFP26S	OFP974
OFP27S	OFP975
OFP28S (SEE M-52-14)	OFP764 (SEE M-52-14)
OFP29S	OFP976
OFP30S	OFP977
1FP01S (SEE M-52-14)	1FP764 (SEE M-52-14)
2FP01S (SEE M-52-14)	2FP931 (SEE M-52-14)

* VALVE OFP821 USED TO DRAIN LINE OFP291A14 IN WINTER.

NOTES:

1. UNLESS OTHERWISE SPECIFIELD PIPING SHOWN ON THIS DWG. IS SAFETY CATEGORY #D PER PIPING DESIGN TABLE 100BB.
2. VALVE NUMBERS FOR FIRE HYDRANT ISOLATION VALVES ARE LISTED IN TABLE 1S-1. A TYPICAL HYDRANT INSTALLATION IS SHOWN BELOW.

4 VALVE BY CECO TO REGULATE PRESSURE PER AIR COMPRESSOR VENDOR REQUIREMENTS.
5. CECO TO DETERMINE GPM REQUIREMENTS BASED UPON VENDOR INFO.
6. DRAIN OFP291A14 WHEN NOT IN USE.

7. A 3/4" VENT TAP INSTALLED APPROXIMATELY 3 FT. WEST OF VALVE OFP600. THIS IS TO ALLOW VENTING OF A HIGH POINT THAT EXISTS ON THE FIRE PROTECTION FEED 0FP11AB-12. THE VENT TAP MAY BE USED TO VENT THE SYSTEM IF THE SEGMENT OF THE OUTER FIRE PROTECTION HEADER 0FP296A-14 BETWEEN ISOLATION VALVES 0FP588 AND 0FP592 OR THE SEGMENT OF THE FIRE PROTECTION FEED 0FP11AB-12 BETWEEN ISOLATION VALVES 0FP600 AND 0FP170B IS DRAINED. THIS VENT TAP IS LOCATED UNDERGROUND.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AA	EDSF	FOR RECORD, EC 617498	EDSF	EDSF	EDSF

Exelon Generation.
Braidwood Station 20 Unit: 1&2
Rising to the Challenge 20

DIAGRAM OF
FIRE PROTECTION
UNITS 1 & 2

SCALE :NONE
DATE :05/20/85
DRAWN BY:E133
ORG. BY :S040

M-52
SHEET NUMBER: 15
SIZE: F
M05

M-52, SH.16

"H"

VIKING - FIRE SUPPRESSION SYSTEM LIST

FIRE ZONE	M-603 SHEET NO.	SYSTEM TYPE	PROTECTING	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.
1A1	2	DELUGE	MAIN POWER TRANSFORMER	1S-13	18.10B-1
1A2	2	DELUGE	MAIN POWER TRANSFORMER	1S-14	18.10A-1
2A1	15	DELUGE	MAIN POWER TRANSFORMER	2S-13	18.10B-2
2A2	15	DELUGE	MAIN POWER TRANSFORMER	2S-14	18.10A-2
1B1	2,7	DELUGE	SA TRANSFORMER 142-1	1S-17	18.10E-1
1B2	2,8	DELUGE	SA TRANSFORMER 142-2	1S-16	18.10E-1
2B1	9,15	DELUGE	SA TRANSFORMER 242-1	2S-17	18.10E-2
2B2	10,15	DELUGE	SA TRANSFORMER 242-2	2S-18	18.10E-2
1C1	2,11	DELUGE	UA TRANSFORMER 141-1	1S-15	18.10C-1
1C2	2,12	DELUGE	UA TRANSFORMER 141-2	1S-16	18.10D-1
2C1	13,15	DELUGE	UA TRANSFORMER 241-1	2S-15	18.10C-2
2C2	14,15	DELUGE	UA TRANSFORMER 241-2	2S-16	18.10D-2
1D	16	DELUGE	HYDROGEN SEAL OIL UNIT UNIT 1	1S-19	8.5-1
2D	17	DELUGE	HYDROGEN SEAL OIL UNIT UNIT 2	2S-19	8.5-2
1E	18,19,20,21,22, 23,24,25	WET PIPE SPRINKLER	TURBINE MEZZANINE FLOOR UNIT 1	1S-20	8.5-1
2E	26,27,28, 29,30	WET PIPE SPRINKLER	TURBINE MEZZANINE FLOOR UNIT 2	2S-20	8.5-2
1F	31	WET PIPE SPRINKLER	CLEAN/DIRTY OIL TANK ROOM	1S-21	8.1-0
1H	33,34,35,36,37, 38,39,40,41	WET PIPE SPRINKLER	GRADE FLOOR TURBINE UNIT 1	1S-22	8.3-1
2H	42,43,44,45, 46,47,48,49, 50,51,52	WET PIPE SPRINKLER	GRADE FLOOR TURBINE UNIT 2	2S-22	8.3-2
2H1	84	WET PIPE SPRINKLER	UNIT 2 RAILROAD TRACK BAY TURBINE BUILDING	2S-56	8.3-2
1J	53	DELUGE	TURBINE OIL STORAGE TANK UNIT 1	1S-23	8.3-1
2J	54	DELUGE	TURBINE OIL STORAGE TANK UNIT 2	2S-23	8.3-2
1K	55,56,57 58,59,60	WET PIPE SPRINKLER	TURBINE BUILDING BASEMENT UNIT 1	1S-24	8.2-1
2K	59,61,62,63	WET PIPE SPRINKLER	TURBINE BUILDING BASEMENT UNIT 2	2S-24	8.2-2
1M	65	WET PIPE SPRINKLER	EL 401 STOREROOM SERVICE BLDG	1S-56	18.6-0
1P	66	WET PIPE SPRINKLER	DIESEL FIRE PUMP ROOM LSH	1S-25	18.13-0
1Q	67	1 SHOT TF HALON 6%	QA VAULT EL 433 SERVICE BUILDING	1S-53	13.0
1R	68	INTERNAL FOAM-DELUGE	OUTDOOR OIL STORAGE TANK (125,000 GAL)	1S-26	18.20-0
1T1	69	DELUGE FOAM	50,000 GAL. DIESEL OIL TANK ROOM (MANUAL SYSTEM)	1S-27	10.1-1
1T2	69	DELUGE FOAM	50,000 GAL. DIESEL OIL TANK ROOM (MANUAL SYSTEM)	1S-28	10.2-1
2T1	71	FOAM-DELUGE	50,000 GAL. DO STORAGE TANK ROOM	2S-27	10.1-2
2T2	71	FOAM-DELUGE	50,000 GAL. DO STORAGE TANK ROOM	2S-28	10.2-2
1W	70	DELUGE	TURBINE BEARINGS	1S-29	8.6-0
2W	72	DELUGE	TURBINE BEARINGS	2S-29	8.6-0
1X	73,74	WET PIPE SPRINKLER	RADWASTE-VR AREAS	1S-32	14.6-0
1Y	75,76,77	WET PIPE SPRINKLER	RECEIVING BUILDING WAREHOUSE EXTENSION	1S-30	18.32-0
1BB	78	WET PIPE SPRINKLER	UNIT 1 AUXILIARY BOILER ROOM	1S-31	8.4-1
2BB	79	WET PIPE SPRINKLER	UNIT 2 AUXILIARY BOILER ROOM	2S-31	8.4-2
2CC	80	WET PIPE SPRINKLER	SECURITY DIESEL AND TANK ROOM	2S-32	8.7A-0
1,2EE1 1,2EE2 1,2EE3 1,2EE4	81,82,83,85	HALON	UPPER CABLE SPREADING AREAS AUTOMATIC 6% DOUBLE SHOT	1,2S-33 1,2S-34 1,2S-35 1,2S-36	3.3A-1,2 3.3B-1,2 3.3C-1,2 3.3D-1,2
1GG	86	WET PIPE SPRINKLER	AUXILIARY BLDG. WASTE OIL TANK OD003T	1S-57	11.5-0
2HH	87	WET PIPE SPRINKLER	WASTE TREATMENT BLDG WASTE OIL TANK	2S-52	18.28-0
1JJ	88	WET PIPE SPRINKLER	COMPONENT COOLING PUMPS	1S-59	11.3-0
1KK1	89	WET PIPE SPRINKLER	EL 426 Q-11 HATCHWAY	2S-55	11.6-0
1KK2	90	WET PIPE SPRINKLER	EL 426 P-18 HATCHWAY	2S-54	11.6-0
1KK3	91	WET PIPE SPRINKLER	EL 401 HATCH AND STAIRS	2S-54	11.5-0
1KK4	92	WET PIPE SPRINKLER	EL 383 HATCH AND STAIRS	2S-54	11.4-0
1KK5	93	WET PIPE SPRINKLER	EL 364 HATCH AND STAIRS	2S-54	11.3-0
1KK6	94	WET PIPE SPRINKLER	EL 346 P-18 STAIRWAY	2S-54	11.2-0
1LL	96	WET PIPE SPRINKLER	AREA 5 EL 364 (UNIT 1—CWA)	1S-60	11.3-1
2LL	96	WET PIPE SPRINKLER	AREA 7 EL 364 (UNIT 2—CWA)	2S-53	11.3-2
1MM	68	INTERNAL FOAM-DELUGE	50,000 GAL. DO OUTDOOR TANK UNIT 2 START	1S-26	18.20-0 8.6-0
2KN	95	WET PIPE SPRINKLER	UNIT 2 START UP STRUCTURE	—	8.5-2
—	98	WET PIPE SPRINKLER	TEMPORARY OFFICES		

LIST OF CARBON DIOXIDE FIRE SUPPRESSION SYSTEMS (L-2811)

SYSTEM NO.	CARDOX DWG NO.	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.	SYSTEM TYPE AND CONCENTRATION	PROTECTING:
1S-1	23,25	1S-37	9.1-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 1B
1S-2	23,25	1S-38	9.2-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 1A
1S-3	23,25	1S-39	9.4-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 1B
1S-4	23,25	1S-40	9.3-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 1A
2S-1	23,25	2S-37	9.1-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 2B
2S-2	23,25	2S-38	9.2-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 2A
2S-3	23,25	2S-39	9.4-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 2B
2S-4	23,25	2S-40	9.3-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 2A
1U-1	25	1S-41	11.4A-1	34% TOTAL FLOOD AUTO	UNIT 1 DIESEL AF PUMP ROOM
1U-2	25	1S-42	11.4A-1	34% TOTAL FLOOD AUTO	U-1 DIESEL AF PUMP DAY TANK
2U-1	25	2S-41	11.4A-2	34% TOTAL FLOOD AUTO	U-2 DIESEL AF PUMP ROOM
2U-2	25	2S-42	11.4A-2	34% TOTAL FLOOD AUTO	U-2 DIESEL AF PUMP DAY TANK
1Z1	26,21	1S-43	3.2A-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1Z2	26,21	1S-44	3.2B-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1Z3	27,21	1S-45	3.2C-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1Z4	27,21	1S-46	3.2D-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z1	28,21	2S-43	3.2A-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z2	28,21	2S-44	3.2B-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z3	27,21	2S-45	3.2C-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z4	27,21	2S-46	3.2D-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1DD	23,25	1S-47	3.1-1	50% TOTAL FLOOD AUTO	UNIT 1 CABLE TUNNEL
2DD	23,25	2S-47	3.1-2	50% TOTAL FLOOD AUTO	UNIT 2 CABLE TUNNEL
1EE1	29	1S-48	3.3A-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
1EE2	29	1S-49	3.3B-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
1EE3	29	1S-50	3.3C-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
1EE4	29	1S-51	3.3D-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE1	30	2S-48	3.3A-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE2	30	2S-49	3.3B-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE3	30	2S-50	3.3C-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE4	30	2S-51	3.3D-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA

"H"

MPT FIRE SUPPRESSION SYSTEM LIST

FIRE ZONE	M-604 SHEET NO.	SYSTEM TYPE	PROTECTING	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.
2A1	9	DELUGE	MAIN POWER TRANSFORMER 2W	2S-13	18.10B-2
2A2	8	DELUGE	MAIN POWER TRANSFORMER 2E	2S-14	18.10A-2
1A1	3, 20	DELUGE	MAIN POWER TRANSFORMER 1W	1S-13	18.10B-1
1A2	12, 21	DELUGE	MAIN POWER TRANSFORMER 1E	1S-14	18.10A-1

"H"

LIST OF CHARCOAL FILTER DELUGE SYSTEMS

P&ID #	GA	EQUIPMENT NO.	ELEVATION	FILTER NAME	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.
M-94-2	M-22-4	OVV19S	451	TSC FILTER UNIT (OVV21F, OVV22F)	2S-57	18.26-0
M-95-11	M-22-2	OVA05FA	467-4	AUXILIARY BUILDING EXHAUST FILTER	1S-1	11.7-0
M-95-11	M-22-2	OVA05FD	467-4	AUXILIARY BUILDING EXHAUST FILTER	2S-1	11.7-0
M-95-11	M-22-1	OVA05FB	459-2	AUXILIARY BUILDING EXHAUST FILTER	1S-2	11.7-0
M-95-11	M-22-1	OVA05FE	459-2	AUXILIARY BUILDING EXHAUST FILTER	2S-2	11.7-0
M-95-11	M-6	OVA05FC	451	AUXILIARY BUILDING EXHAUST FILTER	1S-3	11.7-0
M-95-11	M-6	OVA05FF	451	AUXILIARY BUILDING EXHAUST FILTER	2S-3	11.7-0
M-95-12	M-22-2	OVA05FG	467-4	AUXILIARY BUILDING EXHAUST FILTER	2S-8	11.7-0
M-95-12	M-22-1	OVA05FH	459-2	AUXILIARY BUILDING EXHAUST FILTER	2S-9	11.7-0
M-95-12	M-6	OVA05FI	451	AUXILIARY BUILDING EXHAUST FILTER	2S-10	11.7-0
M-95-12	M-22-1	OVA09FA	459-2	FUEL HANDLING EXHAUST FILTER	2S-25	11.7-0
M-95-12	M-6	OVA09FB	451	FUEL HANDLING EXHAUST FILTER	2S-26	11.7-0
M-96-1	M-22-1	OVC05FA	463-5	CONTROL RM MAKEUP FILTER	1S-5	3.3A-1
M-96-1	M-22-1	OVC06FA	463-5	UNIT OVC01SA	1S-6	3.3A-1
M-96-1	M-6	OVC02FA	451	RECIRCULATION ABSORBER	1S-4	18.4-1
M-96-2	M-22-1	OVC05FB	463-5	CONTROL RM MAKEUP FILTER	2S-5	3.3A-2
M-96-2	M-22-1	OVC06FB	463-5	UNIT OVC01SB	2S-6	3.3A-2
M-96-2	M-6	OVC02FB	451	RECIRCULATION ABSORBER	2S-4	18.4-2
M-103-3	M-7	1VP01SA	426	CONTAINMENT CHARCOAL FILTER	1S-11	1.3-1
M-103-3	M-7	1VP01SB	426	CONTAINMENT CHARCOAL FILTER	1S-12	1.3-1
M-104-3	M-7	2VP01SA	426	CONTAINMENT CHARCOAL FILTER	2S-11	1.3-2
M-104-3	M-7	2VP01SB	426	CONTAINMENT CHARCOAL FILTER	2S-12	1.3-2
M-105-1	M-22-1	1VQ01S	459-2	POST LOCA FILTER	1S-7	11.7-1
M-106-1	M-22-1	2VQ01S	459-2	POST LOCA FILTER	2S-7	11.7-2
M-113-3	M-22-2	OVF01S	477	AUX. BLDG. TANK VENT FILTER	1S-10	11.7-0
M-113-3	M-22-3	OOG04F	468-2	OFF GAS FILTER UNIT OOG01S	1S-8	8.6-1
M-113-3	M-22-3	OOG05F	468-2	OFF GAS FILTER UNIT OOG01S	1S-9	8.6-1
M-114-2	M-12	OVW10S	410	VR AREA FILTER UNIT (OVW12F, OVW18F)	1S-58	14.6-0
M-48-35B	M-12	OVR04FA	410	VR AREA FILTER UNIT	NA	14.6-0
M-48-35B	M-12	OVR04FB	410	VR AREA FILTER UNIT	NA	14.6-0

DIAGRAM OF FIRE PROTECTION
FIRE SUPPRESSION SYSTEM
DESIGNATION

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
H	EDSF	FOR RECORD, EC 379761	EDSF	EDSF	EDSF

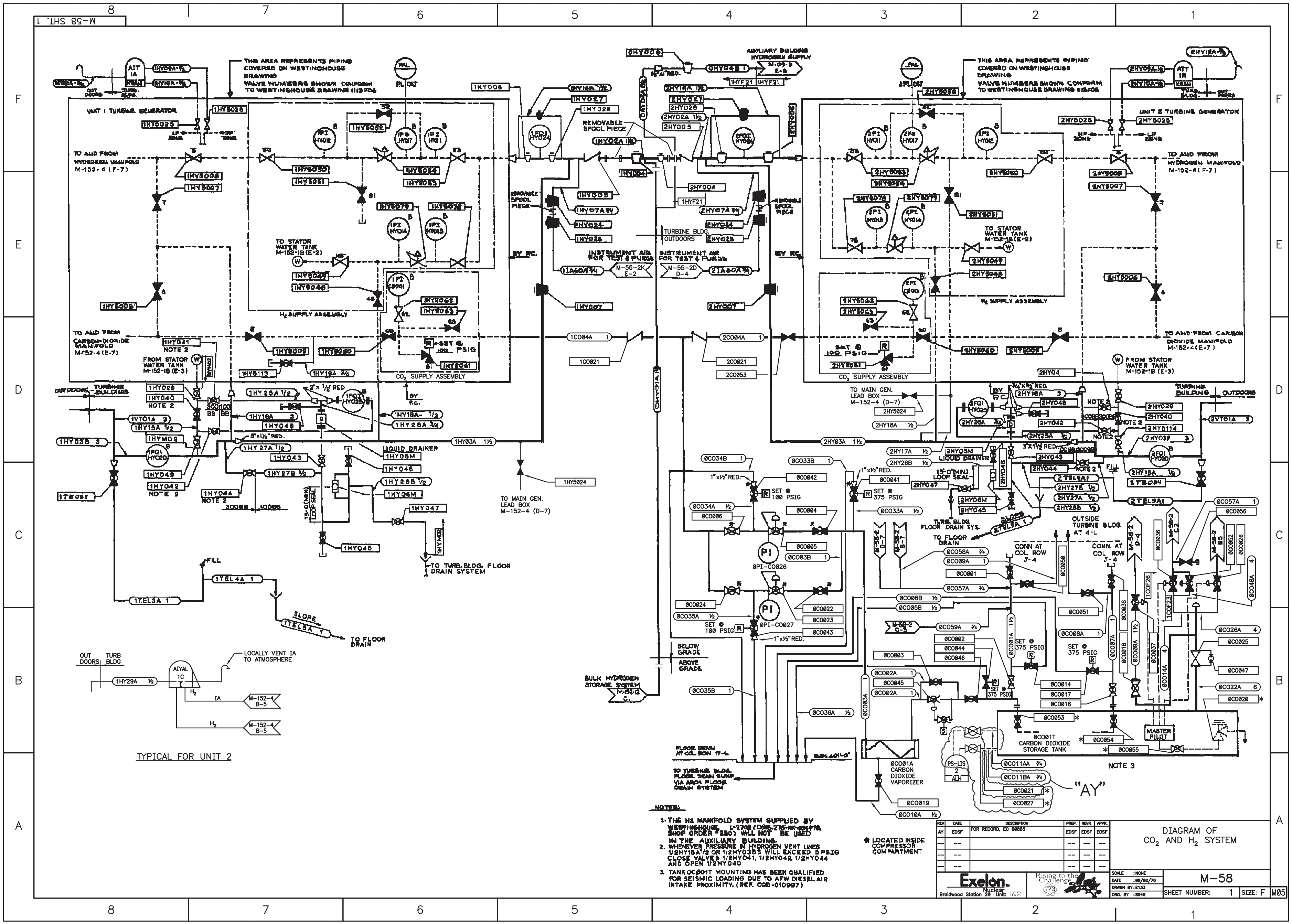
Exelon Generation.
Braidwood Station 20 Unit: 1&2
Rising to the Challenge 20

SCALE :NONE
DATE :10/22/85
DRAWN BY:E133
ORG. BY :S040

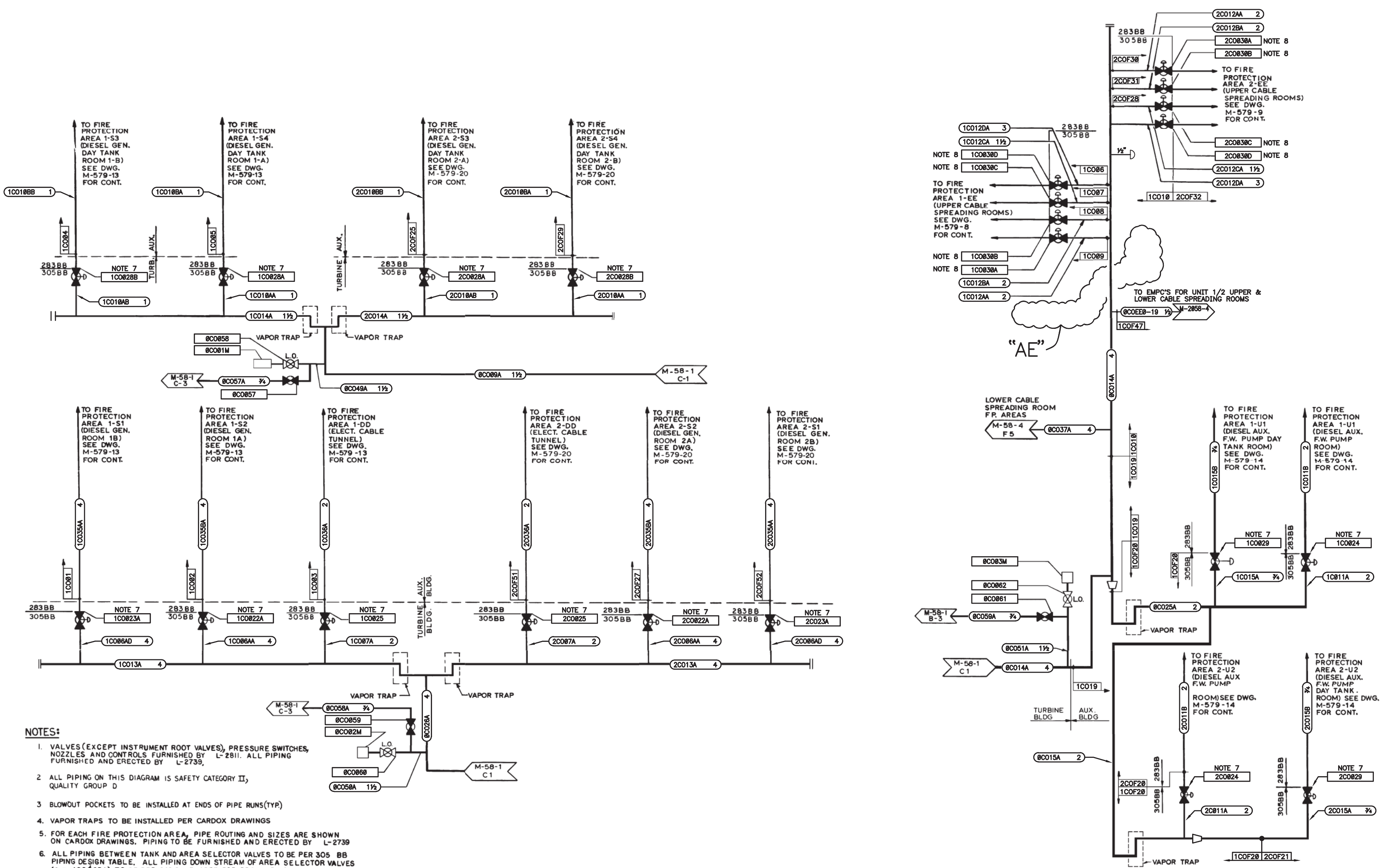
M-52

SHEET NUMBER: 16 SIZE: F M05

AMENDMENT 23
DECEMBER 2008



M-58 SHT. 2



NOTES:

1. VALVES (EXCEPT INSTRUMENT ROOT VALVES), PRESSURE SWITCHES, NOZZLES AND CONTROLS FURNISHED BY L-2811. ALL PIPING FURNISHED AND ERECTED BY L-2739.
2. ALL PIPING ON THIS DIAGRAM IS SAFETY CATEGORY II, QUALITY GROUP D
3. BLOWOUT POCKETS TO BE INSTALLED AT ENDS OF PIPE RUNS (TYP.)
4. VAPOR TRAPS TO BE INSTALLED PER CARDOX DRAWINGS
5. FOR EACH FIRE PROTECTION AREA, PIPE ROUTING AND SIZES ARE SHOWN ON CARDOX DRAWINGS. PIPING TO BE FURNISHED AND ERECTED BY L-2739
6. ALL PIPING BETWEEN TANK AND AREA SELECTOR VALVES TO BE PER 305 BB PIPING DESIGN TABLE. ALL PIPING DOWN STREAM OF AREA SELECTOR VALVES (e.g. 1CO023A) TO BE PER 283BB EXCEPT FOR PRESSURE SWITCH TAPS WHICH SHALL BE 305 BB. ALL ¼" PIPING TO BE PER CARDOX DRAWINGS. BREAK FLANGES TO BE INSTALLED UP- AND DOWN STREAM OF VALVES WHERE SCREWED VALVES ARE SUPPLIED BY L-2811.
7. SEE M-2058-3 FOR TYPICAL DETAIL FOR SELECTOR VALVE, LOCKOUT VALVE AND INSTRUMENTATION.
8. SEE M-2058-4 FOR TYPICAL DETAIL FOR SELECTOR VALVE AND INSTRUMENTATION.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AE	EDSF	FOR RECORD, EC 383002	EDSF	EDSF	EDSF
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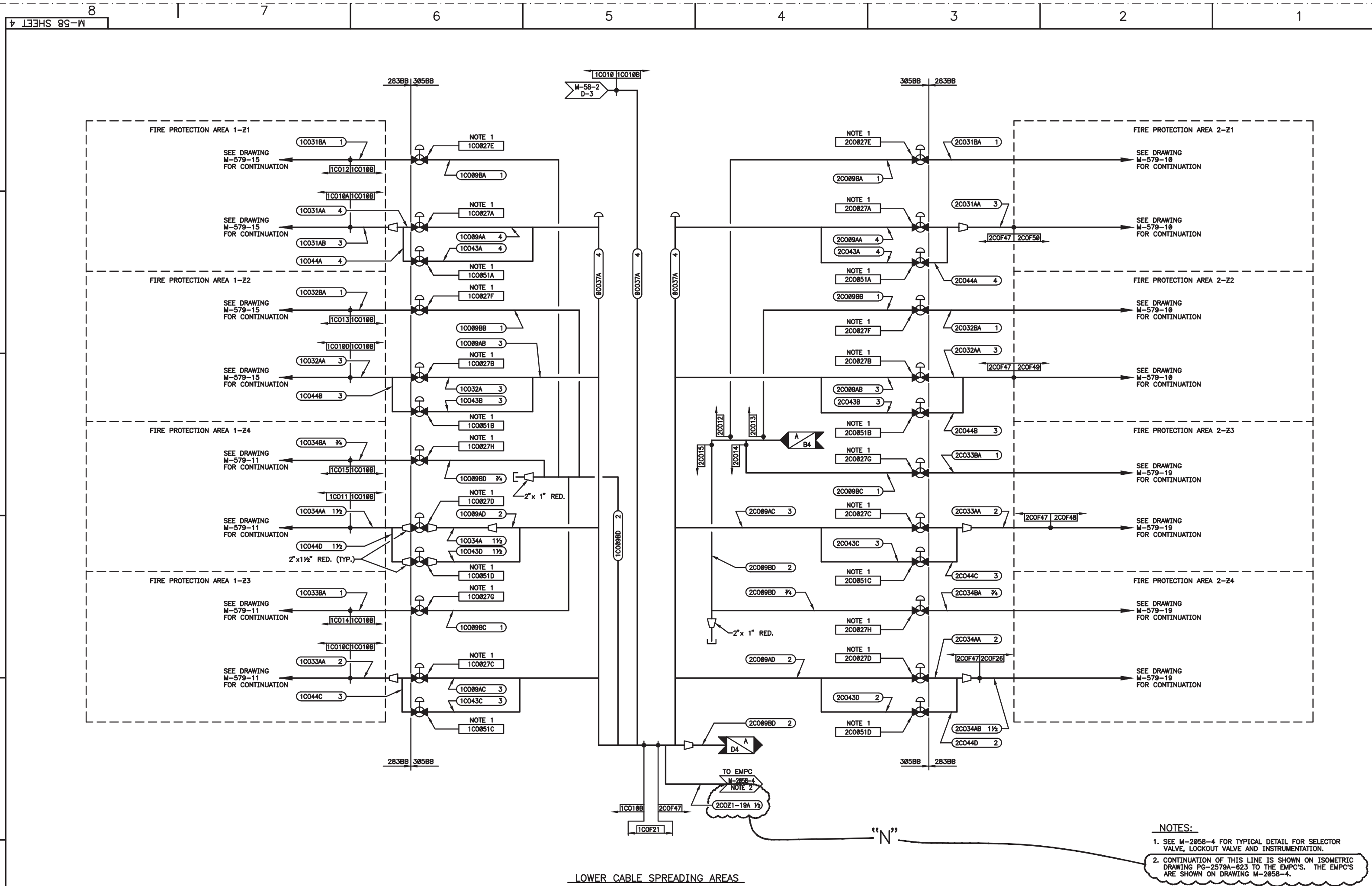
DIAGRAM OF
CO_2 AND H_2
SYSTEM
UNITS 1 & 2

Exelon Nuclear
Braidwood Station 20 Unit: 1&2
Rising to the Challenge 20

SCALE :NONE
DATE :09/10/76
DRAWN BY:E133
ORG. BY :S040

M-58
SHEET NUMBER: 2 SIZE: F M05

AMENDMENT 24
DECEMBER 2010



NOTES:

1. SEE M-2058-4 FOR TYPICAL DETAIL FOR SELECTOR VALVE, LOCKOUT VALVE AND INSTRUMENTATION.
2. CONTINUATION OF THIS LINE IS SHOWN ON ISOMETRIC DRAWING PG-2579A-623 TO THE EMPC'S. THE EMPC'S ARE SHOWN ON DRAWING M-2058-4.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
N	EDSF	FOR RECORD, EC 376617	EDSF	EDSF	EDSF
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DIAGRAM OF
CO_2 SYSTEM
UNITS 1 & 2

Exelon Nuclear
Braidwood Station 20 Unit: 1&2
Rising to the Challenge

SCALE :NONE
DATE :01/30/00
DRAWN BY:E133
ORG. BY :S040

M-58
SHEET NUMBER: 4
SIZE: F
M05

PORTABLE FIRE EXTINGUISHER LOCATION

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
CD-1-1	G-0.8	401'-0"		DRY CHEMICAL

FH-1-1	AA-11.2	401'-0"	2.3-20	DRY CHEMICAL
FH-1-2	AA-12.8	401'-0"	2.3-20	DRY CHEMICAL
FH-1-3	Z.5-15	401'-0"	2.3-20	DRY CHEMICAL
FH-3-5	W-15	426'-0"	2.3-19	DRY CHEMICAL
FH-3-6	W-21	426'-0"	2.3-19	DRY CHEMICAL
FH-1-7	Z.5-21	401'-0"	2.3-20	DRY CHEMICAL
FH-3-11	W-19	426'-0"	2.3-19	DRY CHEMICAL
FH-2-12	N.SIDE FUEL UNLOAD AREA	426'-0"	2.3-19	DRY CHEMICAL
FH-2-13	S.SIDE FUEL UNLOAD AREA	426'-0"	2.3-19	DRY CHEMICAL

C-2-1	R 1	377'-0"		DRY CHEMICAL
C-2-2	R 11	377'-0"		DRY CHEMICAL
C-2-3	R 17	377'-0"		DRY CHEMICAL
C-2-4	R 22	377'-0"		DRY CHEMICAL
C-2-5	R 31	377'-0"		DRY CHEMICAL
C-2-6	R 38	377'-0"		DRY CHEMICAL
C-3-1	R 17	401'-0"		DRY CHEMICAL
C-3-2	R 17	401'-0"		DRY CHEMICAL
C-3-3	R 32	401'-0"		DRY CHEMICAL
C-3-4	R 38	401'-0"		DRY CHEMICAL
C-3-5	R 22	401'-0"		DRY CHEMICAL
C-3-6	R 37	401'-0"		DRY CHEMICAL
C-3-7	R 2	401'-0"		DRY CHEMICAL
C-3-8	R 12	401'-0"		DRY CHEMICAL
C-5-1	R 7	426'-0"		DRY CHEMICAL
C-5-2	R 26	426'-0"		DRY CHEMICAL
C-5-3	R 17	426'-0"		DRY CHEMICAL
C-5-4	R 38	426'-0"		DRY CHEMICAL

LS-1-1	BB-107	602'-10"		DRY CHEMICAL
LS-1-2	CC-106	588'-0"		DRY CHEMICAL
LS-1-3	CC-102	588'-0"		DRY CHEMICAL
LS-1-4	BB.5-101	602'-10"		DRY CHEMICAL
LS-1-5	BB-104	602'-10"		DRY CHEMICAL

RS-1-1	A.5-1	557'-0"		DRY CHEMICAL
RS-1-2	A.5-5.5	557'-0"		DRY CHEMICAL
RS-1-3	D-2	557'-0"		DRY CHEMICAL
RS-1-4	E-7	557'-0"		DRY CHEMICAL

TS-2-1h	E.5-0.75	435'-0"		HALON (1211 OR 1301)
TS-2-2h	F.5-0.7	435'-0"		HALON (1211 OR 1301)
TS-2-3h	H.3-0.7	435'-0"		HALON (1211 OR 1301)
TS-3-1	H.5-0.75	451'-0"		DRY CHEMICAL

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
S-1-1	A.5-44.5	401'-0"		DRY CHEMICAL
S-1-2	B-43	401'-0"		DRY CHEMICAL
S-1-3	D.1-43	401'-0"		DRY CHEMICAL
S-1-4	F-44	401'-0"		DRY CHEMICAL
S-1-5	F-45	401'-0"		DRY CHEMICAL
S-1-6	G-36	401'-0"		DRY CHEMICAL
S-1-7	H-36	401'-0"		DRY CHEMICAL
S-1-8c	G.1-39.5	401'-0"		CARBON DIOXIDE
S-1-9c	G.1-43	401'-0"		CARBON DIOXIDE
S-1-10	H-43	401'-0"		DRY CHEMICAL
S-1-11	J-41	401'-0"		DRY CHEMICAL
S-1-12	J-43	401'-0"		DRY CHEMICAL
S-1-13	B-39	401'-0"		DRY CHEMICAL
S-1-14	F-39	401'-0"		DRY CHEMICAL
S-1-15	D.1-44.5	401'-0"		DRY CHEMICAL
S-2-1	A.5-44.5	417'-0"		DRY CHEMICAL
S-2-2	A-39	417'-0"		DRY CHEMICAL
S-2-3	F-36.5	417'-0"		DRY CHEMICAL
S-2-4	K.5-36	417'-0"		DRY CHEMICAL
S-2-5	D-41.5	417'-0"		DRY CHEMICAL
S-2-6	B-43.5	417'-0"		DRY CHEMICAL
S-2-7	B-43	417'-0"		DRY CHEMICAL
S-3-1	A.5-44.5	433'-0"		DRY CHEMICAL
S-3-2	A.5-39	433'-0"		DRY CHEMICAL
S-3-3	B.5-37.5	433'-0"		DRY CHEMICAL
S-3-4	F-39	433'-0"		DRY CHEMICAL
S-3-5	F.5-37.5	433'-0"		DRY CHEMICAL
S-3-6	H-43.5	433'-0"		DRY CHEMICAL
S-3-7	H.9-37	433'-0"		DRY CHEMICAL
S-3-8	H.9-44	433'-0"		DRY CHEMICAL
S-3-9	F.5-43	433'-0"		DRY CHEMICAL
S-3-10	D.1-44	433'-0"		DRY CHEMICAL
S-3-11	F.5-44	433'-0"		DRY CHEMICAL
S-4-1	A.5-44	451'-0"		DRY CHEMICAL
S-4-2	B-39.5	451'-0"		DRY CHEMICAL
S-4-3	B-37.5	451'-0"		DRY CHEMICAL
S-4-4	D.1-39	451'-0"		DRY CHEMICAL
S-4-5	F-39	451'-0"		DRY CHEMICAL
S-4-6	H-41	451'-0"		DRY CHEMICAL
S-4-7	K-37	451'-0"		DRY CHEMICAL
S-4-8	J.5-43	451'-0"		DRY CHEMICAL
S-4-10	H-44.5	451'-0"		DRY CHEMICAL
S-4-11	D.1-44	451'-0"		DRY CHEMICAL
S-4-12	D.1-43	451'-0"		DRY CHEMICAL
S-4-13	D.1-41.5	451'-0"		DRY CHEMICAL
S-4-14	D-41.5	451'-0"		DRY CHEMICAL
S-4-15	H.9-41.5	451'-0"		DRY CHEMICAL
S-4-16	F-44.5	451'-0"		DRY CHEMICAL

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
T-1-1	K-18	364'-0"		DRY CHEMICAL
T-1-2	J-16	364'-0"		DRY CHEMICAL
T-1-5	G-12	364'-0"		DRY CHEMICAL
T-1-6	G-8.5	364'-0"		DRY CHEMICAL
T-1-7	J-7	364'-0"		DRY CHEMICAL
T-1-8	K-8	364'-0"		DRY CHEMICAL
T-1-9	J.5-12	364'-0"		DRY CHEMICAL
T-1-10	K-22	364'-0"		DRY CHEMICAL
T-1-11	F-18	364'-0"		DRY CHEMICAL
T-1-12	G-24	364'-0"		DRY CHEMICAL
T-1-13	G-26.5	364'-0"		DRY CHEMICAL
T-1-14	J-30	364'-0"		DRY CHEMICAL
T-1-15	K-28	364'-0"		DRY CHEMICAL
T-1-16	J.5-24	364'-0"		DRY CHEMICAL
T-1-17	G-16	364'-0"		DRY CHEMICAL
T-1-18	F-18	364'-0"		DRY CHEMICAL
T-1-19	L-5	383'-0"		DRY CHEMICAL
T-1-20	K-14	383'-0"		DRY CHEMICAL
T-1-21	K-32	364'-0"		DRY CHEMICAL
T-1-22	L-6.5	383'-0"		DRY CHEMICAL
T-1-23	L-7.5	383'-0"		DRY CHEMICAL
T-1-24	L-30	383'-0"		DRY CHEMICAL
T-1-25	L-30	383'-0"		DRY CHEMICAL
T-2-1	J-18	401'-0"		DRY CHEMICAL
T-2-2	L-9	401'-0"		DRY CHEMICAL
T-2-3	L-7	401'-0"		DRY CHEMICAL
T-2-4	K-4	401'-0"		DRY CHEMICAL
T-2-5	K-1	401'-0"		DRY CHEMICAL
T-2-6	H-1	364'-0"		DRY CHEMICAL
T-2-7	G-3.5	401'-0"		DRY CHEMICAL
T-2-8	D-7	401'-0"		DRY CHEMICAL
T-2-9	F-11	401'-0"		DRY CHEMICAL
T-2-10	H-12	STAIRS @ EL 387'-0"		DRY CHEMICAL
T-2-11	F-18	401'-0"		DRY CHEMICAL
T-2-12	G-16	401'-0"		DRY CHEMICAL
T-2-13	F-18	401'-0"		DRY CHEMICAL
T-2-14	G-20	401'-0"		DRY CHEMICAL
T-2-15	H-24	STAIRS @ EL 387'-0"		DRY CHEMICAL
T-2-16	F-24	401'-0"		DRY CHEMICAL
T-2-17	D-26	401'-0"		DRY CHEMICAL
T-2-18	F-28	401'-0"		DRY CHEMICAL
T-2-19	E-31.5	401'-0"		DRY CHEMICAL
T-2-21	G-32.5	401'-0"		DRY CHEMICAL
T-2-22	G-35	401'-0"		DRY CHEMICAL
T-2-24	K-36	401'-0"		DRY CHEMICAL

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
T-2-25	K-33	401'-0"		DRY CHEMICAL
T-2-26	L-29.5	401'-0"		DRY CHEMICAL
T-2-27	L-26.5	401'-0"		DRY CHEMICAL
T-2-28	L-20	401'-0"		DRY CHEMICAL
T-2-29	J-18	401'-0"		DRY CHEMICAL
T-2-30	C.5-16	401'-0"		DRY CHEMICAL
T-2-31	E-3.5	401'-0"		DRY CHEMICAL
T-2-32	D-29.5	401'-0"		DRY CHEMICAL
T-2-33	D-1	401'-0"		DRY CHEMICAL
T-2-34	C-30	401'-0"		DRY CHEMICAL
T-2-35	C.5-20	401'-0"		DRY CHEMICAL
T-2-36	F.5-35.5	401'-0"		DRY CHEMICAL
T-2-37	F.5-34	401'-0"		DRY CHEMICAL
T-2-38	C-6	401'-0"		DRY CHEMICAL
T-2-39	E-4	401'-0"		DRY CHEMICAL
T-3-1	K-18	426'-0"		DRY CHEMICAL
T-3-2	K-14	426'-0"		DRY CHEMICAL
T-3-3c	K-11	426'-0"		CARBON DIOXIDE
T-3-4	F-2	426'-0"		DRY CHEMICAL
T-3-5	K-4	426'-0"		DRY CHEMICAL
T-3-6	G5-25	426'-0"		DRY CHEMICAL
T-3-7	F-4	426'-0"		DRY CHEMICAL
T-3-8	F-8	426'-0"		DRY CHEMICAL
T-3-9	F-12	426'-0"		DRY CHEMICAL
T-3-10	F-14	426'-0"		DRY CHEMICAL
T-3-11	F-18	426'-0"		DRY CHEMICAL
T-3-12	J.5-18	426'-0"		DRY CHEMICAL
T-3-13	L-22	426'-0"		DRY CHEMICAL
T-3-14	K-24	426'-0"		DRY CHEMICAL
T-3-15	K-28	426'-0"		DRY CHEMICAL
T-3-16	K-34	426'-0"		DRY CHEMICAL
T-3-17	H-37	426'-0"		DRY CHEMICAL
T-3-18	G-34	426'-0"		DRY CHEMICAL
T-3-19	E-32	426'-0"		DRY CHEMICAL
T-3-20	F-30	426'-0"		DRY CHEMICAL
T-3-21	F-25	426'-0"		DRY CHEMICAL
T-3-22	F-22	426'-0"		DRY CHEMICAL
T-3-23	F-18	426'-0"		DRY CHEMICAL
T-3-24	E-28	426'-0"		DRY CHEMICAL
T-3-25	E-0.8	426'-0"		DRY CHEMICAL
T-4-1h	K-19	451'-0"		HALON (1211 OR 1301)
T-4-2h	K-16	451'-0"		HALON (1211 OR 1301)
T-4-3h	K.5-23	451'-0"		HALON (1211 OR 1301)
T-4-4	K-25	451'-0"		DRY CHEMICAL
T-4-5c	L-26	451'-0"		CARBON DIOXIDE
T-4-7	L-35	451'-0"		DRY CHEMICAL
T-4-8	H-37	451'-0"		DRY CHEMICAL
T-4-9	E-31	451'-0"		DRY CHEMICAL

NOTES:
1. REFERENCE TO FIGURES IN FIRE PROTECTION REPORT ARE PROVIDED FOR REFERENCE ONLY.
2. SEE M-545-69 FOR BRACKET MOUNTING DETAILS.

B
MPD OK

DIAGRAM OF FIRE PROTECTION
PORTABLE CO_2 FIRE EXTINGUISHER

BRAIDWOOD 1&2
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS

SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO.	REV.
M-58	D

M-58 SH. 6

AMENDMENT 26
DECEMBER 2014

PORTABLE FIRE EXTINGUISHER LOCATION

“I”

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
T - 4 - 10	E - 25	451'- 0"		DRY CHEMICAL
T - 4 - 11	E - 12	451'- 0"		DRY CHEMICAL
T - 4 - 12	E - 5	451'- 0"		DRY CHEMICAL
T - 4 - 13	H - 1	451'- 0"		DRY CHEMICAL
T - 4 - 14	L - 3	451'- 0"		DRY CHEMICAL
T - 4 - 15c	L - 10	451'- 0"		CARBON DIOXIDE
T - 4 - 16	K - 11	451'- 0"		DRY CHEMICAL
T - 4 - 17	K - 14	451'- 0"		DRY CHEMICAL
T - 4 - 18	K - 22.5	451'- 0"		DRY CHEMICAL
T - 4 - 19	J.5 - 20	451'- 0"		DRY CHEMICAL
T-9-19	L-16	468'-0"		DRY CHEMICAL

“I”

A - 1 - 1	L.5 - 15	330'-0"		DRY CHEMICAL
A - 1 - 2	Q - 17	330'-0"		DRY CHEMICAL
A - 1 - 3	L.5 - 21	330'-0"		DRY CHEMICAL
A - 1 - 4	Q - 19	330'-0"		DRY CHEMICAL
A - 2 - 1	P.5 - 18	346'-0"		DRY CHEMICAL
A - 2 - 2	Q - 12	346'-0"		DRY CHEMICAL
A - 2 - 3	M - 16	346'- 0"		DRY CHEMICAL
A - 2 - 4	M - 23	346'-0"		DRY CHEMICAL
A - 2 - 5	Q - 24	346'-0"		DRY CHEMICAL
A - 2 - 6	U - 18	346'-0"		DRY CHEMICAL
A - 2 - 7	V.5 - 16	346'-0"		DRY CHEMICAL
A - 2 - 8	V.5 - 20	346'-0"		DRY CHEMICAL
A-2-9C	S-12	346'-0"		CARBON DIOXIDE
A - 3 - 1	P.5 - 18	364'-0"		DRY CHEMICAL
A - 3 - 2	M - 14	364'-0"		DRY CHEMICAL
A - 3 - 3	P - 10	364'-0"		DRY CHEMICAL
A - 3 - 4	V - 14	364'-0"		DRY CHEMICAL
A - 3 - 5	Y - 15	364'-0"		DRY CHEMICAL
A - 3 - 6	U - 18	364'-0"		DRY CHEMICAL
A - 3 - 7	M - 21	364'-0"		DRY CHEMICAL
A - 3 - 8	S - 23	364'-0"		DRY CHEMICAL
A - 3 - 9	Y - 21	364'-0"		DRY CHEMICAL
A - 3 - 10	O.S. TENDON TUNNEL@R-13	364'-0"		DRY CHEMICAL
A - 3 - 11	O.S. TENDON TUNNEL@R-20	364'-0"		DRY CHEMICAL
A - 3 - 12	TENDON TUNNEL@R-41	364'-0"		DRY CHEMICAL
A - 3 - 13	TENDON TUNNEL@R-34	364'-0"		DRY CHEMICAL
A - 3 - 14	N - 25	364'-0"		DRY CHEMICAL
A - 4 - 1	P.5 - 18	383'- 0"		DRY CHEMICAL
A - 4 - 2	M - 17	383'- 0"		DRY CHEMICAL
A - 4 - 3	L.5 - 12	383'- 0"		DRY CHEMICAL
A - 4 - 4	L.5 - 10	383'- 0"		DRY CHEMICAL
A - 4 - 5	U - 18	383'- 0"		DRY CHEMICAL

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
A - 4 - 6	Q - 21	383'-0"		DRY CHEMICAL
A - 4 - 7	Q - 25	383'-0"		DRY CHEMICAL
A - 4 - 8h	N - 23.5	383'-0"		HALON (1211 OR 1301)
A - 4 - 9h	M - 25	383'-0"		HALON (1211 OR 1301)
A - 4 - 10h	M - 28	383'-0"		HALON (1211 OR 1301)
A - 4 - 11	P - 28.3	383'-0"		DRY CHEMICAL
A - 4 - 12	P - 31	383'-0"		DRY CHEMICAL
A - 4 - 13	L.5 - 23	383'-0"		DRY CHEMICAL
A - 4 - 14	M - 19	383'-0"		DRY CHEMICAL
A - 5 - 1	L.5 - 10.5	401'- 0"		DRY CHEMICAL
A - 5 - 2	Q - 12.5	401'- 0"		DRY CHEMICAL
A - 5 - 3	L.5 - 13	401'- 0"		DRY CHEMICAL
A - 5 - 4	M - 15	401'- 0"		DRY CHEMICAL
A - 5 - 5	P.5 - 18	401'- 0"		DRY CHEMICAL
A - 5 - 6	U - 15	401'- 0"		DRY CHEMICAL
A - 5 - 7	P - 21	401'- 0"		DRY CHEMICAL
A - 5 - 8	N - 25	401'- 0"		DRY CHEMICAL
A - 5 - 9	U - 21	401'- 0"		DRY CHEMICAL
A - 5 - 10	Q.5 - 23	401'- 0"		DRY CHEMICAL
A - 6 - 1	L.5 - 18	426'- 0"		DRY CHEMICAL
A - 6 - 3	S-23	346'-0"		DRY CHEMICAL
A - 6 - 4	S-24	346'-0"		DRY CHEMICAL
A - 6 - 5h	M - 18	426'- 0"		HALON (1211 OR 1301)
A - 6 - 6h	M - 15	426'- 0"		HALON (1211 OR 1301)
A - 6 - 7h	N - 16	426'- 0"		HALON (1211 OR 1301)
A - 6 - 8	P - 11	426'- 0"		DRY CHEMICAL
A - 6 - 9	N - 12	426'- 0"		DRY CHEMICAL
A - 6 - 10c	S - 12	426'- 0"		CARBON DIOXIDE
A - 6 - 11c	V - 13.5	426'- 0"		CARBON DIOXIDE
A - 6 - 12c	L - 8	426'- 0"		CARBON DIOXIDE
A - 6 - 13c	P.5 - 8	426'- 0"		CARBON DIOXIDE
A - 6 - 14c	P.5 - 6.5	426'- 0"		CARBON DIOXIDE
A - 6 - 15c	L - 7	426'- 0"		CARBON DIOXIDE
A - 6 - 16	V - 13	426'- 0"		DRY CHEMICAL
A - 6 - 17	S - 17.5	426'- 0"		DRY CHEMICAL
A - 6 - 18	P.5 - 18	426'- 0"		DRY CHEMICAL
A - 6 - 19	V - 23	426'- 0"		DRY CHEMICAL
A - 6 - 20	Q.5 - 24	426'- 0"		DRY CHEMICAL
A - 6 - 21	N - 25	426'- 0"		DRY CHEMICAL
A - 6 - 22c	L - 27	426'- 0"		CARBON DIOXIDE
A - 6 - 23c	P.5 - 28	426'- 0"		CARBON DIOXIDE
A - 6 - 24c	L - 29.5	426'- 0"		CARBON DIOXIDE
A - 6 - 25c	P.5 - 29.5	426'- 0"		CARBON DIOXIDE
A - 6 - 26	V - 21	426'- 0"		DRY CHEMICAL
A - 6 - 27	V - 18.5	426'- 0"		DRY CHEMICAL
A - 6 - 28c	Q 5 - 11.5	414'- 0"		CARBON DIOXIDE
A - 6 - 29	U.5 - 23	414'- 0"		DRY CHEMICAL

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
A - 6 - 30	Q.5 - 24.5	414'-0"		DRY CHEMICAL
A - 6 - 31	V.5 - 13	414'-0"		DRY CHEMICAL
A - 7 - 1	P.5 - 18	439'-0"		DRY CHEMICAL
A - 7 - 2	Q - 11.5	439'-0"		DRY CHEMICAL
A - 7 - 3	P - 10	439'-0"		DRY CHEMICAL
A - 7 - 4	M - 10	439'-0"		DRY CHEMICAL
A - 7 - 5	N-13	439'-0"		DRY CHEMICAL
A - 7 - 6	L.5 - 23	439'-0"		DRY CHEMICAL
A - 7 - 7	L.5 - 26	439'-0"		DRY CHEMICAL
A - 7 - 8	P - 26	439'-0"		DRY CHEMICAL
A - 7 - 9	Q - 24.5	439'-0"		DRY CHEMICAL
A - 7 - 10	P - 17	439'-0"		DRY CHEMICAL
A - 7 - 11	P - 19	439'-0"		DRY CHEMICAL
A - 8 - 1h	15 - P	451'- 0"		HALON (1211 OR 1301)
A - 8 - 2h	18 - N	451'- 0"		HALON (1211 OR 1301)
A - 8 - 3h	21 - P	451'- 0"		HALON (1211 OR 1301)
A - 8 - 4h	23 - M	451'- 0"		HALON (1211 OR 1301)
A - 8 - 5h	18 - P	451'- 0"		HALON (1211 OR 1301)
A - 8 - 6h	13 - P	451'- 0"		HALON (1211 OR 1301)
A - 8 - 7h	17 - L	451'- 0"		HALON (1211 OR 1301)
A - 8 - 8c	N - 13	451'- 0"		CARBON DIOXIDE
A - 8 - 9	P - 11	451'- 0"		DRY CHEMICAL
A - 8 - 10c	Q - 13	451'- 0"		CARBON DIOXIDE
A - 8 - 11c	N.5 - 9	451'- 0"		CARBON DIOXIDE
A - 8 - 12c	M - 8	451'- 0"		CARBON DIOXIDE
A - 8 - 13c	M - 8	451'- 0"		CARBON DIOXIDE
A - 8 - 14c	L - 7	451'- 0"		CARBON DIOXIDE
A - 8 - 15c	P.5 - 7	451'- 0"		CARBON DIOXIDE
A - 8 - 16	S - 17	451'- 0"		DRY CHEMICAL
A - 8 - 17	P.5 - 18	451'- 0"		DRY CHEMICAL
A - 8 - 18				
A - 8 - 19c	M - 23	451'- 0"		CARBON DIOXIDE
A - 8 - 20h	L - 19	451'- 0"		HALON (1211 OR 1301)
A - 8 - 21h	P - 23	451'- 0"		HALON (1211 OR 1301)
A - 8 - 22c	M - 25	451'- 0"		CARBON DIOXIDE
A - 8 - 23c	P.5 - 23	451'- 0"		CARBON DIOXIDE
A - 8 - 24	N.5 - 25	451'- 0"		DRY CHEMICAL
A - 8 - 25c	L - 29	451'- 0"		CARBON DIOXIDE
A - 8 - 26c	P.5 - 29.5	451'- 0"		CARBON DIOXIDE
A - 8 - 27c	M - 26.5	451'- 0"		CARBON DIOXIDE
A - 8 - 28c	N.5 - 26.5	451'- 0"		CARBON DIOXIDE
A - 8 - 29c				
A - 8 - 30	S - 19	451'- 0"		DRY CHEMICAL
A - 8 - 31	S - 24	451'- 0"		DRY CHEMICAL
A - 9 - 1	12.5 - M	463'- 4"		DRY CHEMICAL
A - 9 - 2	17 - P	463'- 4"		DRY CHEMICAL
A - 9 - 3	OUTSIDE ELEV. @ COL. 18	463'- 4"		DRY CHEMICAL

CO_2 EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
A - 9 - 4	18.5 - P	463'- 4"		DRY CHEMICAL
A - 9 - 5	23.5 - M	463'- 4"		DRY CHEMICAL
A - 9 - 6c	OUTSIDE UNIT 1 HVAC CONT. PANEL ROOM	467'- 4"		CARBON DIOXIDE
A - 9 - 7	18 - S	459'-0"		DRY CHEMICAL
A - 9 - 8c	OUTSIDE DOOR UNIT 2 HVAC C. PANEL ROOM	467'- 4"		CARBON DIOXIDE
A - 9 - 9				
A - 9 - 10	S.5 - 23	467'- 4"		DRY CHEMICAL
A - 9 - 11c	18 - Q	475'- 6"		CARBON DIOXIDE
A - 9 - 12	18 - S	475'- 6"		DRY CHEMICAL
A - 9 - 13	18 - V	459'- 0"		DRY CHEMICAL
A - 9 - 14	13 - U	459'- 0"		DRY CHEMICAL
A - 9 - 15	23 - S.7	459'- 0"		DRY CHEMICAL
A - 9 - 16	18 - S	467'- 4"		DRY CHEMICAL
A - 9 - 17	18 - M	475'- 6"		DRY CHEMICAL
A - 9 - 18	L - 25	463'- 4"		DRY CHEMICAL
A - 9 - 19	L - 11	463'- 4"		DRY CHEMICAL
A-9-20	Q-18	477'-0"		DRY CHEMICAL

“I”

NOTES:

1. REFERENCE TO FIGURES IN FIRE PROTECTION REPORT ARE PROVIDED FOR REFERENCE ONLY.
2. LOCATION TO BE ±10'-0" FROM THE COLUMN INDICATED. IF LOCATED IN A CORNER, EITHER WALL MAY BE USED.
3. SEE FIRE EXTINGUISHER STAND DETAIL ON M-545-69 FOR FIRE EXTINGUISHERS A-5-5, A-7-5 & A-8-2H

“I”

4. SEE NOTE 6 ON DWG. M-545-69 FOR MOUNTING DETAIL AT FIRE EXTINGUISHERS T-9-19 AND A-9-20.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
I	EDSF	FOR RECORD, EC 389683	EDSF	EDSF	EDSF
--	--		--	--	--
--	--		--	--	--
--	--		--	--	--

DIAGRAM OF FIRE PROTECTION
PORTABLE CO_2 FIRE EXTINGUISHER

UNITS 1 & 2

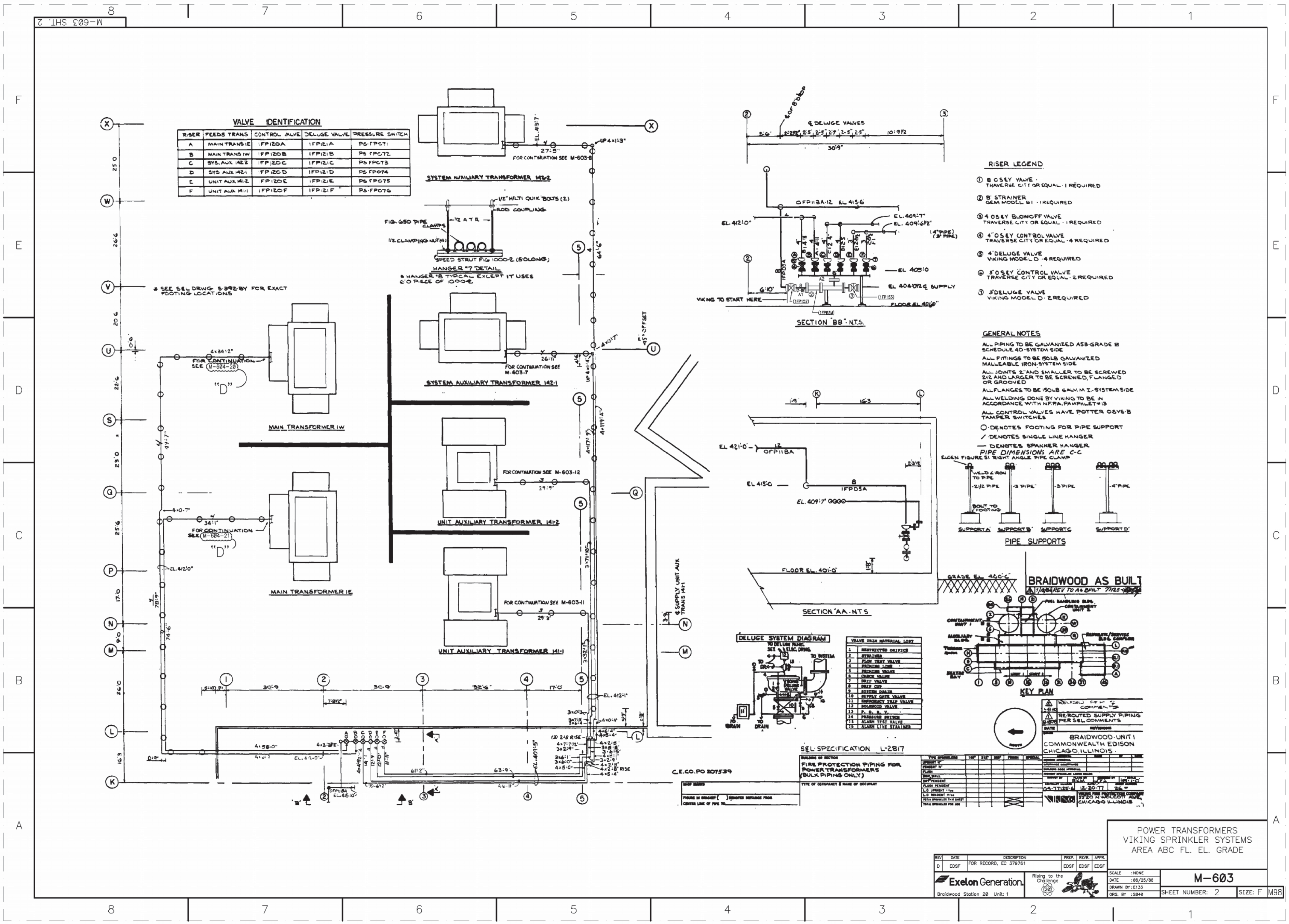
Exelon. Nuclear
Braidwood Station 20 Unit: 1&2

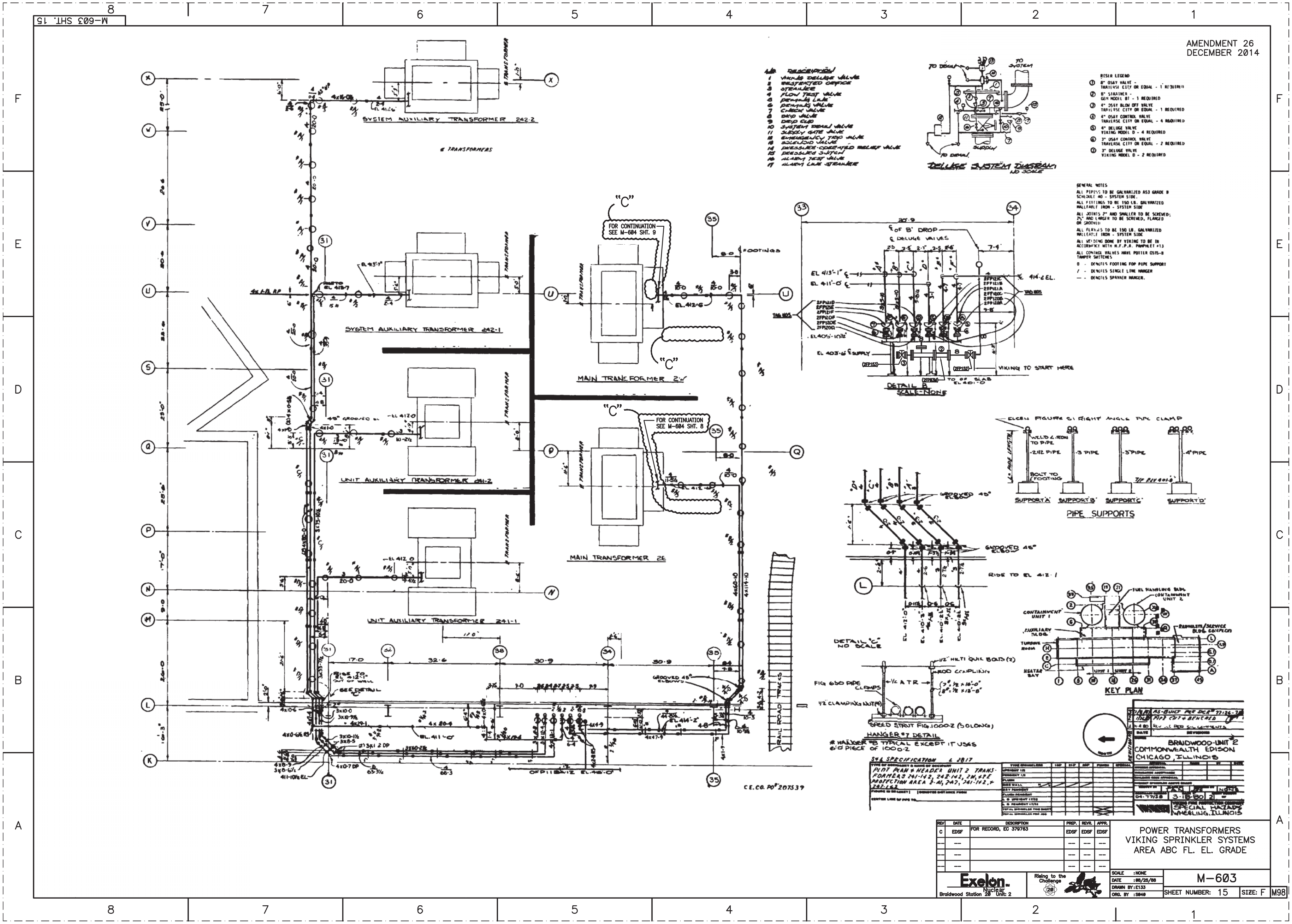
Rising to the Challenge 20

SCALE : NONE
DATE : 10/31/85
DRAWN BY: E133
ORG. BY : E133

M-58

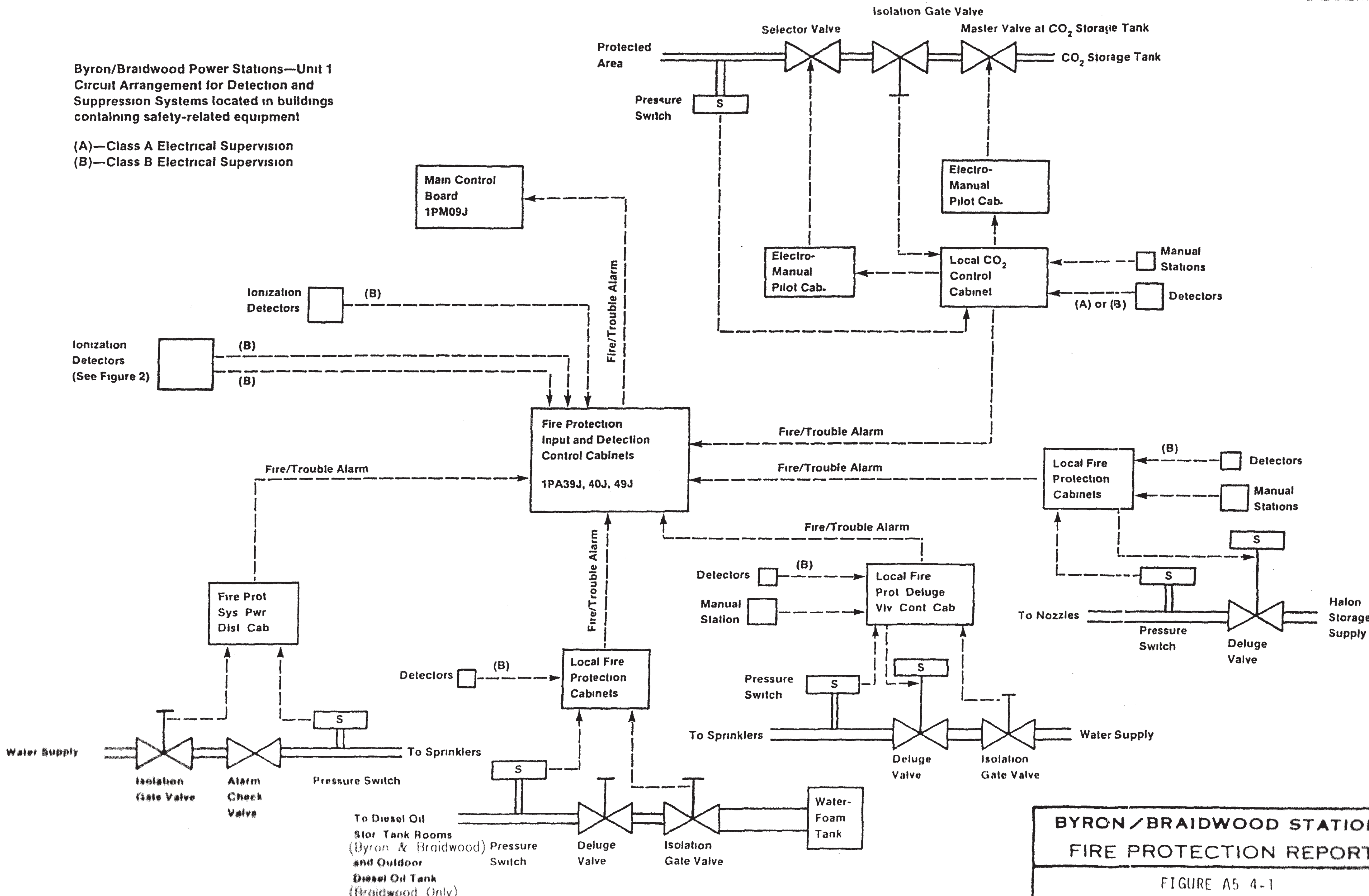
SHEET NUMBER: 6 SIZE: F M98


M-603 SHT. 2
VALVE IDENTIFICATION
RISER | FEEDS TRANS | CONTROL VALVE | DELUGE VALVE | PRESSURE SWITCH
A | MAIN TRANS 1E | 1FP120A | 1FP121A | PS-FPO71
B | MAIN TRANS 1W | 1FP120B | 1FP121B | PS FPO72
C | SYS. AUX 142-2 | 1FP120C | 1FP121C | PS FPO73
D | SYS AUX 142-1 | 1FP120D | 1FP121D | PS FPO74
E | UNIT AUX 141-2 | 1FP120E | 1FP121E | PS FPO75
F | UNIT AUX 141-1 | 1FP120F | 1FP121F | PS-FPO76
SYSTEM AUXILIARY TRANSFORMER 142-2
HANGER "7 DETAIL
SYSTEM AUXILIARY TRANSFORMER 142-1
MAIN TRANSFORMER 1W
MAIN TRANSFORMER 1E
UNIT AUXILIARY TRANSFORMER 141-2
UNIT AUXILIARY TRANSFORMER 141-1
SECTION "BB" N.T.S.
SECTION "AA" N.T.S
RISER LEGEND
① 8 OS&Y VALVE · TRAVERSE CITY OR EQUAL · 1 REQUIRED
② 8" STRAINER GEM MODEL 81 · 1 REQUIRED
③ 4 OS&Y BLOWOFF VALVE TRAVERSE CITY OR EQUAL · 1 REQUIRED
④ 4" OS&Y CONTROL VALVE TRAVERSE CITY OR EQUAL · 4 REQUIRED
⑤ 4" DELUGE VALVE VIKING MODEL D · 4 REQUIRED
⑥ 3" OS&Y CONTROL VALVE TRAVERSE CITY OR EQUAL · 2 REQUIRED
⑦ 3" DELUGE VALVE VIKING MODEL D · 2 REQUIRED
GENERAL NOTES
ALL PIPING TO BE GALVANIZED A53-GRADE B SCHEDULE 40 · SYSTEM SIDE
ALL FITTINGS TO BE 150LB GALVANIZED MALLEABLE IRON-SYSTEM SIDE
ALL JOINTS 2" AND SMALLER TO BE SCREWED 2 1/2 AND LARGER TO BE SCREWED, FLANGED OR GROOVED
ALL FLANGES TO BE 150LB GALV. M.I.-SYSTEM SIDE
ALL WELDING DONE BY VIKING TO BE IN ACCORDANCE WITH N.F.P.A. PAMPHLET #13
ALL CONTROL VALVES HAVE POTTER OSYS-B TAMPER SWITCHES
○ · DENOTES FOOTING FOR PIPE SUPPORT
/ · DENOTES SINGLE LINE HANGER
— DENOTES SPANNER HANGER
PIPE DIMENSIONS ARE C-C
ELCEN FIGURE 51 RIGHT ANGLE PIPE CLAMP
PIPE SUPPORTS
DELUGE SYSTEM DIAGRAM
KEY PLAN
BRAIDWOOD AS BUILT
SEL SPECIFICATION L-2817
FIRE PROTECTION PIPING FOR POWER TRANSFORMERS (BULK PIPING ONLY)
BRAIDWOOD · UNIT 1
COMMONWEALTH EDISON
CHICAGO, ILLINOIS
VIKING FIRE PROTECTION COMPANY
5520 N WOLCOTT AVE
CHICAGO ILLINOIS
C.E.CO. PO 207539
POWER TRANSFORMERS
VIKING SPRINKLER SYSTEMS
AREA ABC FL. EL. GRADE
REV | DATE | DESCRIPTION | PREP. | REVR. | APPR.
D | EDSF | FOR RECORD, EC 379761 | EDSF | EDSF | EDSF
Exelon Generation
Braidwood Station 20 Unit: 1
Rising to the Challenge
SCALE :NONE
DATE :08/25/88
DRAWN BY: E133
ORG. BY :S040
M-603
SHEET NUMBER: 2
SIZE: F
M98


M-603 SHT. 15
AMENDMENT 26
DECEMBER 2014
SYSTEM AUXILIARY TRANSFORMER 242-2
SYSTEM AUXILIARY TRANSFORMER 242-1
UNIT AUXILIARY TRANSFORMER 241-2
UNIT AUXILIARY TRANSFORMER 241-1
MAIN TRANSFORMER 2W
MAIN TRANSFORMER 2E
"C"
FOR CONTINUATION
SEE M-604 SHT. 9
FOR CONTINUATION
SEE M-604 SHT. 8
DELUGE SYSTEM DIAGRAM
NO SCALE
DETAIL "B"
SCALE-NONE
DETAIL "C"
NO SCALE
PIPE SUPPORTS
SUPPORT A
SUPPORT B
SUPPORT C
SUPPORT D
HANGER #7 DETAIL
KEY PLAN
RAILROAD TRACKS
BRAIDWOOD-UNIT 2
COMMONWEALTH EDISON
CHICAGO, ILLINOIS
SPECIAL HAZARDS
WHEELING, ILLINOIS
REV | DATE | DESCRIPTION | PREP. | REVR. | APPR.
C | EDSF | FOR RECORD, EC 379763 | EDSF | EDSF | EDSF
POWER TRANSFORMERS
VIKING SPRINKLER SYSTEMS
AREA ABC FL. EL. GRADE
Exelon Nuclear
Braidwood Station Unit 2
Rising to the Challenge
SCALE: NONE
DRAWN BY: E133
ORG. BY: S840
M-603
SHEET NUMBER: 15
SIZE: F
M98

Byron/Braidwood Power Stations—Unit 1
Circuit Arrangement for Detection and Suppression Systems located in buildings containing safety-related equipment

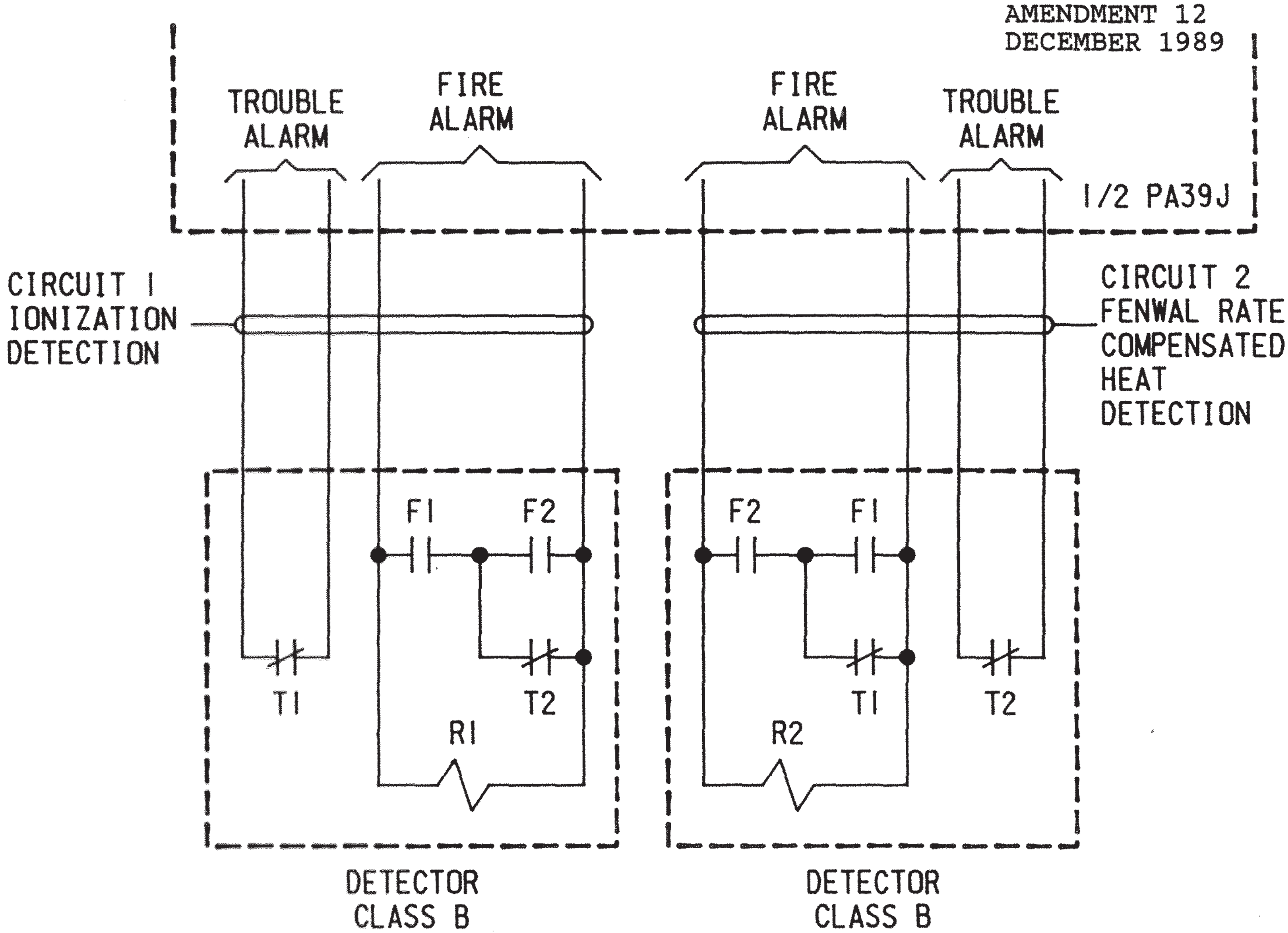
(A)—Class A Electrical Supervision
(B)—Class B Electrical Supervision



BYRON / BRAIDWOOD STATIONS
FIRE PROTECTION REPORT

FIGURE A5 4-1

UNIT 1 FIRE PROTECTION SYSTEM
SINGLE LINE DIAGRAM

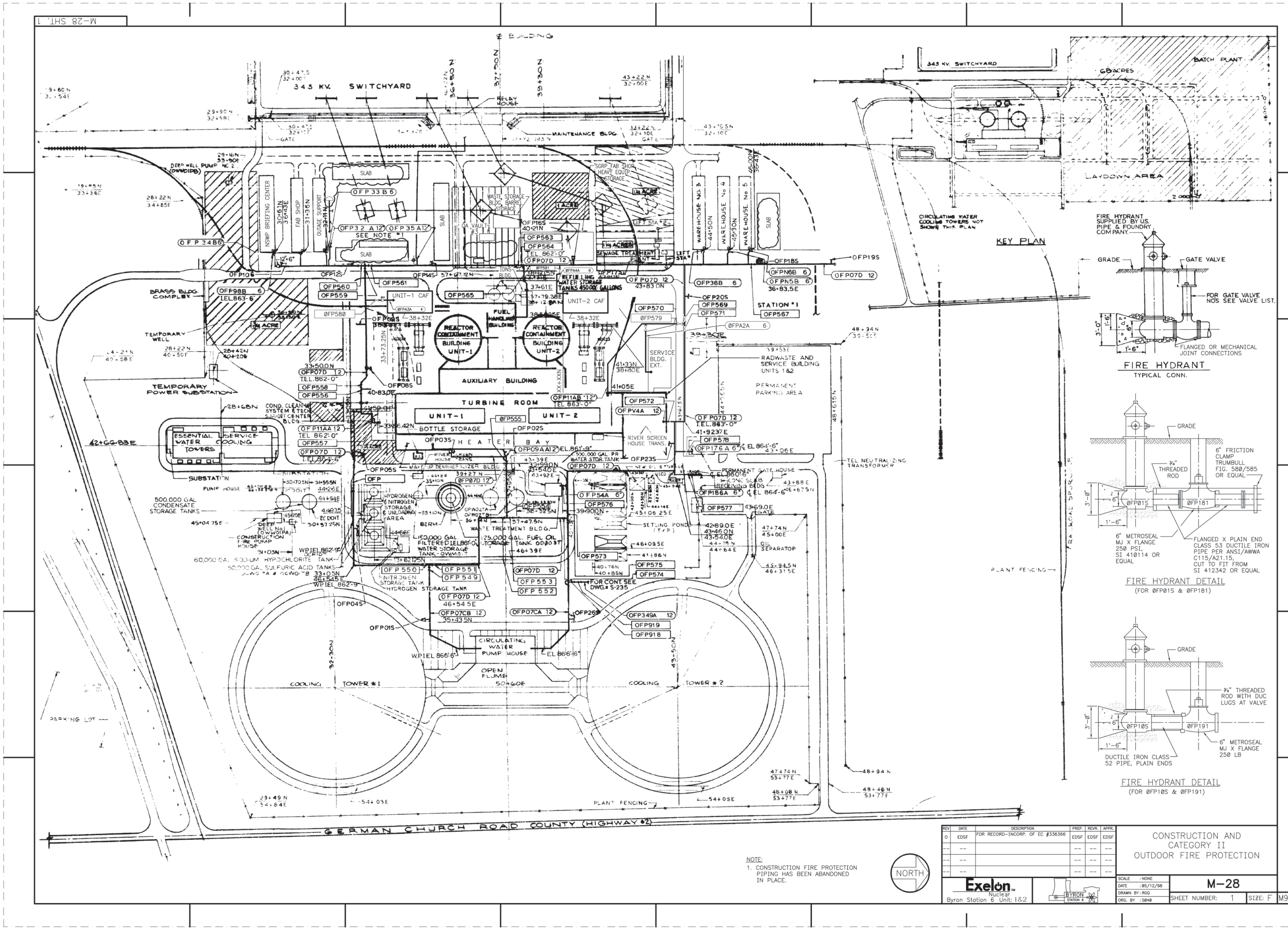


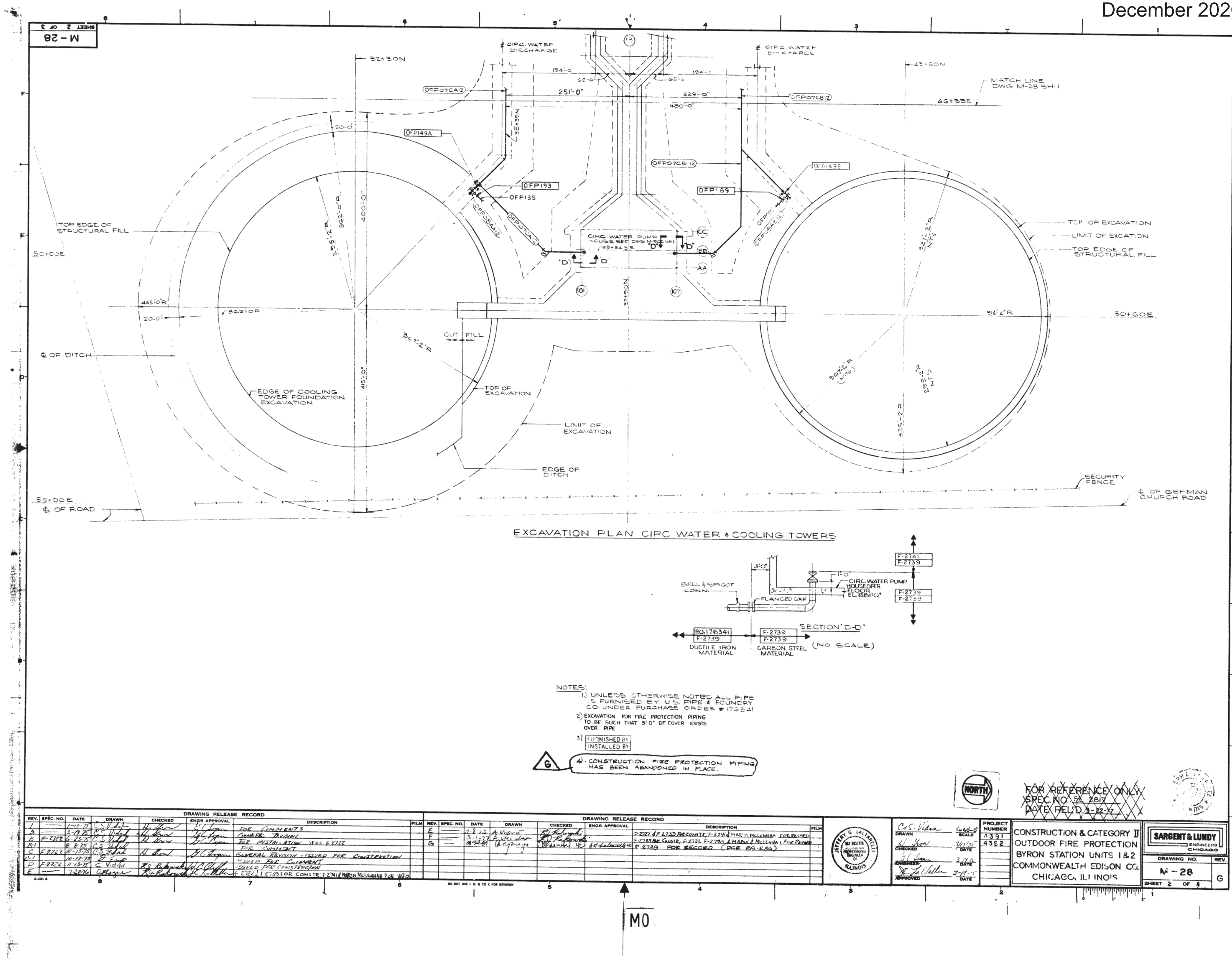
F = FIRE ALARM CONTACT (SHOWN IN THE ABSENCE OF A FIRE)
T = TROUBLE CONTACT (SHOWN IN TROUBLE CONDITION)
R = END OF LINE RESISTOR

CIRCUITS 1 & 2 PROVIDE FIRE ALARM RECEIPT CAPABILITY FOR A COMMON LOCATION. AN OPEN CIRCUIT ON EITHER CIRCUIT WILL NOT AFFECT THE INITIATION OF THE AUTOMATIC FIRE SUPPRESSION SYSTEMS.

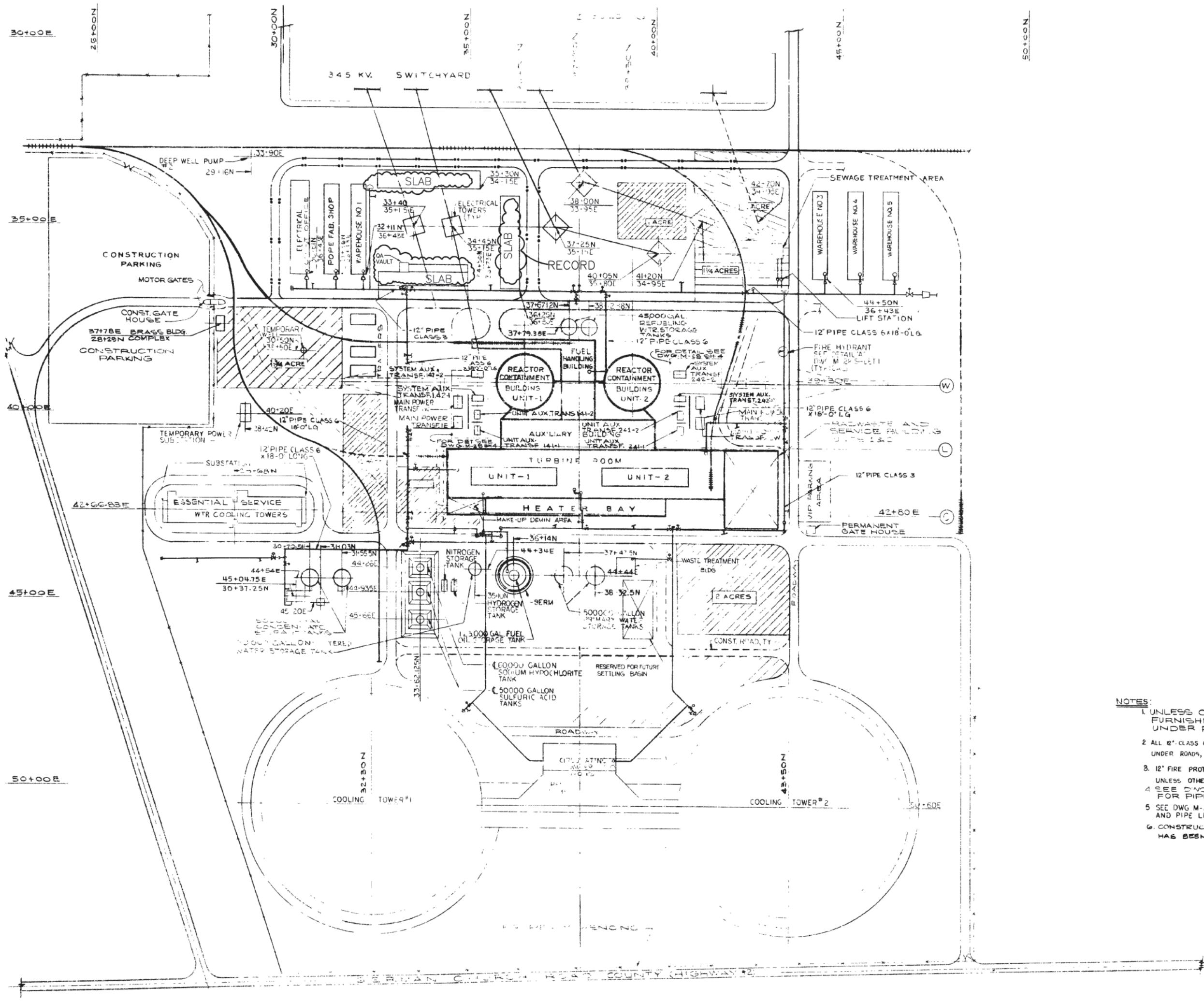
BYRON/BRAIDWOOD STATIONS FIRE PROTECTION REPORT
FIGURE A5.4-2 UNIT 1 FIRE DETECTION SCHEMATIC DIAGRAM FOR CABLE SPREADING ROOMS

S&L ECAD F7 REISC.9


M-28 SHT. 1
345 KV. SWITCHYARD
RELAY HOUSE
MAINTENANCE BLDG.
WAREHOUSE No. 3
WAREHOUSE No. 4
WAREHOUSE No. 5
SLAB
NSWP BRIEFING CENTER
FAB SHOP
OUTAGE SUPPORT
DEEP WELL PUMP No. 2
BRASS BLDG. COMPLEX
TEMPORARY WELL
TEMPORARY POWER SUBSTATION
REACTOR CONTAINMENT BUILDING UNIT-1
REACTOR CONTAINMENT BUILDING UNIT-2
FUEL HANDLING BUILDING
AUXILIARY BUILDING
TURBINE ROOM
UNIT-1
UNIT-2
BOTTLE STORAGE
HEATER BAY
UNIT-1 CAF
UNIT-2 CAF
STATION #1
SERVICE BLDG. EXT.
RADWASTE AND SERVICE BUILDING UNITS 1&2
PERMANENT PARKING AREA
RIVER SCREEN HOUSE TRANS.
TEL NEUTRALIZING TRANSFORMER
ESSENTIAL SERVICE WATER COOLING TOWERS
SUBSTATION
500,000 GAL CONDENSATE STORAGE TANKS
HYDROGEN & NITROGEN STORAGE & UNLOADING AREA
WASTE TREATMENT BLDG.
SETTLING POND (TYP)
OIL SEPARATOR
NITROGEN STORAGE TANK
HYDROGEN STORAGE TANK
CIRCULATING WATER PUMP HOUSE
OPEN FLUME
COOLING TOWER #1
COOLING TOWER #2
PLANT FENCING
PARKING LOT
GERMAN CHURCH ROAD COUNTY (HIGHWAY #2)
KEY PLAN
345 KV. SWITCHYARD
BATCH PLANT
LAYDOWN AREA
CIRCULATING WATER COOLING TOWERS NOT SHOWN THIS PLAN
FIRE HYDRANT SUPPLIED BY U.S. PIPE & FOUNDRY COMPANY
GRADE
GATE VALVE
FOR GATE VALVE NOS SEE VALVE LIST.
FLANGED OR MECHANICAL JOINT CONNECTIONS
FIRE HYDRANT
TYPICAL CONN.
6" FRICTION CLAMP TRUMBULL FIG. 580/585 OR EQUAL
3/4" THREADED ROD
6" METROSEAL MJ X FLANGE 250 PSI, SI 410114 OR EQUAL
FLANGED X PLAIN END CLASS 53 DUCTILE IRON PIPE PER ANSI/AWWA C115/A21.15, CUT TO FIT FROM SI 412342 OR EQUAL
FIRE HYDRANT DETAIL
(FOR ØFP01S & ØFP181)
3/4" THREADED ROD WITH DUC LUGS AT VALVE
6" METROSEAL MJ X FLANGE 250 LB
DUCTILE IRON CLASS 52 PIPE, PLAIN ENDS
FIRE HYDRANT DETAIL
(FOR ØFP10S & ØFP191)
NOTE:
1. CONSTRUCTION FIRE PROTECTION PIPING HAS BEEN ABANDONED IN PLACE.
NORTH
0 EDSF FOR RECORD-INCORP. OF EC #336366 EDSF EDSF EDSF
CONSTRUCTION AND CATEGORY II OUTDOOR FIRE PROTECTION
Exelon Nuclear
Byron Station 6 Unit: 1&2
SCALE: NONE
DATE: 05/12/98
M-28
SHEET NUMBER: 1
SIZE: F
M98


M-28
EXCAVATION PLAN CIRC WATER & COOLING TOWERS
CIRC WATER DISCHARGE
MATCH LINE DWG M-28 SH.1
TOP EDGE OF STRUCTURAL FILL
TOP OF EXCAVATION
LIMIT OF EXCAVATION
CIRC WATER PUMP HOUSE
¢ OF DITCH
EDGE OF COOLING TOWER FOUNDATION EXCAVATION
EDGE OF DITCH
SECURITY FENCE
¢ OF ROAD
¢ OF GERMAN CHURCH ROAD
CUT FILL
SECTION 'D-D'
(NO SCALE)
BELL & SPIGOT CONN.
FLANGED CONN.
CIRC WATER PUMP HOUSE OPER FLOOR EL 881'0"
DUCTILE IRON MATERIAL
CARBON STEEL MATERIAL
NOTES:
1) UNLESS OTHERWISE NOTED ALL PIPE IS FURNISHED BY U.S. PIPE & FOUNDRY CO. UNDER PURCHASE ORDER #176341
2) EXCAVATION FOR FIRE PROTECTION PIPING TO BE SUCH THAT 5'-0" OF COVER EXISTS OVER PIPE
3) FURNISHED BY / INSTALLED BY
4) CONSTRUCTION FIRE PROTECTION PIPING HAS BEEN ABANDONED IN PLACE.
NORTH
FOR REFERENCE ONLY
DRAWING RELEASE RECORD
CONSTRUCTION & CATEGORY II
OUTDOOR FIRE PROTECTION
BYRON STATION UNITS 1&2
COMMONWEALTH EDISON CO.
CHICAGO, ILLINOIS
SARGENT & LUNDY ENGINEERS CHICAGO
DRAWING NO. M-28
REV. G
SHEET 2 OF 3
M0

Amendment 29
December 2020



NOTES:

1. UNLESS OTHERWISE NOTED ALL PIPE IS FURNISHED BY U.S. PIPE & FOUNDRY CO. UNDER PURCHASE ORDER # 176341.
2. ALL 12" CLASS 6, AND 6" PIPE CLASS 3 TO BE CENTERED UNDER ROADS, TRACKS AND BRIDGES
3. 12" FIRE PROTECTION RING HEADER TO BE CLASS 3 UNLESS OTHERWISE NOTED TO BE CLASS 6
4. SEE DWG M-28 SH 1 & M-28 SH 2 FOR PIPE DIMENSIONS.
5. SEE DWG M-28 SH 1 FOR FIRE HYDRANT, VALVE, AND PIPE LINE NUMBERS.
6. CONSTRUCTION FIRE PROTECTION PIPING HAS BEEN ABANDONED IN PLACE.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
I	EDSF	FOR RECORD–INCORP. OF EC #336366	EDSF	EDSF	EDSF
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ROAD, TRACK, EQUIPMENT AND FIRE PROTECTION RING HEADER

Exelon Nuclear
Byron Station 6 Unit: 1&2

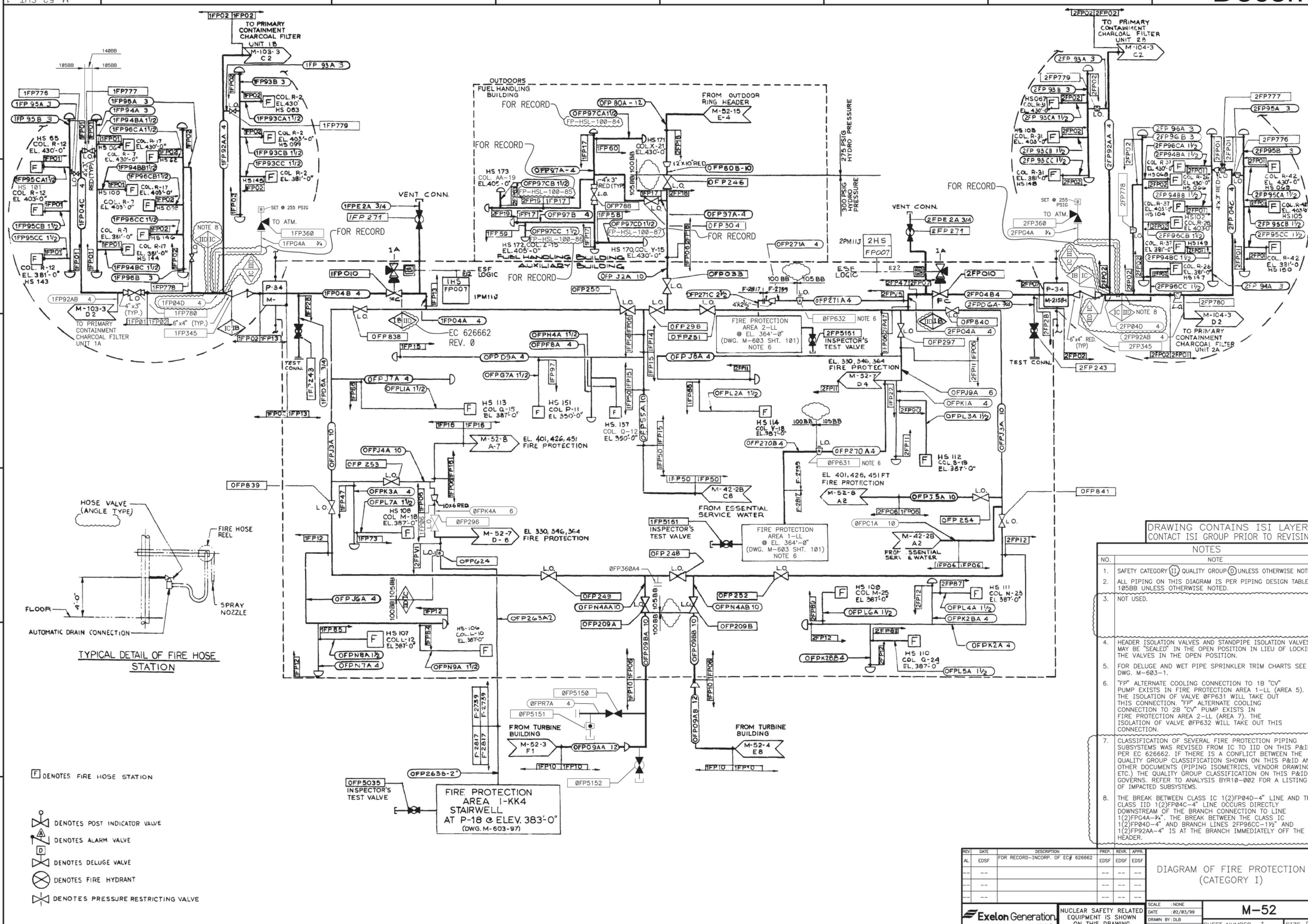
BYRON STATION 6

SCALE : NONE
DATE : 06/26/08
DRAWN BY : TJWP
ORG. BY : S040

M–28

SHEET NUMBER: 3 | SIZE: F | M98

Amendment 29
December 2020



DRAWING CONTAINS ISI LAYERS
CONTACT ISI GROUP PRIOR TO REVISING

NOTES

NO.	NOTE
1.	SAFETY CATEGORY II, QUALITY GROUP D UNLESS OTHERWISE NOTED.
2.	ALL PIPING ON THIS DIAGRAM IS PER PIPING DESIGN TABLE 105BB UNLESS OTHERWISE NOTED.
3.	NOT USED.
4.	HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
5.	FOR DELUGE AND WET PIPE SPRINKLER TRIM CHARTS SEE DWG. M-603-1.
6.	"FP" ALTERNATE COOLING CONNECTION TO 1B "CV" PUMP EXISTS IN FIRE PROTECTION AREA 1-LL (AREA 5). THE ISOLATION OF VALVE 0FP631 WILL TAKE OUT THIS CONNECTION. "FP" ALTERNATE COOLING CONNECTION TO 2B "CV" PUMP EXISTS IN FIRE PROTECTION AREA 2-LL (AREA 7). THE ISOLATION OF VALVE 0FP632 WILL TAKE OUT THIS CONNECTION.
7.	CLASSIFICATION OF SEVERAL FIRE PROTECTION PIPING SUBSYSTEMS WAS REVISED FROM IC TO IID ON THIS P&ID PER EC 626662. IF THERE IS A CONFLICT BETWEEN THE QUALITY GROUP CLASSIFICATION SHOWN ON THIS P&ID AND OTHER DOCUMENTS (PIPING ISOMETRICS, VENDOR DRAWINGS, ETC.) THE QUALITY GROUP CLASSIFICATION ON THIS P&ID GOVERNS. REFER TO ANALYSIS BYR10-002 FOR A LISTING OF IMPACTED SUBSYSTEMS.
8.	THE BREAK BETWEEN CLASS IC 1(2)FP04D-4" LINE AND THE CLASS IID 1(2)FP04C-4" LINE OCCURS DIRECTLY DOWNSTREAM OF THE BRANCH CONNECTION TO LINE 1(2)FPG4A-3/4". THE BREAK BETWEEN THE CLASS IC 1(2)FP04D-4" AND BRANCH LINES 2FP96CC-1½" AND 1(2)FP92AA-4" IS AT THE BRANCH IMMEDIATELY OFF THE HEADER.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AL	EDSF	FOR RECORD-INCORP. OF EC# 626662	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
(CATEGORY I)

Exelon Generation
Byron Station 6 Unit: 1&2

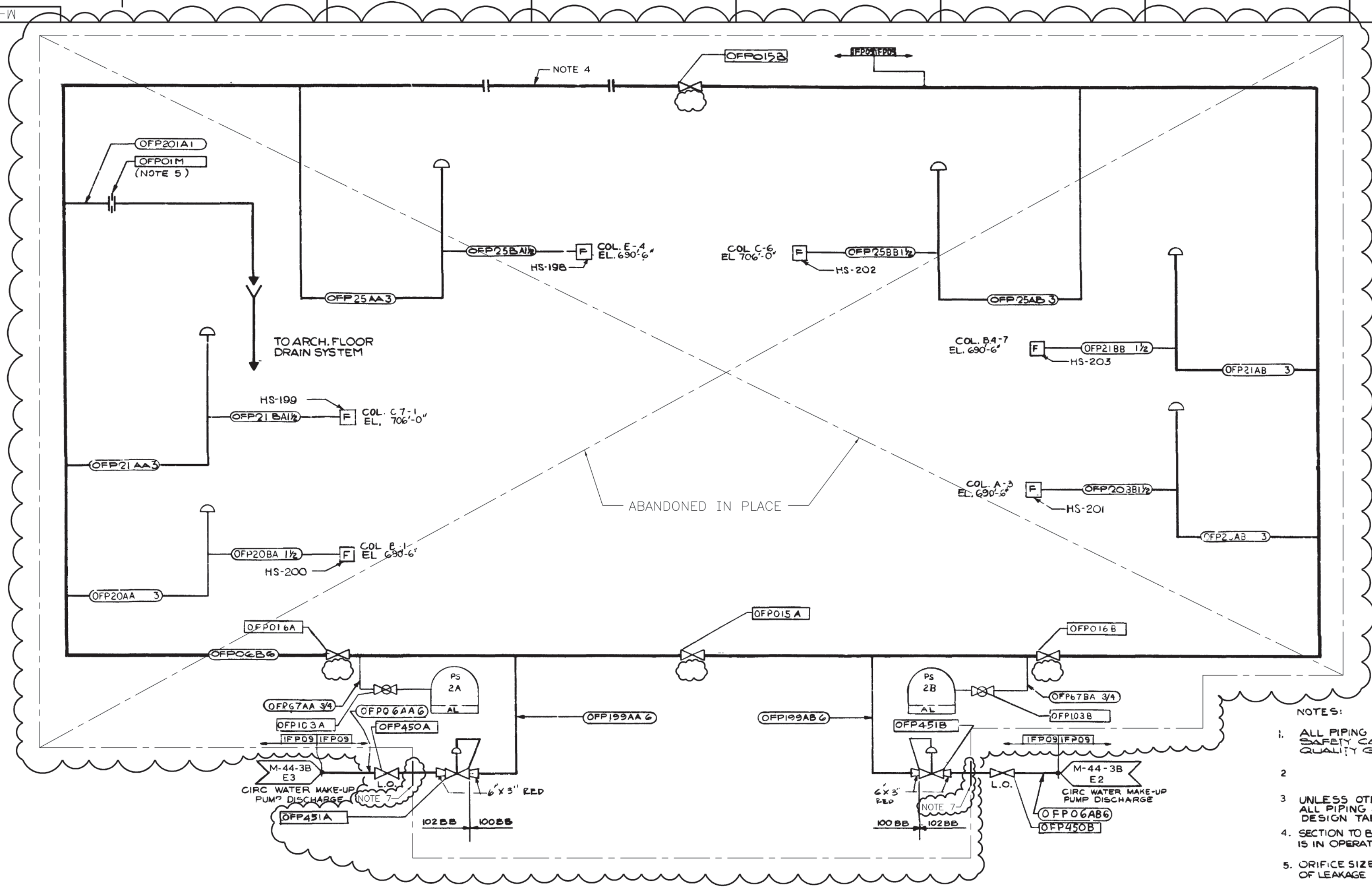
NUCLEAR SAFETY RELATED EQUIPMENT IS SHOWN ON THIS DRAWING

SCALE : NONE
DATE : 02/03/99
DRAWN BY : DLB
ORG. BY : S040

M-52

SHEET NUMBER: 1 | SIZE: F | M05

Amendment
2920



NOTES:

1. ALL PIPING SHALL BE SAFETY CATEGORY II QUALITY GROUP D
2
3 UNLESS OTHERWISE INDICATED ALL PIPING SHALL BE PER PIPING DESIGN TABLE 100BB
4. SECTION TO BE REMOVED WHEN TROLLEY IS IN OPERATION
5. ORIFICE SIZED TO ALLOW 5 G.P.M. OF LEAKAGE
6. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
7. BLANK-OFF PLATE INSTALLED (HEADER ISOLATION).

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
N	EDSF	FOR RECORD- INCORP. OF EC #351113	EDSF	EDSF	EDSF
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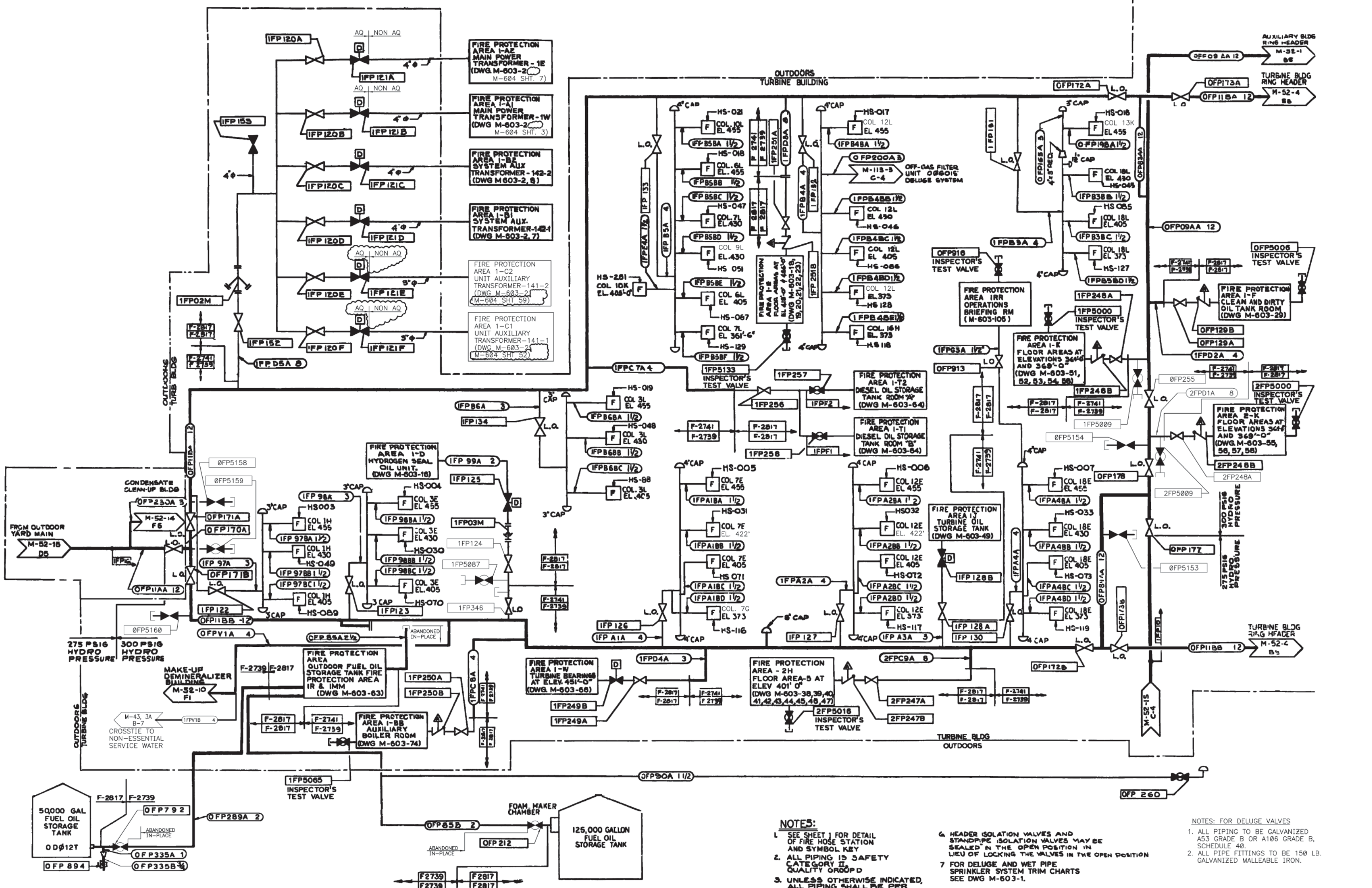
DIAGRAM OF FIRE PROTECTION
AT RIVER SCREEN HOUSE

Exelon Nuclear
Byron Station 6 Unit: 1&2

BYRON STATION 6

SCALE : NONE
DATE : MM/DD/YY
DRAWN BY: M.B.
ORG. BY : S040

M-52
SHEET NUMBER: 2
SIZE: D
M05



NOTES:

1. SEE SHEET 1 FOR DETAIL OF FIRE HOSE STATION AND SYMBOL KEY
2. ALL PIPING IS SAFETY CATEGORY II, QUALITY GROUP D
3. UNLESS OTHERWISE INDICATED, ALL PIPING SHALL BE PER PIPING DESIGN TABLE 100B3
4. FIRE PROTECTION AREAS SHALL BE FURNISHED AND INSTALLED BY SPEC. F-2817
5.
6. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION
7. FOR DELUGE AND WET PIPE SPRINKLER SYSTEM TRIM CHARTS SEE DWG M-603-1.

NOTES: FOR DELUGE VALVES

1. ALL PIPING TO BE GALVANIZED A53 GRADE B OR A106 GRADE B, SCHEDULE 40.
2. ALL PIPE FITTINGS TO BE 150 LB. GALVANIZED MALLEABLE IRON.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AV	EDSF	FOR RECORD–INCORP. OF EC# 626215	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION

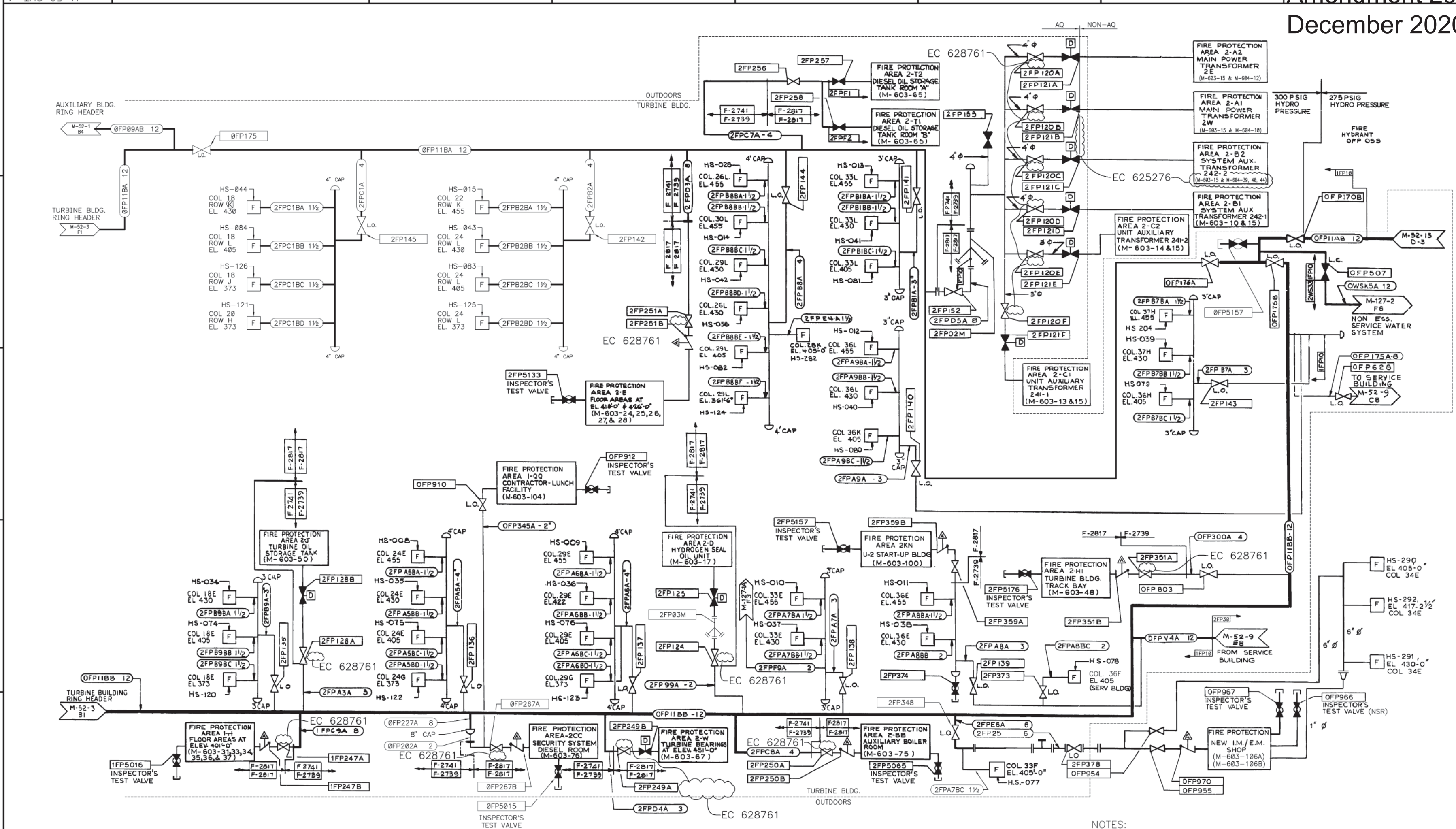
Exelon Generation
Byron Station 6 Unit: 1&2

BYRON STATION 6

SCALE : NONE
DATE : 06/09/97
DRAWN BY: JLR
ORG. BY : S040

M–52

SHEET NUMBER: 3 SIZE: F M05



NOTES:

1. SEE SHEET 1 FOR DETAILS OF FIREHOSE STATION AND SYMBOL KEY.
2. ALL PIPING IS SAFETY CATEGORY II, QUALITY GROUP "D".
3. UNLESS OTHERWISE INDICATED, ALL PIPING SHALL BE PER PIPING DESIGN TABLE 100BB.
4. FIRE PROTECTION AREAS SHALL BE FURNISHED AND INSTALLED BY SPEC. F-2817.
5. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
6. FOR DELUGE AND WET PIPE SPRINKLER TRIM CHARTS SEE DWG. M-603 SH. 1.

EC 628761

NOTES: FOR DELUGE VALVES

1. ALL PIPING TO BE GALVANIZED A53 GRADE B OR A106 GRADE B, SCHEDULE 40.
2. ALL PIPE FITTINGS TO BE 150 LB. GALVANIZED MALLEABLE IRON.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AR	EDSF	FOR RECORD-INCORP. OF EC# 625276 & EC# 628761	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION

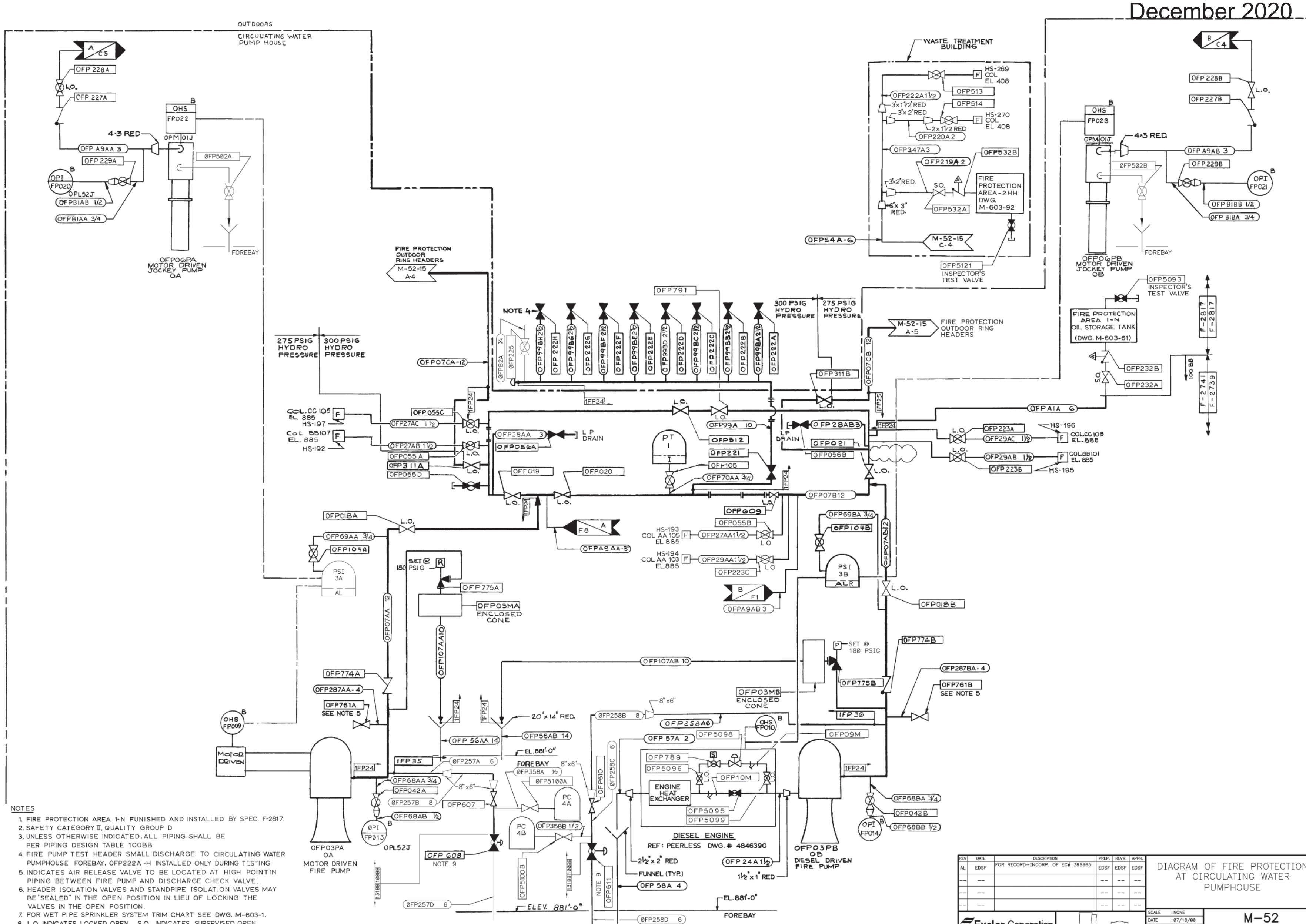
Exelon Generation
Byron Station 6 Unit: 1&2

SCALE : NONE
DATE : 01/31/96
DRAWN BY : SCW
ORG. BY : S040

M-52

SHEET NUMBER: 4 SIZE: F M98

Amendment 29
December 2020



NOTES

1. FIRE PROTECTION AREA 1-N FUNISHED AND INSTALLED BY SPEC. F-2817.
2. SAFETY CATEGORY II, QUALITY GROUP D
3. UNLESS OTHERWISE INDICATED, ALL PIPING SHALL BE PER PIPING DESIGN TABLE 100BB
4. FIRE PUMP TEST HEADER SMALL DISCHARGE TO CIRCULATING WATER PUMPHOUSE FOREBAY, 0FP222A-H INSTALLED ONLY DURING TESTING
5. INDICATES AIR RELEASE VALVE TO BE LOCATED AT HIGH POINT IN PIPING BETWEEN FIRE PUMP AND DISCHARGE CHECK VALVE.
6. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
7. FOR WET PIPE SPRINKLER SYSTEM TRIM CHART SEE DWG. M-603-1.
8. L.O. INDICATES LOCKED OPEN, S.O. INDICATES SUPERVISED OPEN.
9. VALVES ØFP608 AND ØFP611 ARE ANSI CLASS 600 PER VENDOR RECOMMENDATION.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AL	EDSF	FOR RECORD–INCORP. OF EC# 396965	EDSF	EDSF	EDSF
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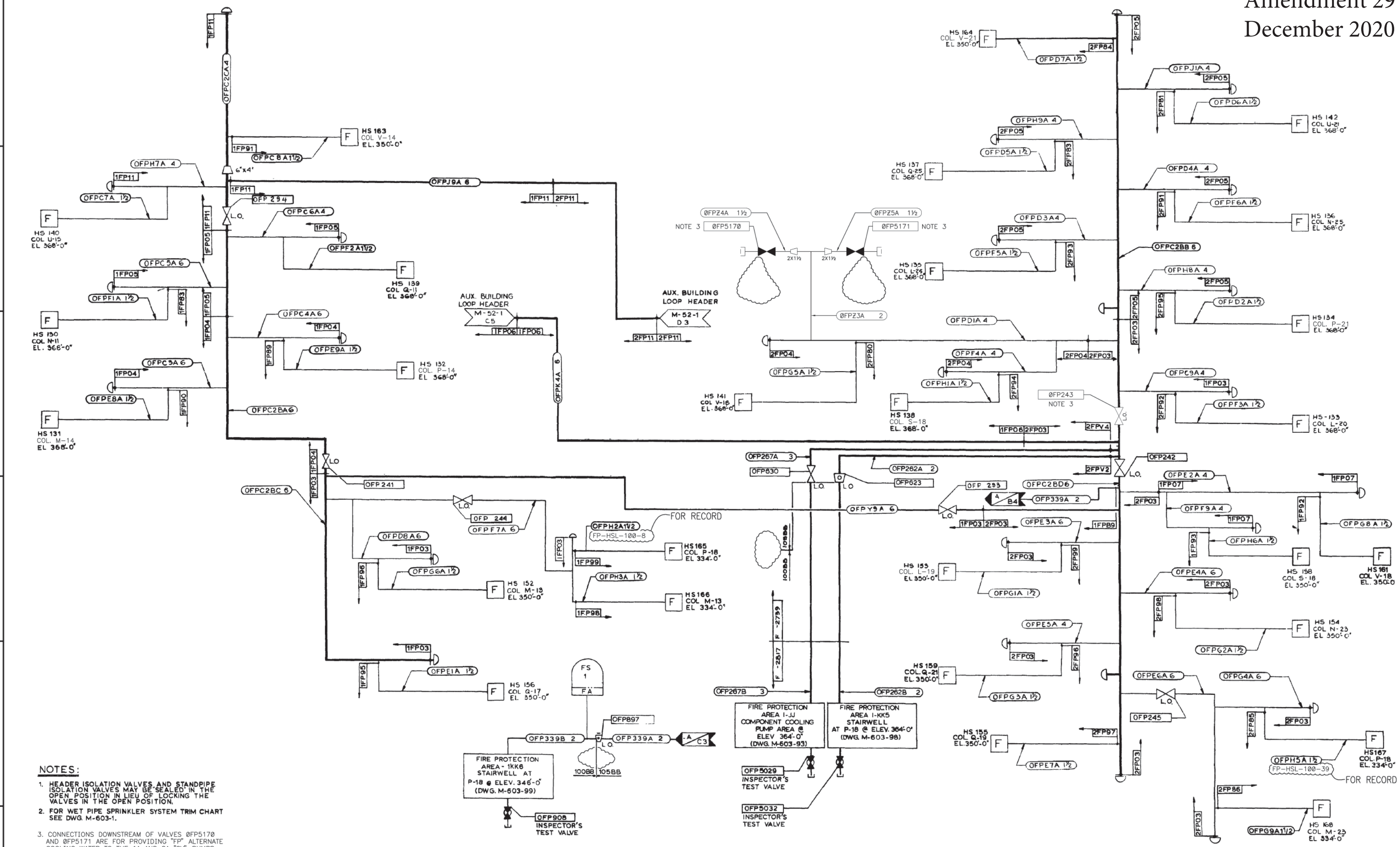
DIAGRAM OF FIRE PROTECTION AT CIRCULATING WATER PUMPHOUSE

Exelon Generation
Byron Station 6 Unit: 1&2
BYRON STATION 6

SCALE : NONE
DATE : 07/18/00
DRAWN BY : DLB
ORG. BY : S040

M–52
SHEET NUMBER: 5 SIZE: F M05

Amendment 29
December 2020



NOTES:

1. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
2. FOR WET PIPE SPRINKLER SYSTEM TRIM CHART SEE DWG. M-603-1.
3. CONNECTIONS DOWNSTREAM OF VALVES ØFP5170 AND ØFP5171 ARE FOR PROVIDING "FP" ALTERNATE COOLING WATER TO THE 1A AND 2A "CV" PUMPS. THE ISOLATION OF VALVE ØFP243 WILL TAKE OUT VALVES ØFP5170 AND ØFP5171.
4. SAFETY CATEGORY II, QUALITY GROUP D UNLESS NOTED OTHERWISE.
5. CLASSIFICATION OF SEVERAL FIRE PROTECTION PIPING SUBSYSTEMS WAS REVISED FROM IC TO IID ON THIS P&ID PER EC 626662. IF THERE IS A CONFLICT BETWEEN THE QUALITY GROUP CLASSIFICATION SHOWN ON THIS P&ID AND OTHER DOCUMENTS (PIPING ISOMETRICS, VENDOR DRAWINGS, ETC.) THE QUALITY GROUP CLASSIFICATION ON THIS P&ID GOVERNS. REFER TO ANALYSIS BYR19-002 FOR A LISTING OF IMPACTED SUBSYSTEMS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AA	EDSF	FOR RECORD-INCORP. OF EC# 626662	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
AUXILIARY BUILDING

Exelon Generation
Byron Station 6 Unit: 1&2

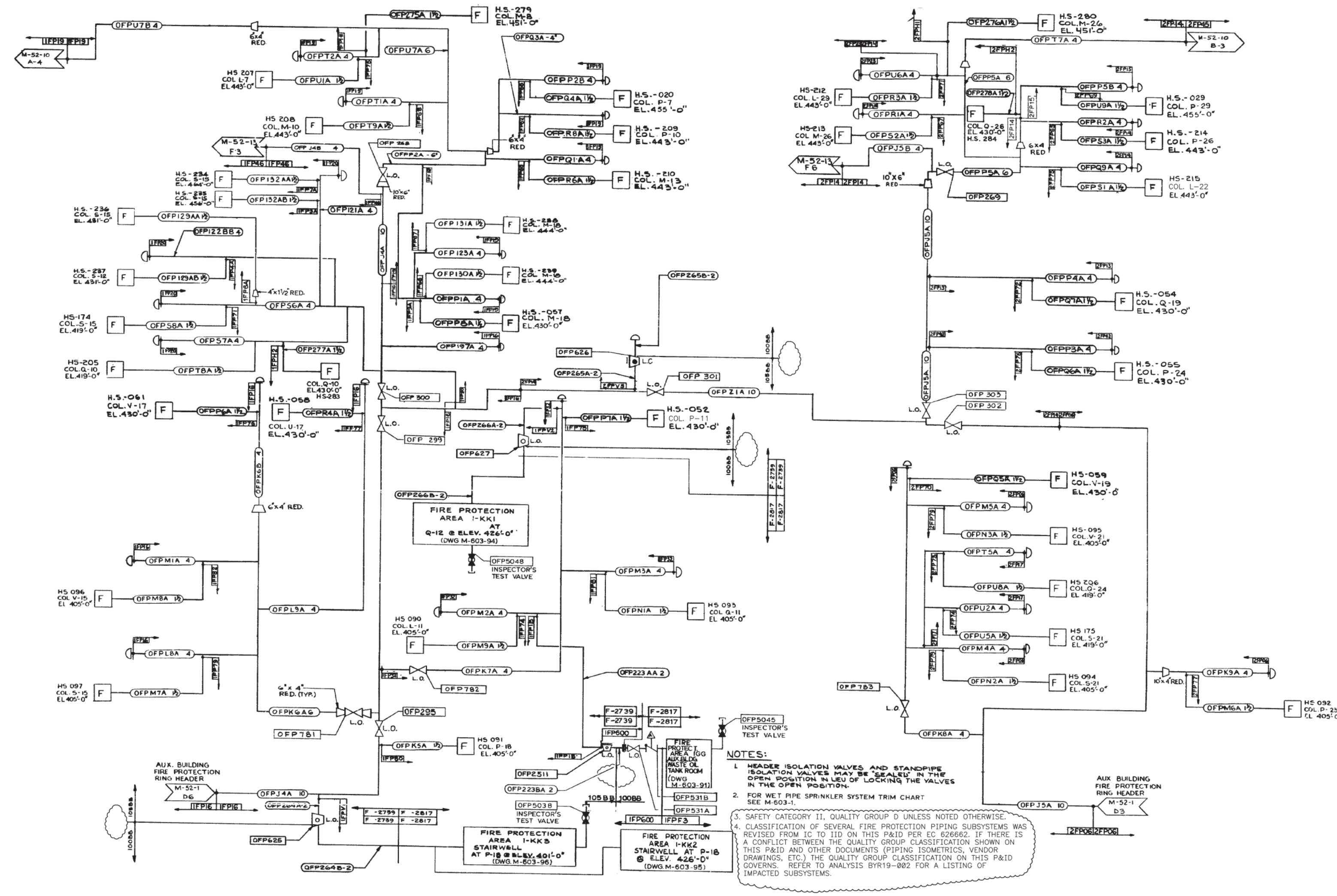
BYRON STATION 6

SCALE : NONE
DATE : 08/18/00
DRAWN BY : BHD
ORG. BY : S040

M-52

SHEET NUMBER: 7 SIZE: F M05

Amendment 29
December 2020



NOTES:

1. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
2. FOR WET PIPE SPRINKLER SYSTEM TRIM CHART SEE M-603-1.
3. SAFETY CATEGORY II, QUALITY GROUP D UNLESS NOTED OTHERWISE.
4. CLASSIFICATION OF SEVERAL FIRE PROTECTION PIPING SUBSYSTEMS WAS REVISED FROM IC TO IID ON THIS P&ID PER EC 626662. IF THERE IS A CONFLICT BETWEEN THE QUALITY GROUP CLASSIFICATION SHOWN ON THIS P&ID AND OTHER DOCUMENTS (PIPING ISOMETRICS, VENDOR DRAWINGS, ETC.) THE QUALITY GROUP CLASSIFICATION ON THIS P&ID GOVERNS. REFER TO ANALYSIS BYR19-002 FOR A LISTING OF IMPACTED SUBSYSTEMS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AJ	EDSF	FOR RECORD-INCORP. OF EC# 626662	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
AUXILIARY BUILDING

Exelon Generation
Byron Station 6 Unit: 1&2

BYRON STATION 6

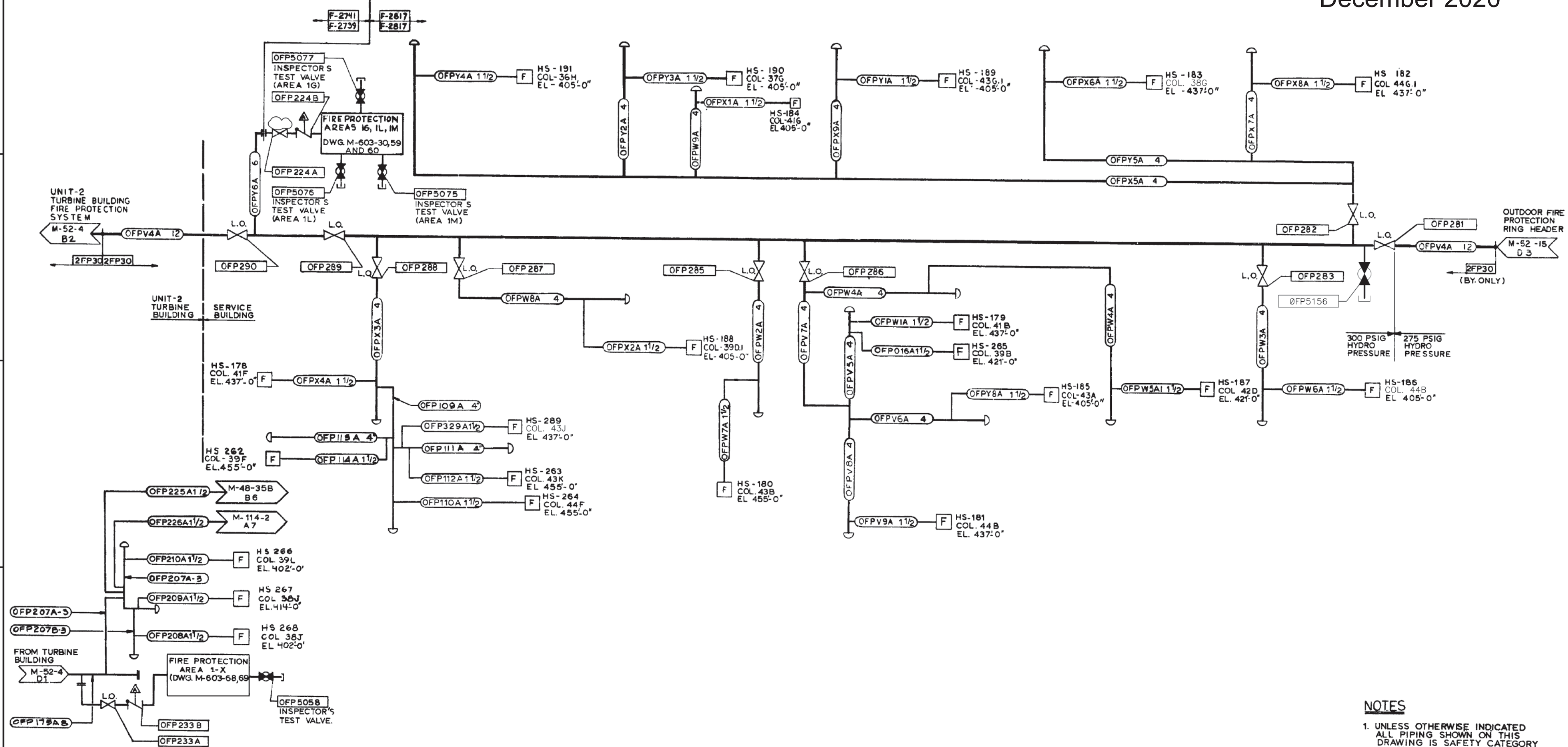
SCALE : NONE
DATE : 11/30/76
DRAWN BY : B. C.
ORG. BY : S040

M-52

SHEET NUMBER: 8 SIZE: F M05

M-52 SHT. 9

Amendment 29
December 2020



NOTES

1. UNLESS OTHERWISE INDICATED ALL PIPING SHOWN ON THIS DRAWING IS SAFETY CATEGORY IID AND PIPING DESIGN TABLE 100 BB.
2. HEADER ISOLATION VALVES AND STAND-PIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
3. FOR WET PIPE SPRINKLER SYSTEM TRIM CHART SEE DWG M-603-1.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AA	EDSF	FOR RECORD-INCORP. OF EC# 618235	EDSF	EDSF	EDSF
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DIAGRAM OF SERVICE BUILDING FIRE PROTECTION

Exelon Generation.
Byron Station 6 Unit: 1&2

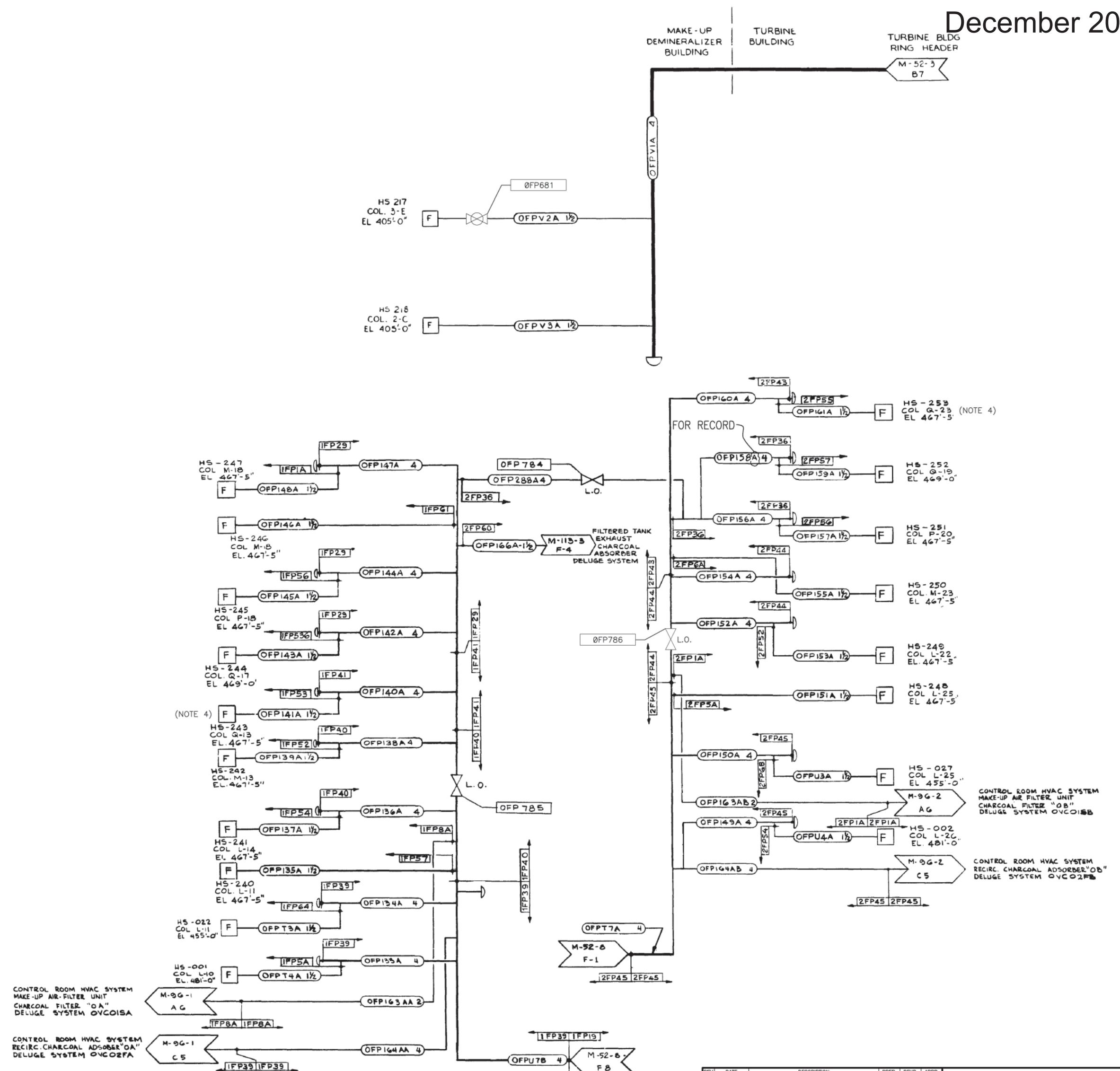
BYRON STATION 6

SCALE : NONE
DATE : 11/05/97
DRAWN BY: BHD
ORG. BY : S040

M-52

SHEET NUMBER: 9 SIZE: D M05

Amendment 29
December 2020



NOTES

1. SEE SHEET 1 FOR DETAIL OF FIRE HOSE STATION AND SYMBOL KEY.

3. HEADER ISOLATION VALVLES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.

4. RUBBER HOSE IS REMOVED, PIPE IS CAPPED AT THE HOSE REEL AND HOSE STATION IS ABANDONED IN PLACE.

5. SAFETY CATEGORY II, QUALITY GROUP D UNLESS NOTED OTHERWISE.

6. CLASSIFICATION OF SEVERAL FIRE PROTECTION PIPING SUBSYSTEMS WAS REVISED FROM IC TO IID ON THIS P&ID PER EC 626662. IF THERE IS A CONFLICT BETWEEN THE QUALITY GROUP CLASSIFICATION SHOWN ON THIS P&ID AND OTHER DOCUMENTS (PIPING ISOMETRICS, VENDOR DRAWINGS, ETC.) THE QUALITY GROUP CLASSIFICATION ON THIS P&ID GOVERNS. REFER TO ANALYSIS BYR19-002 FOR A LISTING OF IMPACTED SUBSYSTEMS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
T	EDSF	FOR RECORD-INCORP. OF EC# 626662	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
MAKE-UP DEMIN
AUXILIARY BUILDING

Exelon Generation
Byron Station 6 Unit: 1&2

SCALE : NONE
DATE : 07/26/04
DRAWN BY : JBC
ORG. BY : S040

M-52

SHEET NUMBER: 10 | SIZE: F | M05

M-52 SHT. 10

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS	
1	L-10	481'-0"	A,B,C	10	100	AUX. BLDG. ROOF	0FP 331	
2	L-26	481'-0"	A,B,C	10	100	AUX. BLDG ROOF	0FP 338	
3	1-H	455'-0"	A,B,C	3	50	TURBINE	1FP166	
4	3-E	455'-0"	A,B,C	3	50	TURBINE	1FP169	
5	7-E	455'-0"	A,B,C	3	50	TURBINE	1FP 175	
6	12-E	455'-0"	A,B,C	3	50	TURBINE	1FP190	
7	18-E	455'-0"	A,B,C	3	50	TURBINE	1FP198	
8	24-E	455'-0"	A,B,C	4	50	TURBINE	2FP205	
9	29-E	455'-0"	A,B,C	4	50	TURBINE	2FP209	
10	33-E	455'-0"	A,B,C	4	50	TURBINE	2FP213	
11	36-E	455'-0"	A,B,C	4	50	TURBINE	2FP216	
12	36-L	455'-0"	A,B,C	4	50	TURBINE	2FP224	
13	33-L	455'-0"	A,B,C	4	50	TURBINE	2FP227	
14	30-L	455'-0"	A,B,C	4	75	TURBINE	2FP232	NOTE 5
15	22-K	455'-0"	A,B,C	4	100	TURBINE	2FP237	
16	13-K	455'-0"	A,B,C	3	100	TURBINE	1FP194	
17	12-L	455'-0"	A,B,C	3	100	TURBINE	1FP185	
18	6-L	455'-0"	A,B,C	3	75	TURBINE	1FP180	NOTE 5
19	3-L	455'-0"	A,B,C	3	50	TURBINE	1FP172	
20	P-7	455'-0"	A,B,C	8	50	AUXILIARY	0FP324	
21	10-L	455'-0"	A,B,C	3	100	TURBINE	1FP179	
22	11-L	455'-0"	A,B,C	10	100	AUXILIARY	0FP332	
23								
24								
25								
26								
27	25-L	455'-0"	A,B,C	10	100	AUXILIARY	0FP335	
28	26-L	455'-0"	A,B,C	4	100	TURBINE	2FP233	
29	P-29	455'-0"	A,B,C	8	50	AUXILIARY	0FP339	
30	3-E	430'-0"	A,B,C	3	50	TURBINE	1FP170	
31	7-E	422'-0"	A,B,C	3	75	TURBINE	1FP176	NOTE 5
32	12-E	422'-0"	A,B,C	3	50	TURBINE	1FP191	
33	18-E	430'-0"	A,B,C	3	50	TURBINE	1FP199	
34	18-E	430'-0"	A,B,C	4	50	TURBINE	2FP202	
35	24-E	430'-0"	A,B,C	4	50	TURBINE	2FP206	
36	29-E	430'-0"	A,B,C	4	75	TURBINE	2FP210	NOTE 5
37	33-E	430'-0"	A,B,C	4	50	TURBINE	2FP214	
38	36-E	430'-0"	A,B,C	4	50	TURBINE	2FP217	
39	37-H	430'-0"	A,B,C	4	50	TURBINE	2FP220	
40	36-L	430'-0"	A,B,C	4	50	TURBINE	2FP223	
41	33-L	430'-0"	A,B,C	4	50	TURBINE	2FP226	
42	29-L	430'-0"	A,B,C	4	100	TURBINE	2FP231	
43	24-L	430'-0"	A,B,C	4	50	TURBINE	2FP236	
44	18-K	430 -0"	A,B,C	4	50	TURBINE	2FP241	
45	18-L	430'-0"	A,B,C	3	50	TURBINE	1FP195	
46	12-L	430'-0"	A,B,C	3	50	TURBINE	1FP186	
17	7-L	430'-0"	A,B,C	3	100	TURBINE	1FP181	
48	3-L	430'-0"	A,B,C	3	50	TURBINE	1FP173	
49	1-H	430'-0"	A,B,C	3	50	TURBINE	1FP167	
50								
51	9-L	430'-0"	A,B,C	3	100	TURBINE	1FP182	
52	11-P	430'-0"	A,B,C	8	50	AUXILIARY	0FP313	
53								
54	Q-19	430'-0"	A,B,C	8	100	AUXILIARY	0FP342	
55	P-24	430'-0"	A,B,C	8	50	AUXILIARY	0FP343	
56	26-L	430'-0"	A,B,C	4	100	TURBINE	2FP230	
57	M-18	430'-0"	A,B,C	8	75	AUXILIARY	0FP323	NOTE 5
58	U-17	430'-0"	A,B,C	8	100	AUXILIARY	0FP319	
59	V-19	430'-0"	A,B,C	8	100	AUXILIARY	0FP344	
60								

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS	
61	V-17	430'-0"	A,B,C	8	50	AUXILIARY	0FP320	
62	R-17	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP163	
63	R-2	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP154	
64	R-7	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP160	
65	R-12	430'-0"	A,B,C	1	100	CONTAIN # 1	1FP157	
66	R-26	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP163	
67	R-31	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP154	
68	R-37	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP160	
69	R-42	430'-0"	A,B,C	1	100	CONTAIN # 2	2FP157	
70	3-E	405'-0"	A,B,C	3	50	TURBINE	1FP171	
71	7-E	405'-0"	A,B,C	3	75	TURBINE	1FP177	NOTE 5
72	12-E	405'-0"	A,B,C	3	50	TURBINE	1FP192	
73	18-E	405'-0"	A,B,C	3	75	TURBINE	1FP200	NOTE 5
74	18-E	405'-0"	A,B,C	4	75	TURBINE	2FP203	NOTE 5
75	24-E	405'-0"	A,B,C	4	50	TURBINE	2FP207	
76	29-E	405'-0"	A,B,C	4	75	TURBINE	2FP211	NOTE 5
77	33-F	405'-0"	A,B,C	4	50	TURBINE	2FP215	
78	36-F	405'-0"	A,B,C	4	75	TURBINE	2FP218	NOTE 5
79	36-H	405'-0"	A,B,C	4	50	TURBINE	2FP219	
80	36-K	405'-0"	A,B,C	4	50	TURBINE	2FP222	
81	33-L	405'-0"	A,B,C	4	100	TURBINE	2FP225	
82	29-L	405'-0"	A,B,C	4	100	TURBINE	2FP229	
83	24-L	405'-0"	A,B,C	4	50	TURBINE	2FP235	
84	18-L	405'-0"	A,B,C	4	75	TURBINE	2FP240	NOTE 5
85	18-L	405'-0"	A,B,C	3	75	TURBINE	1FP196	NOTE 5
86	12-L	405'-0"	A,B,C	3	50	TURBINE	1FP187	
87	6-L	405'-0"	A,B,C	3	100	TURBINE	1FP183	
88	3-L	405'-0"	A,B,C	3	50	TURBINE	1FP174	
89	1-H	405'-0"	A,B,C	3	50	TURBINE	1FP168	
90	L-11	405'-0"	A,B,C	8	50	AUXILIARY	0FP315	
91	P-18	405'-0"	A,B,C	8	50	AUXILIARY	0FP318	
92	P-23	405'-0"	A,B,C	8	100	AUXILIARY	0FP349	
93	Q-11	405'-0"	A,B,C	8	75	AUXILIARY	0FP314	NOTE 5
94	S-21	405'-0"	A,B,C	8	50	AUXILIARY	0FP348	
95	V-21	405'-0"	A,B,C	8	100	AUXILIARY	0FP345	
96	V-15	405'-0"	A,B,C	8	100	AUXILIARY	0FP316	
97	S-15	405'-0"	A,B,C	8	50	AUXILIARY	0FP317	
98	R-17	403'-0"	A,B,C	1	100	CONTAIN #1	1FP164	
99	R-2	403'-0"	A,B,C	1	100	CONTAIN #1	1FP155	
100	R-7	403'-0"	A,B,C	1	100	CONTAIN # 1	1FP161	
101	R-12	403'-0"	A,B,C	1	100	CONTAIN # 1	1FP158	
102	R-26	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP164	
103	R-31	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP155	
104	R-37	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP161	
105	R-42	403'-0"	A,B,C	1	100	CONTAIN # 2	2FP158	
106	L-10	387'-0"	A,B,C	1	50	AUXILIARY	0FP385	
107	L-12	387'-0"	A,B,C	1	50	AUXILIARY	0FP384	
108	M-18	387'-0"	A,B,C	1	50	AUXILIARY	0FP383	
109	M-25	387'-0"	A,B,C	1	50	AUXILIARY	0FP377	
110	Q-24	387'-0"	A,B,C	1	100	AUXILIARY	0FP375	
111	N-23	387'-0"	A,B,C	1	100	AUXILIARY	0FP376	NOTE 3
112	S-19	387'-0"	A,B,C	1	50	AUXILIARY	0FP378	
113	Q-15	387'-0"	A,B,C	1	100	AUXILIARY	0FP382	
114	V-18	387'-0"	A,B,C	1	50	AUXILIARY	0FP379	
115								
116	7-G	373'-0"	A,B,C	3	50	TURBINE	1FP178	
117	12-E	373'-0"	A,B,C	3	50	TURBINE	1FP193	
118	16-H	373'-0"	A,B,C	3	50	TURBINE	1FP189	
119	18-E	373'-0"	A,B,C	3	50	TURBINE	1FP201	
120	18-E	373'-0"	A,B,C	4	50	TURBINE	2FP204	

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS	
121	20-H	373'-0"	A,B,C	4	50	TURBINE	2FP238	
122	24-G	373'-0"	A,B,C	4	50	TURBINE	2FP208	
123	29-G	373'-0"	A,B,C	4	50	TURBINE	2FP212	
124	29-L	364'-0"	A,B,C	4	200	TURBINE	2FP228	
125	24-L	373'-0"	A,B,C	4	50	TURBINE	2FP234	
126	18-J	373'-0"	A,B,C	4	50	TURBINE	2FP239	
127	18-L	373'-0"	A,B,C	3	50	TURBINE	1FP197	
128	12-L	373'-0"	A,B,C	3	50	TURBINE	1FP188	
129	7-L	361'-6"	A,B,C	3	100 NOTE 4	TURBINE	1FP184	
130	N-11	368'-0"	A,B,C	7	50	AUXILIARY	0FP373	
131	M-14	368'-0"	A,B,C	7	50	AUXILIARY	0FP374	
132	P-14	368'-0"	A,B,C	7	50	AUXILIARY	0FP369	
133	L-20	368'-0"	A,B,C	7	50	AUXILIARY	0FP355	
134	P-21	368'-0"	A,B,C	7	50	AUXILIARY	0FP356	
135	L-25	368'-0"	A,B,C	7	50	AUXILIARY	0FP361	
136	N-25	368'-0"	A,B,C	7	100	AUXILIARY	0FP357	
137	Q-25	368'-0"	A,B,C	7	50	AUXILIARY	0FP360	
138	S-18	368'-0"	A,B,C	7	50	AUXILIARY	0FP362	NOTE 3
139	Q-11	368'-0"	A,B,C	7	50	AUXILIARY	0FP368	
140	U-15	368'-0"	A,B,C	7	100	AUXILIARY	0FP372	
141	V-18	368'-0"	A,B,C	7	100	AUXILIARY	0FP366	NOTE 3
142	U-21	368'-0"	A,B,C	7	100	AUXILIARY	0FP358	
143	R-12	381'-0"	A,B,C	1	100	CONTAIN #1	1FP159	
144	R-17	381'-0"	A,B,C	1	100	CONTAIN #1	1FP162	
145	R-2	381'-0"	A,B,C	1	100	CONTAIN #1	1FP156	
146	R-7	381'-0"	A,B,C	1	100	CONTAIN #1	1FP165	
147	R-26	381'-0"	A,B,C	1	100	CONTAIN #2	2FP165	
148	R-31	381'-0"	A,B,C	1	100	CONTAIN #2	2FP156	
149	R-37	381'-0"	A,B,C	1	100	CONTAIN #2	2FP162	
150	R-42	381'-0"	A,B,C	1	100	CONTAIN #2	2FP159	
151	P-11	350'-0"	A,B,C	1	100	AUXILIARY	0FP381	
152	M-13	350'-0"	A,B,C	7	50	AUXILIARY	0FP370	
153	L-19	350'-0"	A,B,C	7	50	AUXILIARY	0FP363	NOTE 3
154	N-23	350'-0"	A,B,C	7	100	AUXILIARY	0FP352	
155	Q-19	350'-0"	A,B,C	7	50	AUXILIARY	0FP365	
156	Q-17	350'-0"	A,B,C	7	100	AUXILIARY	0FP371	
157	Q-12	350'-0"	A,B,C	1	50	AUXILIARY	0FP380	
158	S-18	350'-0"	A,B,C	7	100	AUXILIARY	0FP354	
159	Q-21	350'-0"	A,B,C	7	50	AUXILIARY	0FP364	
160								
161	V-18	350'-0"	A,B,C	7	100	AUXILIARY	0FP353	
162								
163	V-14	350'-0"	A,B,C	7	100	AUXILIARY	0FP367	
164	V-21	350'-0"	A,B,C	7	100	AUXILIARY	0FP359	NOTE 3
165	M-13	334'-0"	A,B,C	7	50	AUXILIARY	0FP448	
166	P-18	334'-0"	A,B,C	7	50	AUXILIARY	0FP449	
167	P-18	334'-0"	A,B,C	7	50	AUXILIARY	0FP351	
168	M-23	334'-0"	A,B,C	7	50	AUXILIARY	0FP350	
169								
170	Y-15	430'-0"	A	1	75	FUEL HANDLING	0FP389	NOTE 5
171	X-21	430'-0"	A	1	75	FUEL HANDLING	0FP386	NOTE 5
172	Z-15	405'-0"	A,B,C	1	100	FUEL HANDLING	0FP388	
173	AA-19	405'-0"	A	1	100	FUEL HANDLING	0FP387	
174	S-15	419'-0"	A,B,C	8	75	AUXILIARY	0FP322	NOTE 5
175	S-21	419'-0"	A,B,C	8	75	AUXILIARY	0FP347	NOTE 5
176	S-15	471'-0"	A,B,C	13	100	AUXILIARY	0FP329	
177	S-20	471'-0"	A,B,C	13	100	AUXILIARY	0FP334	
178	41-F	437'-0"	A,B,C	9	50	RW/SERVICE	0FP415	
179	41-B	437'-0"	A,B,C	9	50	RW/SERVICE	0FP410	
180	43-B	455'-0"	A,B,C	9	50	RW/SERVICE	0FP412	

NO.	NOTES
1.	ANGLE VALVES, FIRE HOSE, SEMI-AUTOMATIC FIRE HOSE REELS, AUTOMATIC DRAIN VALVES AND HOSE COUPLINGS ARE TO BE PURCHASED BY SPEC. F-2739, PER LETTER SLMC-930/SLPG-878 DATED APR. 4, 1977. FIRE HOSE PURCHASED AFTER OCT. 15, 1985 MUST BE TESTED TO 500 PSI. NON-LISTED HOSE REEL REPLACEMENTS MAY BE INSTALLED WHERE SEMI-AUTOMATIC CAPABILITY IS NOT REQUIRED, PER FDRP 18-039.
2.	ALL NOZZLES FOR HOSE STATIONS LISTED ON THIS DRAWING ARE TO BE PURCHASED BY SPEC. F-2739 PER PIPING SPECIALTY RELEASE #81.
3.	BALL VALVE SUBSTITUTED FOR ANGLE VALVE.
4.	PROVIDE ONE (1) ADDITIONAL HOSE REEL WITH 100' OF HOSE AT THIS LOCATION.
5.	AS AN ALTERNATE, A 100' LONG HOSE MAY BE INSTALLED AT THESE LOCATIONS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
Z	EDSF	FOR RECORD-INCORP. OF EC #379872	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
MANUAL HOSE STATIONS

Exelon Nuclear
Byron Station 6 Unit: 1&2

BYRON STATION 6

SCALE : NONE
DATE : 03/30/05
DRAWN BY : JBC
ORG. BY : S040

M-52

SHEET NUMBER: 11 SIZE: F M05

M-52 SHT. 11

M-52 SHT. 12

Amendment 29
December 2020

MANUAL HOSE STATIONS

HOSE REEL NO.	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS	
181	44-B	437'-0"	A,B,C	9	100	RW/SERVICE	OFP 411	
182	44-G.1	437'-0"	A,B,C	9	75	RW/SERVICE	OFP 405	NOTE 5
183	38-G	437'-0"	A,B,C	9	75	RW/SERVICE	OFP 406	NOTE 5
184	41-G.1	405'-0"	A,B,C	9	50	RW/SERVICE	OFP413	
185	43-A	405'-0"	A,B,C	9	50	RW/SERVICE	OFP409	
186	44-B	405'-0"	A,B,C	9	50	RW/SERVICE	OFP407	
187	42-D	421'-0"	A,B,C	9	75	RW/SERVICE	OFP408	NOTE 5
188	39-D.1	405'-0"	A,B,C	9	50	RW/SERVICE	OFP414	
189	43-G	405'-0"	A,B,C	9	50	RW/SERVICE	OFP 404	
190	37-G	405'-0"	A,B,C	9	100	RW/SERVICE	OFP 403	
191	36-H	405'-0"	A,B,C	9	50	RW/SERVICE	OFP 402	
192	BB-107	885'-0"	A,B,C	5	50	CW PUMP HSE.	OFP400	
193	AA-105	885'-0"	A,B,C	5	50	CW PUMP HSE.	OFP399	
194	AA-103	885-0"	A,B,C	5	50	CW PUMP HSE.	OFP396	
195	BB-101	885'-0"	A,B,C	5	50	CW PUMP HSE.	OFP397	
196	CC-103	885'-0'	A,B,C	5	50	CW PUMP HSE.	OFP 398	
197	CC-105	885'-0'	A,B,C	5	50	CW PUMP HSE	OFP401	
198	E-4	690'-6'	A,B,C	2		RIVER SCREEN HSE	OFP 393	
199	C 7-1	706'-0	A,B,C	2		RIVER SCREEN HSE.	OFP 394	
200	B-1	690'-6"	A,B,C	2		RIVER SCREEN HSE	OFP 395	
201	A-3	690'-6"	A,B,C	2		RIVER SCREEN HSE.	OFP 390	
202	C-6	706'-0"	A,B,C	2		RIVER SCREEN HSE.	OFP 392	
203	B-147	690'-6"	A,B,C	2		RIVER SCREEN HSE.	OFP 391	
204	37-H	455-0"	A,B,C	4	100	TURBINE	2FP221	
205	Q-10	419'-0"	A,B,C	8	100	AUXILIARY	OFP321	
206	Q-24	419'-0"	A,B,C	8	75	AUXILIARY	OFP346	NOTE 5
207	L-7	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP330	
208	M-10	443'-0'	A,B,C	8	100 (3)	AUXILIARY	OFP327	
209	P-10	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP325	
210	M-13	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP326	
211	P-15	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP328	
212	L-29	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP 336	
213	M-26	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP337	
214	P-26	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP340	
215	L-22	443'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP341	
216	P-21	443'-0"	A,B,C	13	100 (3)	AUXILIARY	OFP333	
217	E-3	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP416	
218	C-2	405'-0"	A,B,C	10	50	MAKE-UP DEMIN	OFP417	

ABANDONED IN PLACE

MANUAL HOSE STATIONS

HOSE REEL NO	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT. NO.	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS	
229	S-21	431'-0"	A,B,C	13	75	AUXILIARY	OFP454	NOTE 5
230	S-24	431'-0"	A,B,C	13	75	AUXILIARY	OFP455	NOTE 5
231	S-21	456'-0"	A,B,C	13	75	AUXILIARY	OFP456	NOTE 5
232	S-21	464'-0"	A,B,C	8	100	AUXILIARY	OFP457	
233	S-18	480'-6"	A,B,C	13	100	AUXILIARY	OFP458	
234	S-15	464'-0"	A,B,C	8	100	AUXILIARY	OFP459	
235	S-15	456'-0"	A,B,C	8	100	AUXILIARY	OFP460	
236	S-15	431'-0"	A,B,C	8	100	AUXILIARY	OFP461	
237	S-12	431'-0"	A,B,C	8	75	AUXILIARY	OFP462	NOTE 5
238	M-18	444'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP463	
239	M-18	444'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP464	
240	L-11	467'-5"	A,B,C	10	75	AUXILIARY	OFP465	NOTE 5
241	L-14	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP466	
242	M-13	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP467	
243	Q-13	467'-5"	A,B,C	10		AUXILIARY	OFP468	NOTE 7
244	Q-17	469'-0"	A,B,C	10	100 (3)	AUXILIARY	OFP469	NOTE 4
245	P-18	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP470	NOTE 4
246	M-18	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP471	
247	M-18	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP472	NOTE 4
248	L-25	467'-5"	A,B,C	10	100	AUXILIARY	OFP473	NOTE 6
249	L-22	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP474	
250	M-23	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP475	
251	P-20	467'-5"	A,B,C	10	100 (3)	AUXILIARY	OFP476	
252	Q-19	469'-0"	A,B,C	10	100 (3)	AUXILIARY	OFP477	
253	Q-23	467'-5"	A,B,C	10		AUXILIARY	OFP478	NOTE 7
254	D-2	405'-6"	A,B,C	14	75	GATE HOUSE	OFP479	NOTE 5
255	B-3	405'-6"	A,B,C	14	75	GATE HOUSE	OFP480	NOTE 5
256	C-2	421'-6"	A,B,C	14	75	GATE HOUSE	OFP481	NOTE 5
257	B-3	421'-6"	A,B,C	14	75	GATE HOUSE	OFP482	NOTE 5
258	B-50	408'-0"	A,B,C	14	50	RECEIVING	OFP483	
259	B-52	408'-0"	A,B,C	14	50	RECEIVING	OFP484	
260	D-50	408'-0"	A,B,C	14	50	RECEIVING	OFP485	
261	D-52	408'-0"	A,B,C	14	50	RECEIVING	OFP486	
262	F-39	455'-0"	A,B,C	9	75	KW/SERVICE	0FP489	NOTE 5
263	K-43	455'-0"	A,B,C	9	100	KW/SERVICE	0FP490	
264	F-44	455'-0"	A,B,C	9	75	RW/ SERVICE	0FP491	NOTE 5
265	B-39	421'-0"	A,B,C	9	100	RW/ SERVICE	0FP492	
266	L-39	402-0"	A,B,C	9	50	RW/SERVICE	OFP499	
267	J-38	402-0"	A,B,C	9	50	RW/SERVICE	OFP500	
268	J-38	414-0"	A,B,C	9	50	RW/SERVICE	OFP501	
269	A-2	408'-0"	A,B,C	5	50	WASTE TREAT. BLDG.	OFP 513	NOTE 8
270	B-3	408'-0"	A,B,C	5	50	WASTE TREAT. BLDG.	OFP 514	NOTE 8
271	E.6-.7	405'-0"	A,B,C	14	50	COND CLEAN-UP AREA	OFP537	
272	J.1-.8	405'-0"	A,B,C	14	50	COND CLEAN-UP AREA	OFP538	
273	H.3-.2	405'-0"	A,B,C	14	50	COND CLEAN-UP AREA	OFP539	
274	E.6-.7	439'-0"	A,B,C	14	75	TSC	OFP597	NOTE 5
275	G.8-.7	454'-0"	A,B,C	14	75	TSC	OFP598	NOTE 5
276	J.1-.7	439'-0"	A,B,C	14	75	TSC	OFP599	NOTE 5
277	C-3	405'-6"	A,B,C	14	75	GATE HOUSE	OFP636	NOTE 4, NOTE 5
278	B-3	421'-6"	A,B,C	14	75	GATE HOUSE	OFP637	NOTE 4, NOTE 5
279	M-8	451'-0"	A,B,C	8	50	AUXILIARY	OFP638	NOTE 4
280	M-26	451'-0"	A,B,C	8	50	AUXILIARY	OFP639	NOTE 4
281	K-10	405'-0"	A,B,C	3	100	TURBINE	1FP275	NOTE 4
282	K-28	405'-0"	A,B,C	4	100	TURBINE	2FP275	NOTE 4
283	Q-10	430'-0"	A,B,C	8	100	AUXILIARY	OFP640	NOTE 4
284	Q-26	430'-0"	A,B,C	8	100 (3)	AUXILIARY	OFP641	NOTE 4
285	SEE M-589	405'-0"	A,B,C	14	75	RECEIV. WRHSE.	OFP766	NOTE 5
286	SEE M-589	405'-0"	A,B,C	14	75	RECEIV. WRHSE.	OFP767	NOTE 5
287	SEE M-589	405'-0"	A,B,C	14	75	RECEIV. WRHSE.	OFP768	NOTE 5
288	SEE M-589	405'-0"	A,B,C	14	75	RECEIV. WRHSE.	OFP769	NOTE 5
289	J-43	437'-0"	A,B,C	9	100	SERVICE	OFP872	

MANUAL HOSE STATIONS

HOSE REEL NO	LOCATION	ELEVATION	NOZZLE CLASS	M-52 SHT NO	HOSE LENGTH	BUILDING	ANGLE VALVE NUMBERS	
290	E-34	405'-0"	A,B,C	4	75	IM/EM SHOP	OFP959	NOTE 5
291	E-34	430'-0"	A,B,C	4	75	IM/EM SHOP	OFP960	NOTE 5
292	E-34	417'-2 1/2"	A,B,C	4	75	IM/EM SHOP	OFP972	NOTE 5

NOTES

NO.	NOTES
1.	ANGLE VALVES, FIRE HOSE, SEMI-AUTOMATIC FIRE HOSE REELS, AUTOMATIC DRAIN VALVES AND HOSE COUPLINGS ARE TO BE PURCHASED BY SPEC. F-2739, PER LETTER SLHC-930/SLPG-878 DATED APR. 4, 1977. FIRE HOSE PURCHASED AFTER OCT. 15, 1985 MUST BE TESTED TO 500 PSI. NON-LISTED HOSE REEL REPLACEMENTS MAY BE INSTALLED WHERE SEMI-AUTOMATIC CAPABILITY IS NOT REQUIRED, PER FDRP 18-039.
2.	ALL NOZZLES FOR HOSE STATIONS LISTED ON THIS DRAWING ARE TO BE PURCHASED BY SPEC F-2739 PER LETTERS SLHC-4890/SLPG-8049 DATED MAY 7, 1979 AND R. J. RAKOWSKI'S LETTER TO MR. WESTERMEIER OF MAY 9, 1979.
3.	THE FOLLOWING INFORMATION SHALL BE USED FOR PROCUREMENT OF THE HARD RUBBER HOSES: PROCURE HOSES PER NFPA 1961 AND FITTINGS PER NFPA 1963. REPLACEMENT HOSES REQUIRE A MALE NST FITTING FOR THE NOZZLE END AND A FEMALE NST FITTING FOR THE END ATTACHING TO THE HOSE REEL. THE USE OF THIS HOSE WILL REQUIRE THE ADDITION OF AN ADAPTER (FEMALE NPT X MALE NST), TO BE LOCATED BETWEEN THE MALE NPT FITTING ON THE HOSE REEL AND THE FEMALE NST FITTING ON THE HOSE (CATID 787204). PURCHASE AND INSTALL A NPT X NPSH ADAPTER (CATID 1397911) BETWEEN THE REEL AND HOSE WHEN USING A HOSE WITH A NPSH FITTING. THIS IS A CONSERVATIVE MEASURE, AS THE EXISTING INSTALLATION THOUGH ACCEPTABLE, IS NON-STANDARD.
4.	BALL VALVE SUBSTITUTED FOR ANGLE VALVE.
5.	AS AN ALTERNATE, A 100' LONG HOSE MAY BE INSTALLED AT THESE LOCATIONS.
6.	FIRE HOSE REEL # HS 248 SUPPORT FRAME SHALL BE RESTRAINED TO THE ADJACENT WALKWAY HAND RAIL USING AWG # 9 GAGE WIRE, OR QUICK RELEASE 1 INCH WIDE HIGH STRENGTH NYLON WEBBING WITH METAL CAM BUCKLE, (OR EQUIVALENT) TO PREVENT INADVERTENT LATERAL MOVEMENT OF THE HOSE REEL.
7.	RUBBER HOSE IS REMOVED, PIPE IS CAPPED AT HOSE REEL AND HOSE STATION IS ABANDONED IN PLACE.
8.	GLOBE VALVE SUBSTITUTED FOR ANGLE VALVE.
9.	THE HOSE STATION ANGLE VALVES IN THE AUX. BUILDING MAY BE REPLACED WITH NON-SAFETY RELATED NFPA APPROVED (UL LISTED AND/OR FM APPROVED) VALVES PER CAT ID 705611-3 OR EQUAL. REFERENCE EC 630518. AN ECR SHALL BE INITIATED TO NOTIFY ENGINEERING (PROCUREMENT OR DESIGN) TO UPDATE PASSPORT EQUIPMENT RECORDS UPON INSTALLATION OF A REPLACEMENT VALVE PER THIS NOTE.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
AM	EDSF	FOR RECORD-INCORP. OF EC# 630518	EDSF	EDSF	EDSF
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--	--		--	--	--

DIAGRAM OF FIRE PROTECTION
MANUAL HOSE STATIONS

Exelon Generation
Byron Station 6 Unit: 1&2

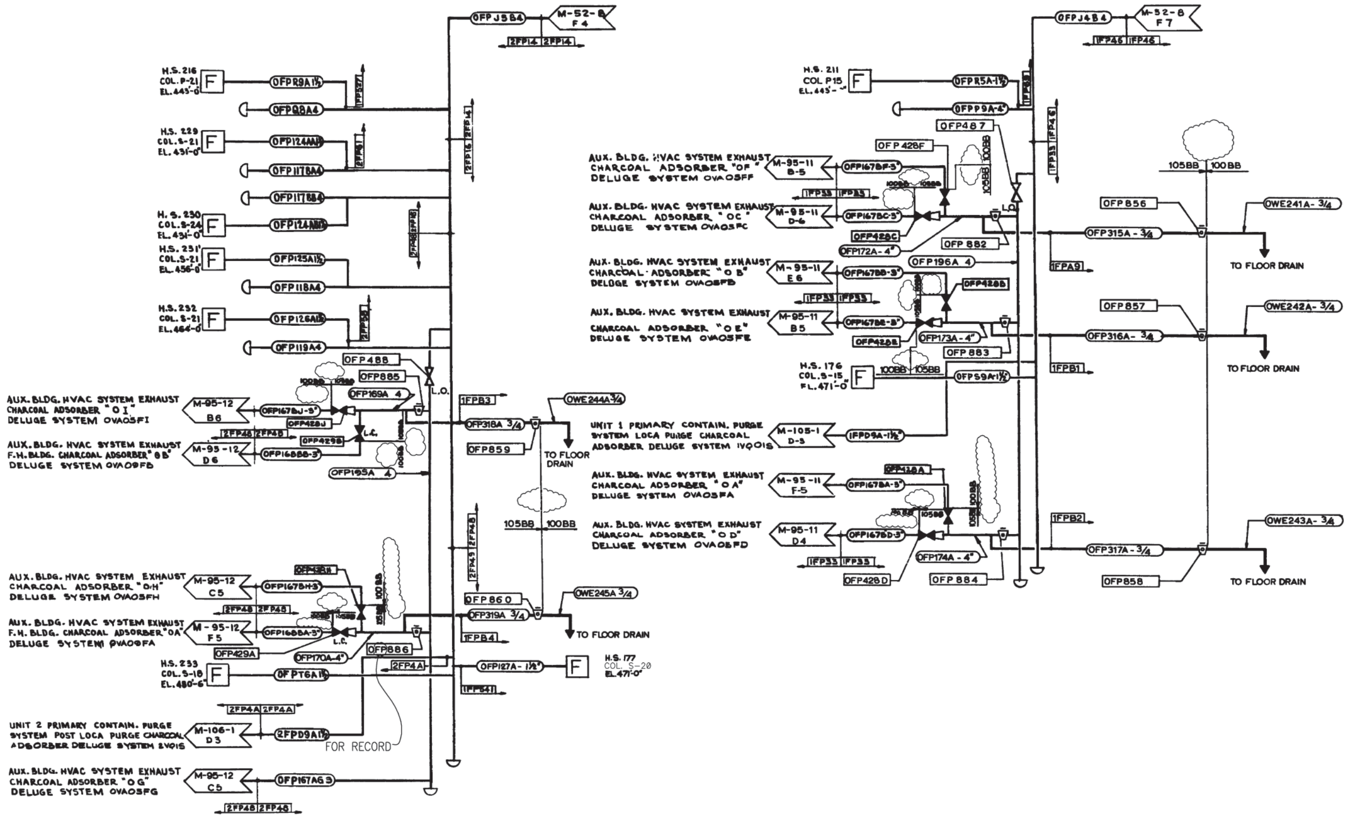
BYRON STATION 6

SCALE : NONE
DATE : 06/02/04
DRAWN BY: JBC
ORG. BY : S040

M-52

SHEET NUMBER: 12 | SIZE: F | M05

Amendment 29
December 2020



NOTES:

1. HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE "SEALED" IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.

2. FIRE PROTECTION DELUGE VALVES MAY BE "SUPERVISED" IN THE CLOSED POSITION IN LIEU OF LOCKING THE VALVES IN THE CLOSED POSITION.

3. SAFETY CATEGORY II, QUALITY GROUP D UNLESS NOTED OTHERWISE.

4. CLASSIFICATION OF SEVERAL FIRE PROTECTION PIPING SUBSYSTEMS WAS REVISED FROM IC TO IID ON THIS P&ID PER EC 626662. IF THERE IS A CONFLICT BETWEEN THE QUALITY GROUP CLASSIFICATION SHOWN ON THIS P&ID AND OTHER DOCUMENTS (PIPING ISOMETRICS, VENDOR DRAWINGS, ETC.) THE QUALITY GROUP CLASSIFICATION ON THIS P&ID GOVERNS. REFER TO ANALYSIS BYR19-002 FOR A LISTING OF IMPACTED SUBSYSTEMS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
X	EDSF	FOR RECORD-INCORP. OF EC# 626662	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION AUXILIARY BUILDING

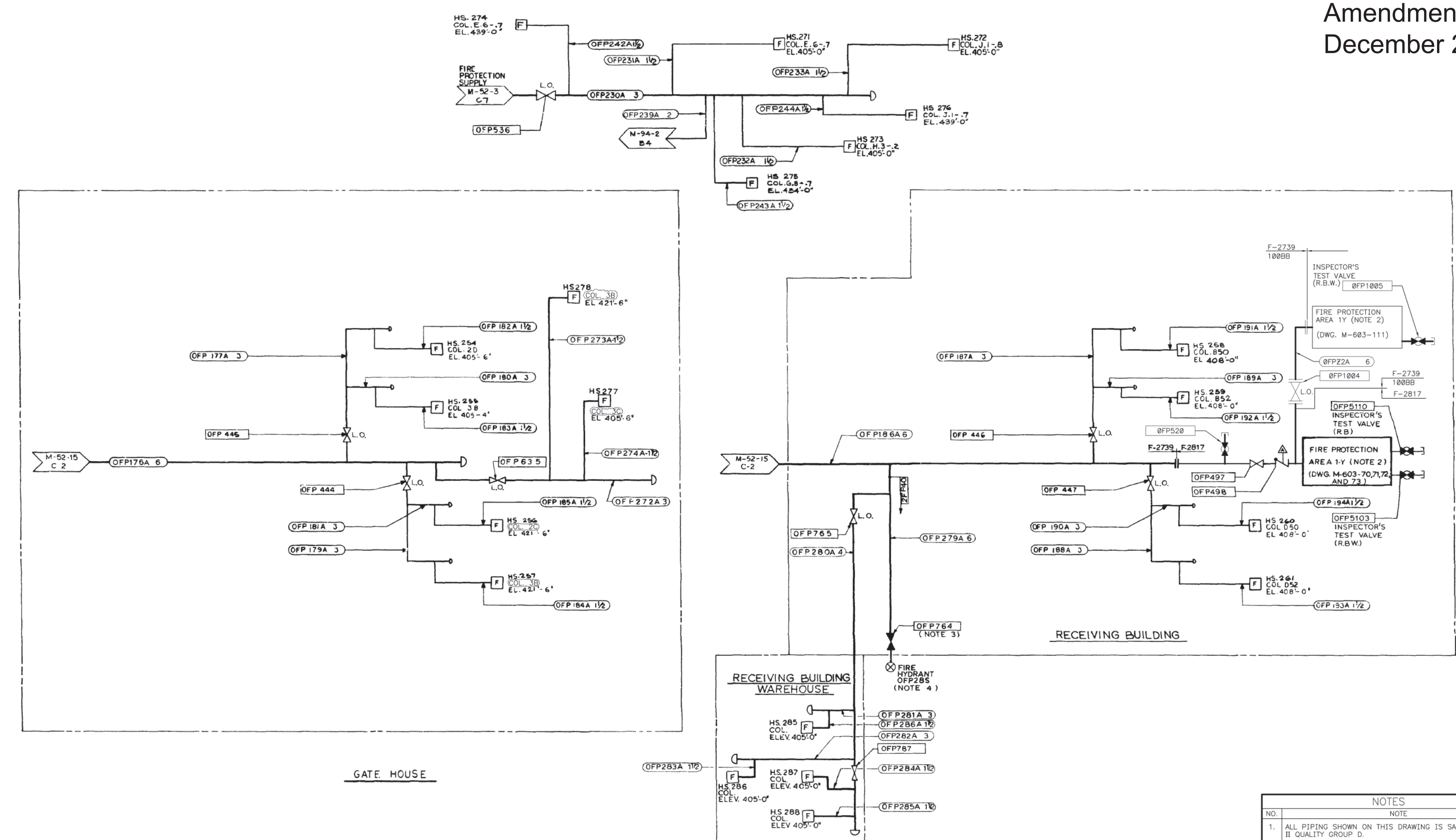
Exelon Generation
Byron Station 6 Unit: 1&2

SCALE : NONE
DATE : 12/05/97
DRAWN BY : JLR
DRG. BY : S040

M-52

SHEET NUMBER: 13 SIZE: F M05

Amendment 29
December 2020



NOTES

NO.	NOTE
1.	ALL PIPING SHOWN ON THIS DRAWING IS SAFETY CATEGORY II QUALITY GROUP D.
2.	SPRINKLER SYSTEM PROVIDES COVERAGE FOR RECEIVING BUILDING, RECEIVING BUILDING WAREHOUSE AND WAREHOUSE EXTENSION.
3.	"VALVE CONTROL" 0FP08M PROVIDES REMOTE OPERATION FOR VALVE 0FP764 FROM OUTSIDE OF RECEIVING BUILDING.
4.	FIRE HYDRANT 0FP28S IS WALL MOUNTED.
5.	HEADER ISOLATION VALVES AND STANDPIPE ISOLATION VALVES MAY BE SEALED IN THE OPEN POSITION IN LIEU OF LOCKING THE VALVES IN THE OPEN POSITION.
6.	FOR WET PIPE SPRINKLER SYSTEM TRIM CHART SEE DRAWING M-603 SHT. 1.

REV.	DATE	DESCRIPTION	PREP.	REVR.	APPR.
U	EDSF	FOR RECORD-INCORP. OF EC #368338	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION

Exelon Nuclear
Byron Station 6 Unit: 1&2

BYRON STATION 6

SCALE: NONE
DATE: 11/14/97
DRAWN BY: BHD
ORG. BY: 5040

M-52

SHEET NUMBER: 14 SIZE: F M05

Amendment 29
December 2020

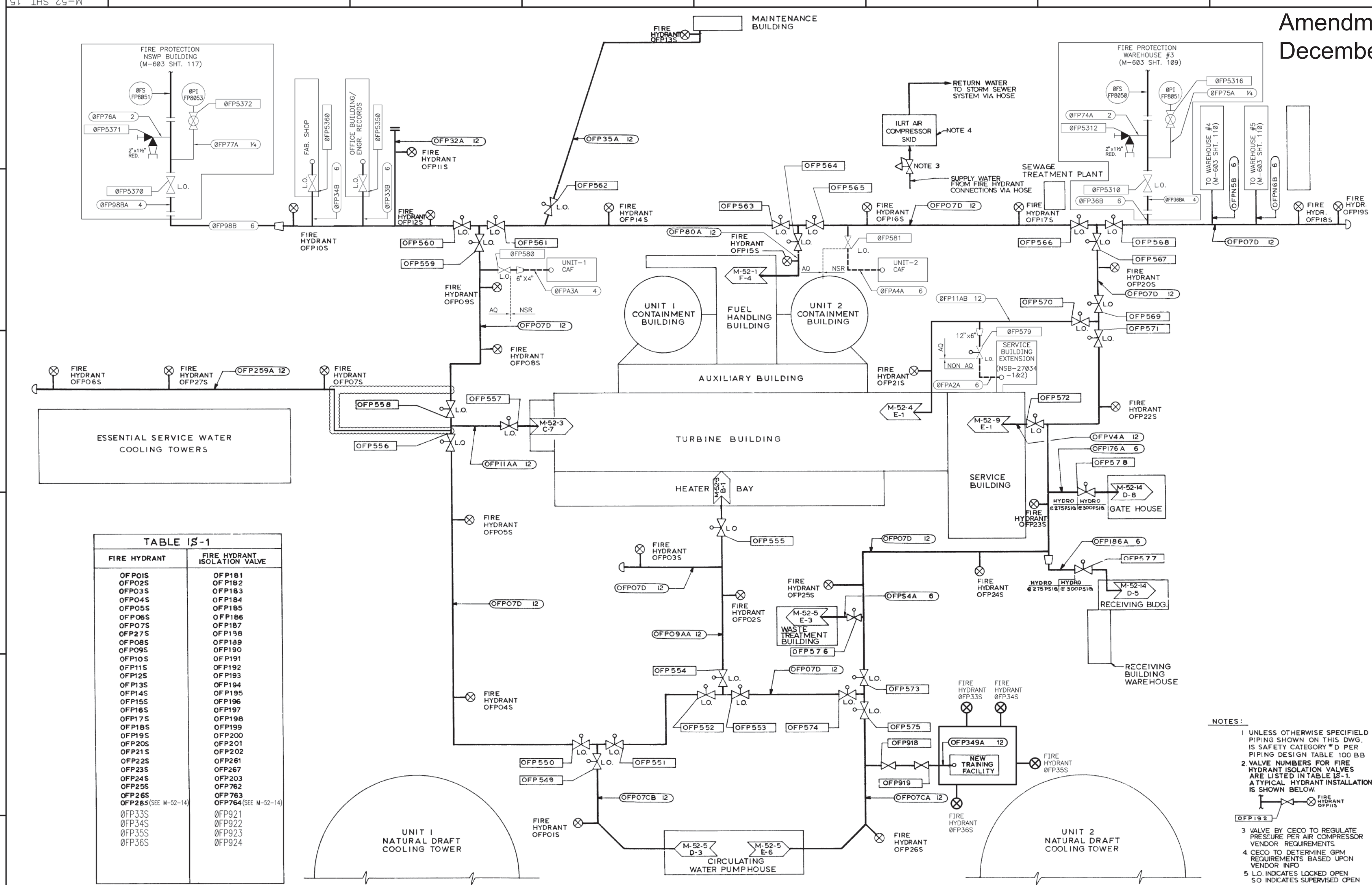

TABLE IS-1	
FIRE HYDRANT	FIRE HYDRANT ISOLATION VALVE
OFP01S	OFP181
OFP02S	OFP182
OFP03S	OFP183
OFP04S	OFP184
OFP05S	OFP185
OFP06S	OFP186
OFP07S	OFP187
OFP27S	OFP188
OFP08S	OFP189
OFP09S	OFP190
OFP10S	OFP191
OFP11S	OFP192
OFP12S	OFP193
OFP13S	OFP194
OFP14S	OFP195
OFP15S	OFP196
OFP16S	OFP197
OFP17S	OFP198
OFP18S	OFP199
OFP19S	OFP200
OFP20S	OFP201
OFP21S	OFP202
OFP22S	OFP261
OFP23S	OFP267
OFP24S	OFP203
OFP25S	OFP762
OFP26S	OFP763
OFP285 (SEE M-52-14)	OFP764 (SEE M-52-14)
0FP33S	0FP921
0FP34S	0FP922
0FP35S	0FP923
0FP36S	0FP924

NOTES:

1 UNLESS OTHERWISE SPECIFIELD PIPING SHOWN ON THIS DWG. IS SAFETY CATEGORY *D PER PIPING DESIGN TABLE 100 BB

2. VALVE NUMBERS FOR FIRE HYDRANT ISOLATION VALVES ARE LISTED IN TABLE IS-1. A TYPICAL HYDRANT INSTALLATION IS SHOWN BELOW.

FIRE HYDRANT OFP11S
OFP192

3 VALVE BY CECO TO REGULATE PRESSURE PER AIR COMPRESSOR VENDOR REQUIREMENTS.

4. CECO TO DETERMINE GPM REQUIREMENTS BASED UPON VENDOR INFO

5 L.O. INDICATES LOCKED OPEN
S.O INDICATES SUPERVISED OPEN

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
Q	EDSF	FOR RECORD-INCORP. OF EC# 618624	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION

Exelon Generation
Byron Station 6 Unit: 1&2

BYRON STATION 6

SCALE : NONE
DATE : 10/01/97
DRAWN BY: DLB
ORG. BY : S040

M-52

SHEET NUMBER: 15 SIZE: F M05

Amendment 29
December 2020

VIKING - FIRE SUPPRESSION SYSTEM LIST

FIRE ZONE	DWG. NO. M-603 SHEET	SYSTEM TYPE	PROTECTING	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.	F-2739 DWG NO
1A1	2	DELUGE	MAIN POWER TRANSFORMER	1S-13	18.10B-1	VFPC-1PT
1A2	2	DELUGE	MAIN POWER TRANSFORMER	1S-14	18.10A-1	VFPC-1PT
2A1	15	DELUGE	MAIN POWER TRANSFORMER	2S-13	18.10B-2	VFPC-2PT
2A2	15	DELUGE	MAIN POWER TRANSFORMER	2S-14	18.10A-2	VFPC-2PT
1B1	2,7	DELUGE	SA TRANSFORMER 142-1	1S-17	18.10E-1	VFPC-1PT
1B2	2,8	DELUGE	SA TRANSFORMER 142-2	1S-18	18.10E-1	VFPC-1PT
2B1	10,15	DELUGE	SA TRANSFORMER 242-1	2S-17	18.10E-2	VFPC-2PT
2B2	15	DELUGE	SA TRANSFORMER 242-2	2S-18	18.10E-2	VFPC-2PT
1C1	2	DELUGE	UA TRANSFORMER 141-1	1S-15	18.10C-1	VFPC-1PT
1C2	2	DELUGE	UA TRANSFORMER 141-2	1S-16	18.10D-1	VFPC-1PT
2C1	13,15	DELUGE	UA TRANSFORMER 241-1	2S-15	18.10C-2	VFPC-2PT
2C2	14,15	DELUGE	UA TRANSFORMER 241-2	2S-16	18.10D-2	VFPC-2PT
1D	16	DELUGE	HYDROGEN SEAL OIL UNIT UNIT 1	1S-19	8.5-1	VFPC-1D
2D	17	DELUGE	HYDROGEN SEAL OIL UNIT UNIT 2	2S-19	8.5-2	VFPC-2D
1E	18,19,20, 21,22,23	WET PIPE SPRINKLER	TURBINE MEZZANINE FLOOR UNIT 1	1S-20	8.5-1	VFPC-1E
2E	24,25,26, 27,28	WET PIPE SPRINKLER	TURBINE MEZZANINE FLOOR UNIT 2	2S-20	8.5-2	VFPC-2E
1F	29	WET PIPE SPRINKLER	CLEAN/DIRTY OIL TANK ROOM	1S-21	8.1-0	VFPC-1F
1G	30	WET PIPE SPRINKLER	EL 433 STOREROOM SERVICE BUILDING	1S-54	18.8-0	VFPC-1M
1H	31,32,33,34, 35,36,37	WET PIPE SPRINKLER	GRADE FLOOR TURBINE UNIT 1	1S-22	8.3-1	VFPC-1H
2H	38,39,40, 41,42,43, 44,45,46, 47	WET PIPE SPRINKLER	GRADE FLOOR TURBINE UNIT 2	2S-22	8.3-2	VFPC-2H
2H1	48	WET PIPE SPRINKLER	UNIT 2 RAILROAD TRACK BAY TURBINE BUILDING	2S-56	8.3-2	VFPC-2TW
1J	49	DELUGE	TURBINE OIL STORAGE TANK UNIT 1	1S-23	8.3-1	VFPC-1J
2J	50	DELUGE	TURBINE OIL STORAGE TANK UNIT 2	2S-23	8.3-2	VFPC-2J
1K	51,52,53, 54,58	WET PIPE SPRINKLER	TURBINE BUILDING BASEMENT UNIT 1	1S-24	8.2-1	VFPC-1K
2K	55,56,57, 58	WET PIPE SPRINKLER	TURBINE BUILDING BASEMENT UNIT 2	2S-24	8.2-2	VFPC-2K
1L	59	WET PIPE SPRINKLER	ELEVATOR MACHINERY ROOM EL 417	1S-55	18.7-0	VFPC-1M
1M	60	WET PIPE SPRINKLER	EL 401 STOREROOM SERVICE BLDG	1S-56	18.6-0	VFPC-1M
1N	61	WET PIPE SPRINKLER	DIESEL FIRE PUMP AND DEISEL OIL STORAGE TANK	1S-25	18.13-0	VFPC-CWPH
1Q	62	1 SHOT TF HALON 6%	QA VAULT EL 433 SERVICE BUILDING	1S-53	13.0	N/A
1R	63	INTERNAL FOAM	OUTDOOR OIL STORAGE TANK 125,000 GALLON	1S-26	18.20-0	VFPC-1R
1T1	64	DELUGE FOAM	50.000 GAL. DIESEL OIL TANK ROOM (MANUAL SYSTEM)	1S-27	10.1-1	VFPC-1T1&2T1
1T2	64	DELUGE FOAM	50.000 GAL. DIESEL OIL TANK ROOM (MANUAL SYSTEM)	1S-28	10.2-1	VFPC-1T1&2T1
2T1	65	DELUGE FOAM	50.000 GAL. DO STORAGE TANK ROOM	2S-27	10.1-2	VFPC-2T1&2T2
2T2	65	DELUGE FOAM	50.000 GAL. DO STORAGE TANK ROOM	2S-28	10.2-2	VFPC-2T1&2T2
1W	66	DELUGE	TURBINE BEARINGS	1S-29	8.6-0	VFPC-1W
2W	67	DELUGE	TURBINE BEARINGS	2S-29	8.6-0	VFPC-2W
1X	68,69	WET PIPE SPRINKLER	RADWASTE-VR AREAS	1S-32	14.6-0	VFPC-1X
1Y	70,71, 72,73,111	WET PIPE SPRINKLER	RECEIVING BUILDING WAREHOUSE EXTENSION	1S-30	18.32-0	VFPC-SB
1BB	74	WET PIPE SPRINKLER	UNIT 1 AUXILIARY BOILER ROOM	1S-31	8.4-1	VFPC-1BB
2BB	75	WET PIPE SPRINKLER	UNIT 2 AUXILIARY BOILER ROOM	2S-31	8.4-2	VFPC-2BB
2CC	76	WET PIPE SPRINKLER	SECURITY DIESEL AND TANK ROOM	2S-32	8.7A-0	VFPC-2CC
1.2EE1 1.2EE2 1.2EE3 1.2EE4	77,78,79, 80,81,82, 83,84,85, 86,88,89, 90,102,103	HALON	UPPER CABLE SPREADING AREAS AUTOMATIC 6%	1.2S-33 1.2S-34 1.2S-35 1.2S-36	3.3A-1.2 3.3B-1.2 3.3C-1.2 3.3D-1.2	N/A
1GG	91	WET PIPE SPRINKLER	AUXILIARY BLDG. WASTE OIL TANK OD003T	1S-57	11.5-0	VFPC-1GG
2HH	92	WET PIPE SPRINKLER	WASTE TREATMENT BLDG WASTE OIL TANK	2S-52	18.28-0	VFPC-2HH
1JJ	93	WET PIPE SPRINKLER	COMPONENT COOLING PUMPS	1S-59	11.3-0	VFPC-1JJ
1KK1	94	WET PIPE SPRINKLER	EL 426 Q-11 HATCHWAY	2S-55	11.6-0	VFPC-1KK1-5
1KK2	95	WET PIPE SPRINKLER	EL 426 P-18 STAIRWELL	2S-54	11.6-0	VFPC-1KK1-5
1KK3	96	WET PIPE SPRINKLER	EL 401 HATCH AND STAIRS	2S-54	11.5-0	VFPC-1KK1-5
1KK4	97	WET PIPE SPRINKLER	EL 383 HATCH AND STAIRS	2S-54	11.4-0	VFPC-1KK1-5
1KK5	98	WET PIPE SPRINKLER	EL 364 HATCH AND STAIRS	2S-54	11.3-0	VFPC-1KK1-5
1KK6	99	WET PIPE SPRINKLER	EL.346 STAIRS	2S-54	11.2-0	N/A

LIST OF CARBON DIOXIDE FIRE SUPPRESSION SYSTEMS (F-2811)

SYSTEM NO.	CARDOX DWG NO.	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.	SYSTEM TYPE AND CONCENTRATION	PROTECTING:
1S-1	23.25	1S-37	9.1-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 1B
1S-2	23.25	1S-38	9.2-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 1A
1S-3	23.25	1S-39	9.4-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 1B
1S-4	23.25	1S-40	9.3-1	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 1A
2S-1	23.25	2S-37	9.1-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 2B
2S-2	23.25	2S-38	9.2-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR 2A
2S-3	23.25	2S-39	9.4-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 2A
2S-4	23.25	2S-40	9.3-2	34% TOTAL FLOOD AUTO	DIESEL GENERATOR DAY TANK 2B
1U-1	25	1S-41	11.4A-1	34% TOTAL FLOOD AUTO	UNIT 1 DIESEL AF PUMP ROOM
1U-2	25	1S-42	11.4A-1	34% TOTAL FLOOD AUTO	U-1 DIESEL AF PUMP DAY TANK
2U-1	25	2S-41	11.4A-2	34% TOTAL FLOOD AUTO	U-2 DIESEL AF PUMP ROOM
2U-2	25	2S-42	11.4A-2	34% TOTAL FLOOD AUTO	U-2 DIESEL AF PUMP DAY TANK
1V1	32.33	1S-52	18.11-1	34% TOTAL FLOOD AUTO	B SX MAKEUP PUMP DIESEL DAY TANK RSH
1V2	32.33	2S-52	18.11-2	34% TOTAL FLOOD AUTO	A SX MAKEUP PUMP DIESEL DAY TANK RSH
1Z1	26.21	1S-43	3.2A-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1Z2	26.21	1S-44	3.2B-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1Z3	27.21	1S-45	3.2C-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1Z4	27.21	1S-46	3.2D-1	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z1	28.21	2S-43	3.2A-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z2	28.21	2S-44	3.2B-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z3	27.21	2S-45	3.2C-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
2Z4	27.21	2S-46	3.2D-2	50% TOTAL FLOOD AUTO	LOWER CABLE SPREADING AREA
1AA1	32.33	1S-52	18.11-0	LOCAL APPLICATION	B SX MAKEUP PUMP DIESEL
1AA2	32.33	1S-52	18.11-0	LOCAL APPLICATION	A SX MAKEUP PUMP DIESEL
1DD	23.25	1S-47	3.1-1	50% TOTAL FLOOD AUTO	UNIT 1 CABLE TUNNEL
2DD	23.25	2S-47	3.1-2	50% TOTAL FLOOD AUTO	UNIT 2 CABLE TUNNEL
1EE1	29	1S-48	3.3A-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
1EE2	29	1S-49	3.3B-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
1EE3	29	1S-50	3.3C-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
1EE4	29	1S-51	3.3D-1	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE1	30	2S-48	3.3A-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE2	30	2S-49	3.3B-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE3	30	2S-50	3.3C-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA
2EE4	30	2S-51	3.3D-2	50% TOTAL FLOOD MANUAL	UPPER CABLE SPREADING AREA

JANUS - FIRE SUPPRESSION SYSTEM LIST

FIRE ZONE	M-604 SHEET NO.	SYSTEM TYPE	PROTECTING	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.
1A1	3	DELUGE	MAIN POWER TRANSFORMER	1S-13	18.10B-1
1A2	7	DELUGE	MAIN POWER TRANSFORMER	1S-14	18.10A-1
2A1	10	DELUGE	MAIN POWER TRANSFORMER	2S-13	18.10B-2
2A2	12	DELUGE	MAIN POWER TRANSFORMER	2S-14	18.10A-2
2B2	39, 40, 44	DELUGE	SA TRANSFORMER 242-2	2S-18	18.10E-2
1C1	52	DELUGE	UA TRANSFORMER 141-1	1S-15	18.10C-1
1C2	59	DELUGE	UA TRANSFORMER 141-2	1S-16	18.10D-1

VIKING - FIRE SUPPRESSION SYSTEM LIST

FIRE ZONE	DWG. NO. M-603 SHEET	SYSTEM TYPE	PROTECTING	SUPPRESSION ZONE NO	FP REPORT ZONE NO.	F-2739 DWG. NO.
1LL	101	WET PIPE SPRINKLER	AREA 5 EL 364	1S-60	11.3-1	VFPC-5
2LL	101	WET PIPE SPRINKLER	AREA 7 EL. 364	2S-53	11.3-2	VFPC-7
1MM	63	FOAM	50,000 GAL.DØ OUTDOOR TANK	1S-26	18.20-0	VFPC-1R
2KN	100	WET PIPE SPRINKLER	U2 START-UP BLDG EL 451		8.6-0	VFPC-2KN
1QQ	104	WET PIPE SPRINKLER	CONTRACTOR'S LUNCH ROOM FACILITY EL.401			
1RR	105	WET PIPE SPRINKLER	OPERATIONS BREIFING ROOM EL.451'-0"			
	106	WET PIPE SPRINKLER	IM/EM SHOP			
	109	WET PIPE SPRINKLER	WAREHOUSE #3			
	110	WET PIPE SPRINKLER	WAREHOUSE #4 & 5			

LIST OF CHARCOAL FILTER DELUGE SYSTEMS

P&ID #	GA	EQUIPMENT NO.	ELEVATION	FILTER NAME	SUPPRESSION ZONE NO.	FP REPORT ZONE NO.
M-94-2	M-22-4	OVV19S	451	TSC FILTER UNIT (OVV21F, OVV22F)	2S-57	18.26-0
M-95-11	M-22-2	OVA05FA	467-4	AUXILIARY BUILDING EXHAUST FILTER	1S-1	11.7-0
M-95-11	M-22-2	OVA05FD	467-4	AUXILIARY BUILDING EXHAUST FILTER	2S-1	11.7-0
M-95-11	M-22-1	OVA05FB	459-2	AUXILIARY BUILDING EXHAUST FILTER	1S-2	11.7-0
M-95-11	M-22-1	OVA05FE	459-2	AUXILIARY BUILDING EXHAUST FILTER	2S-2	11.7-0
M-95-11	M-6	OVA05FC	451	AUXILIARY BUILDING EXHAUST FILTER	1S-3	11.7-0
M-95-11	M-6	OVA05FF	451	AUXILIARY BUILDING EXHAUST FILTER	2S-3	11.7-0
M-95-12	M-22-2	OVA05FG	467-4	AUXILIARY BUILDING EXHAUST FILTER	2S-8	11.7-0
M-95-12	M-22-1	OVA05FH	459-2	AUXILIARY BUILDING EXHAUST FILTER	2S-9	11.7-0
M-95-12	M-6	OVA05FI	451	AUXILIARY BUILDING EXHAUST FILTER	2S-10	11.7-0
M-95-12	M-22-1	OVA09FA	459-2	FUEL HANDLING EXHAUST FILTER	2S-25	11.7-0
M-95-12	M-6	OVA09FB	451	FUEL HANDLING EXHAUST FILTER	2S-26	11.7-0
M-96-1	M-22-1	OVC05FA	463-5	CONTROL RM MAKEUP FILTER	1S-5	3.3A-1
M-96-1	M-22-1	OVC06FA	463-5	UNIT OVC01SA	1S-6	3.3A-1
M-96-1	M-6	OVC02FA	451	RECIRCULATION ABSORBER	1S-4	18.4-1
M-96-2	M-22-1	OVC05FB	463-5	CONTROL RM MAKEUP FILTER	2S-5	3.3A-2
M-96-2	M-22-1	OVC06FB	463-5	UNIT OVC01SB	2S-6	3.3A-2
M-96-2	M-6	OVC02FB	451	RECIRCULATION ABSORBER	2S-4	18.4-2
M-103-3	M-7	1VP01SA	426	CONTAINMENT CHARCOAL FILTER	1S-11	1.3-1
M-103-3	M-7	1VP01SB	426	CONTAINMENT CHARCOAL FILTER	1S-12	1.3-1
M-104-3	M-7	2VP01SA	426	CONTAINMENT CHARCOAL FILTER	2S-11	1.3-2
M-104-3	M-7	2VP01SB	426	CONTAINMENT CHARCOAL FILTER	2S-12	1.3-2
M-105-1	M-22-1	1VQ01S	459-2	POST LOCA FILTER	1S-7	11.7-1
M-106-1	M-22-1	2VQ01S	459-2	POST LOCA FILTER	2S-7	11.7-2
M-113-3	M-22-2	OVF01S	477	AUX. BLDG. TANK VENT FILTER	1S-10	11.7-0
M-113-3	M-22-3	ODG04F	468-2	OFF GAS FILTER UNIT ODG01S	1S-8	8.6-1
M-113-3	M-22-3	ODG05F	468-2	OFF GAS FILTER UNIT ODG01S	1S-9	8.6-1
M-114-2	M-12	OVW10S	410	VR AREA FILTER UNIT (OVW12F, OVW18F)	1S-58	14.6-0
M-48-35B	M-12	OVR04FA	410	VR AREA FILTER UNIT	NA	14.6-0
M-48-35B	M-12	OVR04FB	410	VR AREA FILTER UNIT	NA	14.6-0

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
J	EDSF	FOR RECORD-INCORP. OF EC# 626215	EDSF	EDSF	EDSF
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Exelon Generation.
Byron Station 6 Unit: 1&2

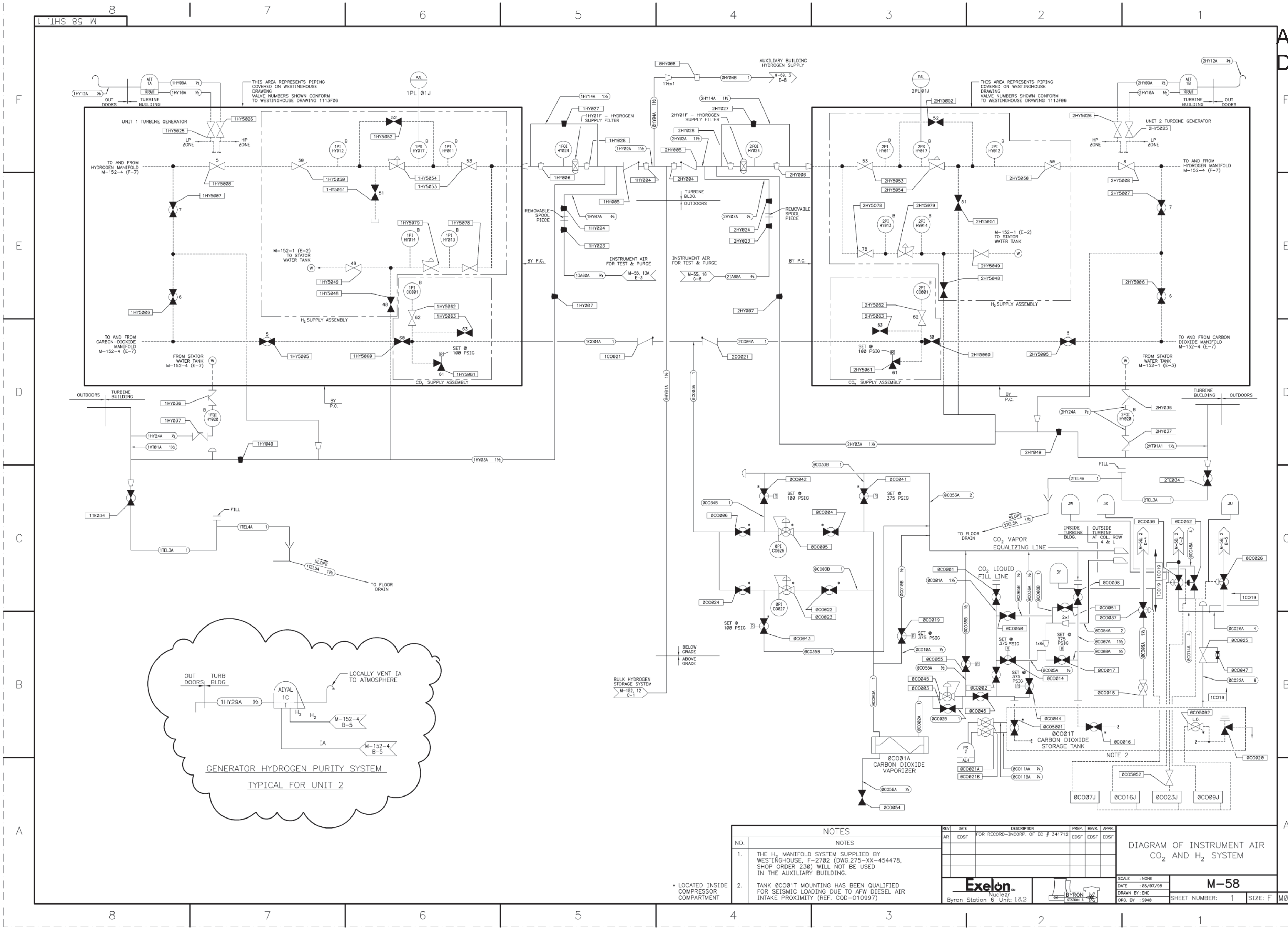
BYRON STATION 6

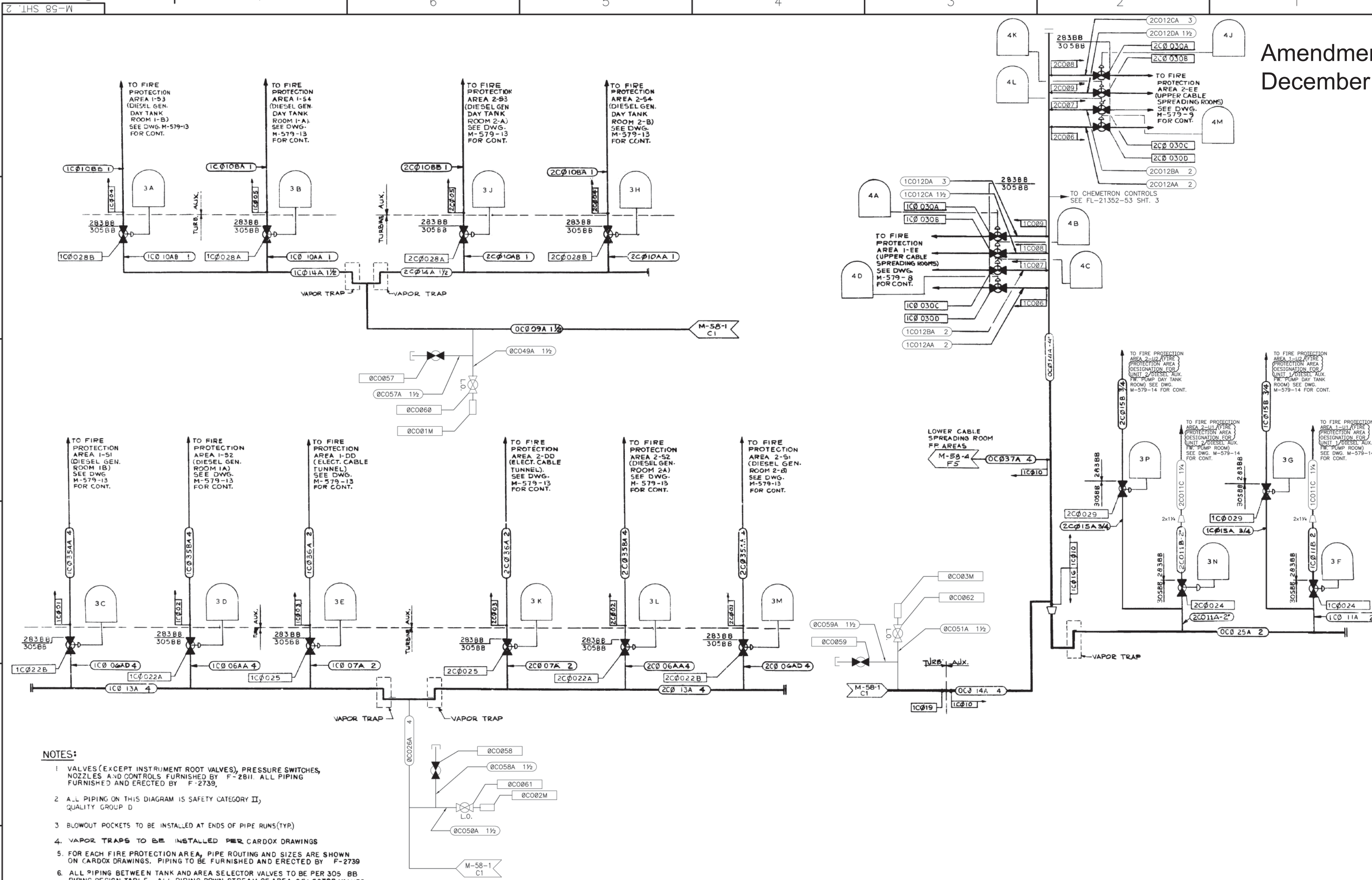
DIAGRAM OF FIRE PROTECTION FIRE SUPPRESSION SYSTEM DESIGNATION

SCALE : NONE
DATE : 04/18/98
DRAWN BY: DLB
ORG. BY : S040

M-52

SHEET NUMBER: 16 SIZE: F M05


M-58 SHT. 1
UNIT 1 TURBINE GENERATOR
UNIT 2 TURBINE GENERATOR
THIS AREA REPRESENTS PIPING COVERED ON WESTINGHOUSE DRAWING VALVE NUMBERS SHOWN CONFORM TO WESTINGHOUSE DRAWING 1113F06
TO AND FROM HYDROGEN MANIFOLD M-152-4 (F-7)
TO AND FROM CARBON-DIOXIDE MANIFOLD M-152-4 (E-7)
FROM STATOR WATER TANK M-152-4 (E-7)
FROM STATOR WATER TANK M-152-1 (E-3)
M-152-1 (E-2) TO STATOR WATER TANK
H_2 SUPPLY ASSEMBLY
CO_2 SUPPLY ASSEMBLY
SET @ 100 PSIG
1HY01F - HYDROGEN SUPPLY FILTER
2HY01F - HYDROGEN SUPPLY FILTER
AUXILIARY BUILDING HYDROGEN SUPPLY
M-69, 3 E-8
REMOVABLE SPOOL PIECE
INSTRUMENT AIR FOR TEST & PURGE
M-55, 13A E-3
M-55, 16 C-8
TURBINE BLDG.
OUTDOORS
BY P.C.
BELOW GRADE
ABOVE GRADE
BULK HYDROGEN STORAGE SYSTEM
M-152, 12 C-1
TO FLOOR DRAIN
CO_2 VAPOR EQUALIZING LINE
CO_2 LIQUID FILL LINE
SET @ 375 PSIG
INSIDE TURBINE BLDG.
OUTSIDE TURBINE AT COL. ROW 4 & L
0C001T CARBON DIOXIDE STORAGE TANK
0C001A CARBON DIOXIDE VAPORIZER
NOTE 2
GENERATOR HYDROGEN PURITY SYSTEM
TYPICAL FOR UNIT 2
LOCALLY VENT IA TO ATMOSPHERE
NOTES
1. THE H_2 MANIFOLD SYSTEM SUPPLIED BY WESTINGHOUSE, F-2702 (DWG.275-XX-454478, SHOP ORDER 230) WILL NOT BE USED IN THE AUXILIARY BUILDING.
2. TANK 0C001T MOUNTING HAS BEEN QUALIFIED FOR SEISMIC LOADING DUE TO AFW DIESEL AIR INTAKE PROXIMITY (REF. CQD-010997)
* LOCATED INSIDE COMPRESSOR COMPARTMENT
AR EDSF FOR RECORD-INCORP. OF EC # 341712 EDSF EDSF EDSF
DIAGRAM OF INSTRUMENT AIR CO_2 AND H_2 SYSTEM
Exelon Nuclear
Byron Station 6 Unit: 1&2
SCALE: NONE
DATE: 08/07/98
DRAWN BY: ENC
M-58
SHEET NUMBER: 1
SIZE: F
M05



NOTES:

1. VALVES (EXCEPT INSTRUMENT ROOT VALVES), PRESSURE SWITCHES, NOZZLES AND CONTROLS FURNISHED BY F-2811. ALL PIPING FURNISHED AND ERECTED BY F-2739.
2. ALL PIPING ON THIS DIAGRAM IS SAFETY CATEGORY II, QUALITY GROUP D
3. BLOWOUT POCKETS TO BE INSTALLED AT ENDS OF PIPE RUNS (TYP.)
4. VAPOR TRAPS TO BE INSTALLED PER CARDOX DRAWINGS
5. FOR EACH FIRE PROTECTION AREA, PIPE ROUTING AND SIZES ARE SHOWN ON CARDOX DRAWINGS. PIPING TO BE FURNISHED AND ERECTED BY F-2739
6. ALL PIPING BETWEEN TANK AND AREA SELECTOR VALVES TO BE PER 305 BB PIPING DESIGN TABLE. ALL PIPING DOWN STREAM OF AREA SELECTOR VALVES (e.g. 1CØ023A) TO BE PER 283 BB EXCEPT FOR PRESSURE SWITCH TAPS WHICH SHALL BE 305 BB. ALL ½" PIPING TO BE PER CARDOX DRAWINGS. BREAK FLANGES TO BE INSTALLED UP- AND DOWN STREAM OF VALVES WHERE SCREWED VALVES ARE SUPPLIED BY F-2811.
7. FOR ADDITIONAL FIRE PROTECTION AREA ZONE INFORMATION SEE DWG. M-52, SHT.16.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
Y	EDSF	FOR RECORD–INCORP. OF EC# 631561	EDSF	EDSF	EDSF
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DIAGRAM OF CO_2 AND H_2 SYSTEM

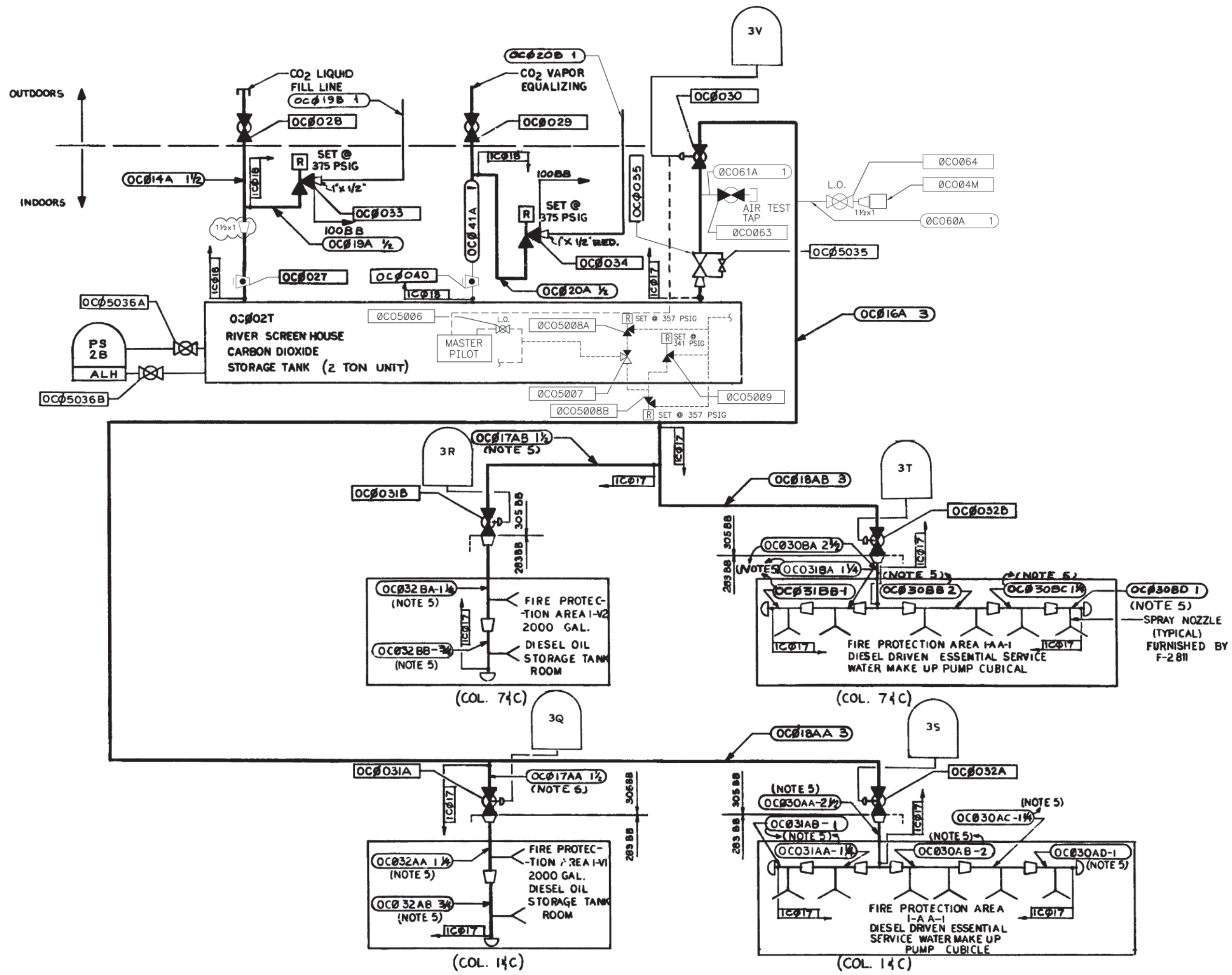
Exelon Generation
Byron Station 6 Unit: 1&2

SCALE : NONE
DATE : 08/09/99
DRAWN BY : BHD
CHK. BY : S040

M–58

SHEET NUMBER: 2 | SIZE: F | M05

Amendment 29
December 2020



NOTES:

1. FIRE PROTECTION SYSTEMS SHALL BE FURNISHED BY SPEC. F-2811 AND INSTALLED BY SPEC. F-2739.
2. ALL PIPING IS SAFETY CATEGORY II, QUALITY GROUP D.
3. INSTALL VAPOR TRAPS PER CARDOX DRAWING
4. PILOT PIPING TO BE PROVIDED BY F-2906 PER CARDOX DWG.
5. PIPING IS SCHEDULE 40
6. BACKING RINGS ARE NOT PERMITTED IN ANY "C0" PIPING.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
Q	EDSF	FOR RECORD-INCORP. OF EC# 623476	EDSF	EDSF	EDSF
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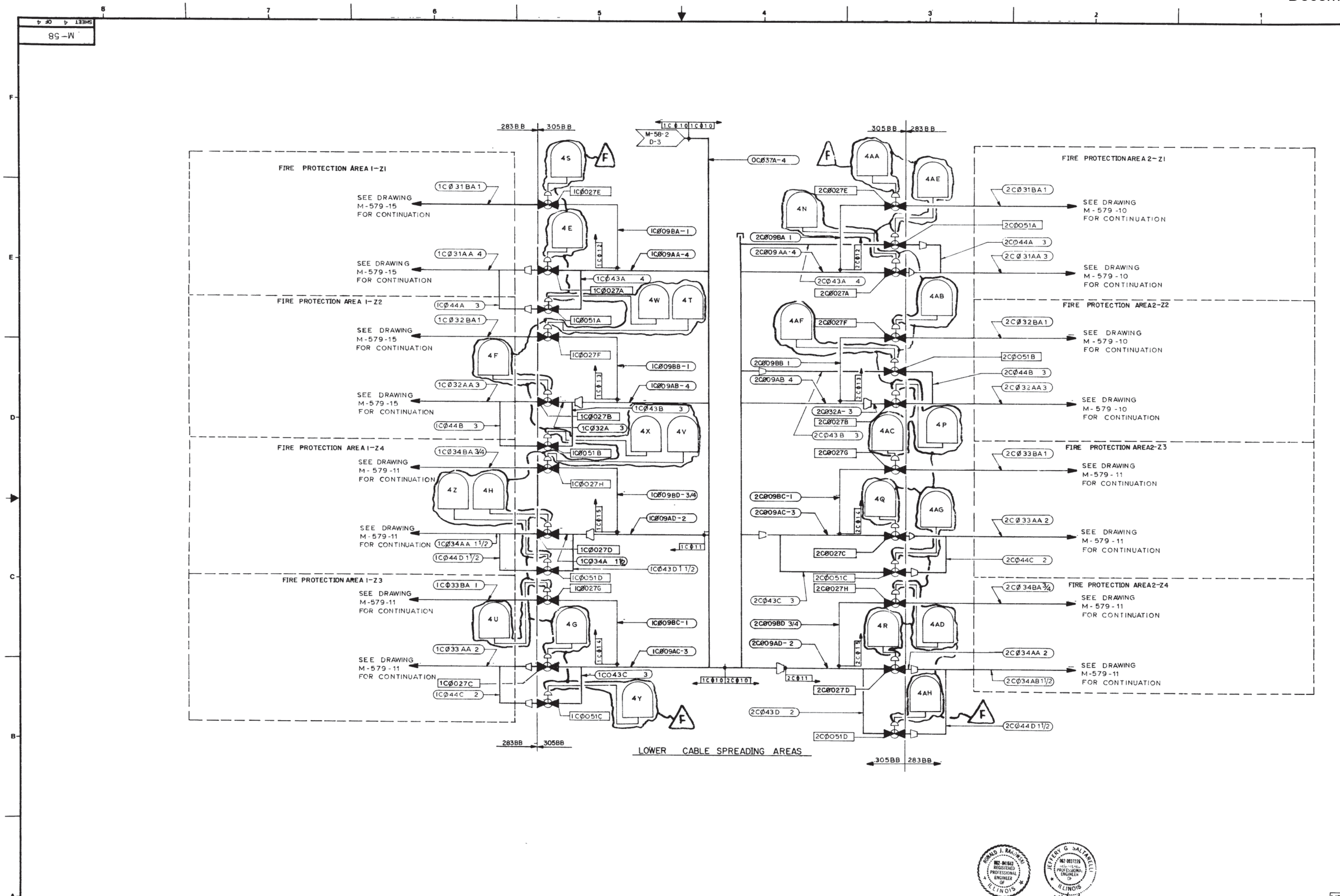
DIAGRAM OF CO_2 & H_2 SYSTEM (AT RIVER SCREEN HOUSE)

Exelon Generation
Byron Station 6 Unit: 1&2

SCALE : NONE
DATE : 11/17/00
DRAWN BY: DLB
ORG. BY : S040

M-58
SHEET NUMBER: 3 SIZE: D M05



REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
A	01-30-80				F/L2739 & F/L-2741 FOR INSTALLATION	
B	12-30-80				F/L2739 & F/L-2741 FOR INSTALLATION (DRN-P&ID-513)	
C	10-4-82				F/L-2739 & F/L-2741 FOR INSTALL. (DRN-MISC-259)	
D	2-17-83				F/L-2739 FOR RECORD (SUB-SYSTEMS ADDED)	
E	10-19-84				F-2739 FOR INSTALL. (ECN-22915, DC# CØ-05)	
F	2-28-90				F-2739 FOR RECORD (DCR 89-349)	

SCALE NONE
PROJECT NUMBER 4391
4392

DIAGRAM OF
CO_2 SYSTEM
BYRON STATION UNITS 1&2
COMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS.

SARGENT & LUNDY
ENGINEERS
CHICAGO

DRAWING NO. M-58
REV. F
SHEET 4 OF

MPD TU

05

MC

M-58 SHT. 5

Amendment 29
December 2020

PORTABLE FIRE EXTINGUISHER LOCATION

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
FH-1-1	AA-11	401'-0"	2.3-20	DRY CHEMICAL
FH-1-2	AA-12	401'-0"	2.3-20	DRY CHEMICAL
FH-1-3	E-15	401'-0"	2.3-20	DRY CHEMICAL
FH-3-5	V-15	426'-0"	2.3-19	CARBON DIOXIDE
FH-3-6	V-21	426'-0"	2.3-19	CARBON DIOXIDE
FH-1-7	E-21	401'-0"	2.3-20	CARBON DIOXIDE
FH-3-11	V-19	426'-0"	2.3-19	CARBON DIOXIDE
FH-2-12	AA-21	411'-0"	2.3-19	DRY CHEMICAL
FH-2-13	AA-16	411'-0"	2.3-19	DRY CHEMICAL

C-1-1	RO-02	377'-0"		DRY CHEMICAL
C-1-2	RO-11	377'-0"		DRY CHEMICAL
C-1-3	RO-17	377'-0"		DRY CHEMICAL
C-1-4	RO-22	377'-0"		DRY CHEMICAL
C-1-5	RO-32	377'-0"		DRY CHEMICAL
C-1-6	RO-38	377'-0"		DRY CHEMICAL
C-3-1	RO-17	401'-0"		DRY CHEMICAL
C-3-2	RO-11	401'-0"		DRY CHEMICAL
C-3-3	RO-32	401'-0"		DRY CHEMICAL
C-3-4	RO-38	401'-0"		DRY CHEMICAL
C-3-5	RO-22	401'-0"		DRY CHEMICAL
C-3-6	RO-37	401'-0"		DRY CHEMICAL
C-3-7	RO-02	401'-0"		DRY CHEMICAL
C-3-8	RO-12	401'-0"		DRY CHEMICAL
C-5-1	RO-07	426'-0"		DRY CHEMICAL
C-5-2	RO-26	426'-0"		DRY CHEMICAL
C-5-3	RO-17	426'-0"		DRY CHEMICAL
C-5-4	RO-38	426'-0"		DRY CHEMICAL

CW-1-7	BB-101	881'-0"		DRY CHEMICAL
CW-1-8	BB-106	867'-0"		DRY CHEMICAL
CW-1-9	BB-102	867'-0"		DRY CHEMICAL
CW-1-10	BB-107	881'-0"		DRY CHEMICAL

RS-1-5	A-1	686'-6"		DRY CHEMICAL
RS-1-6	E-2	686'-6"		DRY CHEMICAL
RS-2-3	C-2	702'-0"		DRY CHEMICAL
RS-1-7	C.7-7	686'-6"		DRY CHEMICAL

TSC-2-1	EA-0.7	435'-0"		HALON (1211 OR 1301)
TSC-2-2	FA-0.7	435'-0"		HALON (1211 OR 1301)
TSC-2-3	HA-0.7	435'-0"		HALON (1211 OR 1301)
TSC-3-1	HA-0.7	451'-0"		DRY CHEMICAL

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
CD-1-1	GA-0.7	401'-0"		DRY CHEMICAL

S-1-1	A-44	401'-0"		DRY CHEMICAL
S-1-2	B-41	401'-0"		DRY CHEMICAL
S-1-3	E-44	401'-0"		DRY CHEMICAL
S-1-4	G-37	401'-0"		DRY CHEMICAL
S-1-5				
S-1-6				
S-1-7	J-36	401'-0"		DRY CHEMICAL
S-1-8	G-39	401'-0"		CARBON DIOXIDE
S-1-9	G-41	401'-0"		CARBON DIOXIDE
S-1-10	H-43	401'-0"		DRY CHEMICAL
S-1-11	J-41	401'-0"		DRY CHEMICAL
S-1-12	J-43	401'-0"		DRY CHEMICAL
S-1-13	B-39	401'-0"		DRY CHEMICAL
S-1-16				
S-1-17	F-43	401'-0"		DRY CHEMICAL
S-1-18	B-43	401'-0"		DRY CHEMICAL
S-2-1	A-44	417'-0"		DRY CHEMICAL
S-2-2	B-39	417'-0"		DRY CHEMICAL
S-2-3	F-36	417'-0"		DRY CHEMICAL
S-2-4	K-36	417'-0"		DRY CHEMICAL
S-2-5	D-41	417'-0"		DRY CHEMICAL
S-3-1	A-44	433'-0"		DRY CHEMICAL
S-3-2	A-39	433'-0"		DRY CHEMICAL
S-3-3	B.8-37	433'-0"		DRY CHEMICAL
S-3-4	F-37	433'-0"		DRY CHEMICAL
S-3-5	H-43	433'-0"		DRY CHEMICAL
S-3-6	J-37	433'-0"		DRY CHEMICAL
S-3-7	H-37	433'-0"		DRY CHEMICAL
S-3-8	J-43	433'-0"		DRY CHEMICAL
S-3-9	B-44	433'-0"		WATER MIST
S-3-10	G-43	433'-0"		WATER MIST
S-3-12	E-35	433'-0"		HALON
S-3-13	J-44	433'-0"		DRY CHEMICAL
S-4-1	A-44	451'-0"		DRY CHEMICAL
S-4-2	D-39	451'-0"		WATER MIST
S-4-3	F-39	451'-0"		DRY CHEMICAL
S-4-4	K-45	451'-0"		DRY CHEMICAL
S-4-5	H-41	451'-0"		DRY CHEMICAL
S-4-6	K-37	451'-0"		DRY CHEMICAL
S-4-7	D-41	451'-0"		WATER MIST
S-4-8	D-45	451'-0"		WATER MIST
S-4-9				
S-4-10				
S-4-11	J-43	451'-0"		WATER MIST
S-4-12	H-44	451'-0"		WATER
S-4-13	D-43	451'-0"		WATER
S-4-14	D-44	451'-0"		HALON
S-4-15	D-42	451'-0"		HALON
S-4-16	D-42	451'-0"		WATER
S-4-17	B-40	451'-0"		HALON
S-4-18	A-38	451'-0"		WATER

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
T-1-1	F-34	401'-0"		DRY CHEMICAL
T-1-2				
T-1-3	C-6	401-0"		DRY CHEMICAL
T-1-4	E-5	401-0"		DRY CHEMICAL
T-1-5	G-11	369'-0"		DRY CHEMICAL
T-1-6	G-8	364'-0"		DRY CHEMICAL
T-1-7	J-8	364'-0"		DRY CHEMICAL
T-1-8	K-8	364'-0"		DRY CHEMICAL
T-1-9	J-11	364'-0"		DRY CHEMICAL
T-1-10	K-22	364'-0"		DRY CHEMICAL
T-1-11	E-18	364'-0"		DRY CHEMICAL
T-1-12	G-23	369'-0"		DRY CHEMICAL
T-1-13	G-25	369'-0"		DRY CHEMICAL
T-1-14	H-30	369'-0"		DRY CHEMICAL
T-1-15	K-28	357'-0"		DRY CHEMICAL
T-1-16	J-24	357'-0"		DRY CHEMICAL
T-1-17	G-16	364'-0"		DRY CHEMICAL
T-1-18	E-18	369'-0"		DRY CHEMICAL
T-1-19	K-6	380'-0"		DRY CHEMICAL
T-1-20	K-7	380'-0"		DRY CHEMICAL
T-1-21	K-31	357'-0"		DRY CHEMICAL
T-1-22	J-17	359'-0"		DRY CHEMICAL
T-1-23	H-16	364'-0"		DRY CHEMICAL
T-1-24	J-5	357'-0"		DRY CHEMICAL
T-1-25	K-14	357'-0"		DRY CHEMICAL
T-1-27	K-29	380'-0"		DRY CHEMICAL
T-1-28	K-30	380'-0"		DRY CHEMICAL
T-2-1	J-17	401'-0"		DRY CHEMICAL
T-2-2	K-9	401'-0"		DRY CHEMICAL
T-2-3	K-6	401'-0"		DRY CHEMICAL
T-2-4	J-4	401'-0"		DRY CHEMICAL
T-2-5	K-1	401'-0"		DRY CHEMICAL
T-2-6	G-4	364'-0"		CARBON DIOXIDE
T-2-7	G-3	401'-0"		DRY CHEMICAL
T-2-8	C-7	401'-0"		DRY CHEMICAL
T-2-9	F-11	401'-0"		DRY CHEMICAL
T-2-10	H-11	STAIRS @ EL.387'-0"		DRY CHEMICAL
T-2-11	E-17	401'-0"		DRY CHEMICAL
T-2-12	G-15	401'-0"		DRY CHEMICAL
T-2-13	F-18	401'-0"		DRY CHEMICAL
T-2-14	G-20	401'-0"		DRY CHEMICAL
T-2-15	H-24	STAIRS @ EL.387'-0"		DRY CHEMICAL
T-2-16	F-24	401'-0"		DRY CHEMICAL
T-2-17	D-25	401'-0"		DRY CHEMICAL
T-2-18	F-25	401'-0"		DRY CHEMICAL
T-2-19	E-31	401'-0"		DRY CHEMICAL
T-2-20	C-25	401'-0"		DRY CHEMICAL
T-2-21	F-32	401'-0"		DRY CHEMICAL
T-2-22	F-34	401'-0"		DRY CHEMICAL
T-2-23	A-25	401'-0"		DRY CHEMICAL
T-2-24	J-35	401'-0"		DRY CHEMICAL

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
T-2-25	K-33	401'-0"		DRY CHEMICAL
T-2-26	K-30	401'-0"		DRY CHEMICAL
T-2-27	K-26	401'-0"		DRY CHEMICAL
T-2-28	K-22	401'-0"		DRY CHEMICAL
T-2-29	J-18	401'-0"		DRY CHEMICAL
T-2-30	C-16	401'-0"		DRY CHEMICAL
T-2-31	D-39	401'-0"		CARBON DIOXIDE
T-2-32	D-29	401'-0"		DRY CHEMICAL
T-3-1	K-17	426'-0"		DRY CHEMICAL
T-3-2	K-14	426'-0"		DRY CHEMICAL
T-3-3	K-11	426'-0"		CARBON DIOXIDE
T-3-4	F-2	426'-0"		DRY CHEMICAL
T-3-5	K-4	426'-0"		DRY CHEMICAL
T-3-6	H-3	426'-0"		DRY CHEMICAL
T-3-7	F-4	426'-0"		DRY CHEMICAL
T-3-8	F-6	418'-0"		DRY CHEMICAL
T-3-9	F-12	426'-0"		DRY CHEMICAL
T-3-10	F-14	426'-0"		DRY CHEMICAL
T-3-11	F-17	426'-0"		DRY CHEMICAL
T-3-12	J-18	426'-0"		DRY CHEMICAL
T-3-13	K-20	426'-0"		DRY CHEMICAL
T-3-14	K-24	426'-0"		DRY CHEMICAL
T-3-15	K-28	426'-0"		DRY CHEMICAL
T-3-16	K-34	426'-0"		DRY CHEMICAL
T-3-17	H-36	426'-0"		DRY CHEMICAL
T-3-18	F-34	426'-0"		DRY CHEMICAL
T-3-19	E-32	426'-0"		DRY CHEMICAL
T-3-20	F-30	418'-0"		DRY CHEMICAL
T-3-21	F-25	418'-0"		DRY CHEMICAL
T-3-22	F-22	426'-0"		DRY CHEMICAL
T-3-23	F-18	426'-0"		DRY CHEMICAL
T-3-24	D-28	418'-0"		DRY CHEMICAL
T-3-25	E-36	426'-0"		DRY CHEMICAL
T-4-1	K-18	451'-0"		HALON (1211 OR 1301)
T-4-2	K-16	451'-0"		HALON (1211 OR 1301)
T-4-3	K-22	451'-0"		HALON (1211 OR 1301)
T-4-4	K-24	451'-0"		DRY CHEMICAL
T-4-5	K-26	451'-0"		CARBON DIOXIDE
T-4-6				
T-4-7	K-35	451'-0"		DRY CHEMICAL
T-4-8	G-36	451'-0"		DRY CHEMICAL
T-4-9	E-31	451'-0"		DRY CHEMICAL

NOTES:

1. REFERENCE TO FIGURES IN FIRE PROTECTION REPORT ARE PROVIDED FOR REFERENCE ONLY.
2. SEE M-545-69 FOR BRACKET MOUNTING DETAILS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
P	EDSF	FOR RECORD-INCORP. OF EC# 618402	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
PORTABLE FIRE EXTINGUISHER

Exelon Generation.
Byron Station 6 Unit: 1&2

BYRON STATION 6

SCALE : NONE
DATE : 12/13/00
DRAWN BY: DLB
ORG. BY : S040

M-58

SHEET NUMBER: 5 | SIZE: D | M05

M-58 SHT. 6

Amendment 29
December 2020

PORTABLE FIRE EXTINGUISHER LOCATION

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
T-4-10	E-25	451'-0"		DRY CHEMICAL
T-4-11	E-12	451'-0"		DRY CHEMICAL
T-4-12	E-4	451'-0"		DRY CHEMICAL
T-4-13	H-1	451'-0"		DRY CHEMICAL
T-4-14	K-3	451'-0"		DRY CHEMICAL
T-4-15	K-9	451'-0"		CARBON DIOXIDE
T-4-16	K-11	451'-0"		DRY CHEMICAL
T-4-17	K-12	451'-0"		DRY CHEMICAL
T-4-18	K-22	451'-0"		DRY CHEMICAL
T-4-19	J-19	451'-0"		DRY CHEMICAL
T-4-20	F-35 FIRST FLOOR	451'-0"		DRY CHEMICAL
T-4-21	F-34 FIRST FLOOR	451'-0"		DRY CHEMICAL
T-4-22	F-35 SECOND FLOOR	451'-0"		DRY CHEMICAL
T-4-23	F-34 SECOND FLOOR	451'-0"		DRY CHEMICAL
T-4-24	K-36	451'-0"		DRY CHEMICAL
T-4-25	L-14	468'-2"		DRY CHEMICAL
T-4-26	J-14	451'-0"		DRY CHEMICAL
T-4-27	J-14	451'-0"		DRY CHEMICAL
A-1-1	L-13	330'-0"		DRY CHEMICAL
A-1-2	Q-17	330'-0"		DRY CHEMICAL
A-1-3	L-21	330'-0"		DRY CHEMICAL
A-1-4	Q-18	330'-0"		DRY CHEMICAL
A-2-1	P-17	346'-0"		DRY CHEMICAL
A-2-2	Q-11	346'-0"		DRY CHEMICAL
A-2-3				
A-2-4	L-23	346'-0"		DRY CHEMICAL
A-2-5	Q-24	346'-0"		DRY CHEMICAL
A-2-6	U-18	346'-0"		DRY CHEMICAL
A-2-7	V-15	346'-0"		DRY CHEMICAL
A-2-8	V-21	346'-0"		DRY CHEMICAL
A-3-1	P-17	364'-0"		DRY CHEMICAL
A-3-2	L-13	364'-0"		DRY CHEMICAL
A-3-3	Q-10	364'-0"		DRY CHEMICAL
A-3-4	V-15	364'-0"		DRY CHEMICAL
A-3-5	X-15	364'-0"		DRY CHEMICAL
A-3-6	U-17	364'-0"		DRY CHEMICAL
A-3-7	L-20	364'-0"		DRY CHEMICAL
A-3-8	S-24	364'-0"		DRY CHEMICAL
A-3-9	Y-21	364'-0"		DRY CHEMICAL
A-3-10	Q-6 1A/1D MSIV	364'-0"		DRY CHEMICAL
A-3-11	Z-6 1B/1C MSIV	364'-0"		DRY CHEMICAL
A-3-12	Q-29 2A/2D MSIV	377'-0"		DRY CHEMICAL
A-3-13	Z-29 2B/2C MSIV	377'-0"		DRY CHEMICAL
A-3-14	N-25	364'-0"		DRY CHEMICAL
A-4-1	P-17	383'-0"		DRY CHEMICAL
A-4-2	M-16	383'-0"		DRY CHEMICAL
A-4-3	L-12	383'-0"		DRY CHEMICAL
A-4-4	L-10	383'-0"		DRY CHEMICAL
A-4-5	U-18	383'-0"		DRY CHEMICAL

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
A-4-6	Q-21	383'-0"		DRY CHEMICAL
A-4-7	Q-25	383'-0"		DRY CHEMICAL
A-4-8	M-23	383'-0"		HALON (1211OR1301)
A-4-9	M-25	383'-0"		HALON (1211OR1301)
A-4-10	M-26	383'-0"		HALON (1211OR1301)
A-4-11	P-28	383'-0"		DRY CHEMICAL
A-4-12	P-31	383'-0"		DRY CHEMICAL
A-4-13	L-23	383'-0"		DRY CHEMICAL
A-5-1	L-10	401'-0"		DRY CHEMICAL
A-5-2				
A-5-3	L-12	401'-0"		DRY CHEMICAL
A-5-4	M-13	401'-0"		DRY CHEMICAL
A-5-5	P-17	401'-0"		DRY CHEMICAL
A-5-6	U-18	401'-0"		DRY CHEMICAL
A-5-7	P-21	401'-0"		DRY CHEMICAL
A-5-8	N-25	401'-0"		DRY CHEMICAL
A-5-9	V-21	401'-0"		DRY CHEMICAL
A-5-10	Q-23	401'-0"		DRY CHEMICAL
A-6-1	L-17	426'-0"		DRY CHEMICAL
A-6-2	M-19	426'-0"		DRY CHEMICAL
A-6-3				
A-6-4				
A-6-5	L-18	426'-0"		HALON (1211 OR 1301)
A-6-6	M-15	426'-0"		HALON (1211 OR 1301)
A-6-7	M-16	426'-0"		HALON (1211 OR 1301)
A-6-8	Q 11	426'-0"		DRY CHEMICAL
A-6-9	N-12	426'-0"		DRY CHEMICAL
A-6-10	S-12	426'-0"		CARBON DIOXIDE
A-6-11	V-12	426'-0"		CARBON DIOXIDE
A-6-12	L-8	426'-0"		CARBON DIOXIDE
A-6-13	P-8	426'-0"		CARBON DIOXIDE
A-6-14	P-6	426'-0"		CARBON DIOXIDE
A-6-15	L-7	426'-0"		CARBON DIOXIDE
A-6-16	V-11	426'-0"		DRY CHEMICAL
A-6-17	S-17.5	426'-0"		DRY CHEMICAL
A-6-18	P-17	426'-0"		DRY CHEMICAL
A-6-19	V-23	426'-0"		DRY CHEMICAL
A-6-20	Q-24	426'-0"		DRY CHEMICAL
A-6-21	M-24	426'-0"		DRY CHEMICAL
A-6-22	L-27	426'-0"		CARBON DIOXIDE
A-6-23	P-27	426'-0"		CARBON DIOXIDE
A-6-24	L-29	426'-0"		CARBON DIOXIDE
A-6-25	P-29	426'-0"		CARBON DIOXIDE
A-6-26	V-20	426'-0"		CARBON DIOXIDE
A-6-27	U-13	414'-0"		DRY CHEMICAL
A-6-28	Q-11	414'-0"		CARBON DIOXIDE
A-6-29	V-23	414'-0"		DRY CHEMICAL

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
A-6-30	Q-24	414'-0"		DRY CHEMICAL
A-6-31	V-18	426'-0"		CARBON DIOXIDE
A-7-1	P-18	439'-0"		DRY CHEMICAL
A-7-2	Q-11	439'-0"		DRY CHEMICAL
A-7-3	P-10	439'-0"		DRY CHEMICAL
A-7-4	L-10	439'-0"		DRY CHEMICAL
A-7-5	L-12	439'-0"		DRY CHEMICAL
A-7-6	L-23	439'-0"		DRY CHEMICAL
A-7-7	L-26	439'-0"		DRY CHEMICAL
A-7-8	P-26	439'-0"		DRY CHEMICAL
A-7-9	Q-24	439'-0"		DRY CHEMICAL
A-7-10	P-16	439'-0"		DRY CHEMICAL
A-7-11	P-19	439'-0"		DRY CHEMICAL
A-8-1	P-15	451'-0"		HALON (1211OR1301)
A-8-2	N-17	451'-0"		HALON (1211OR1301)
A-8-3	P-20	451'-0"		HALON (1211OR1301)
A-8-4	L-23	451'-0"		HALON (1211OR1301)
A-8-5	P-17	451'-0"		HALON (1211OR1301)
A-8-6	N-15	451'-0"		HALON (1211OR1301)
A-8-7	L-16	451'-0"		HALON (1211OR1301)
A-8-8	M-12	451'-0"		CARBON DIOXIDE
A-8-9	P-10	451'-0"		DRY CHEMICAL
A-8-10	P-12	451'-0"		CARBON DIOXIDE
A-8-11	N-8	451'-0"		CARBON DIOXIDE
A-8-12	M-8	451'-0"		CARBON DIOXIDE
A-8-13	L-9	451'-0"		CARBON DIOXIDE
A-8-14	L-7	451'-0"		CARBON DIOXIDE
A-8-15	P-6	451'-0"		CARBON DIOXIDE
A-8-16	S-16	451'-0"		DRY CHEMICAL
A-8-17	P-18	451'-0"		DRY CHEMICAL
A-8-18				
A-8-19	N-23	451'-0"		CARBON DIOXIDE
A-8-20	L-19	451'-0"		HALON (1211OR1301)
A-8-21	P-23	451'-0"		HALON (1211OR1301)
A-8-22	M-24	451'-0"		CARBON DIOXIDE
A-8-23	P-23	451'-0"		CARBON DIOXIDE
A-8-24	P-25	451'-0"		DRY CHEMICAL
A-8-25	L-28	451'-0"		CARBON DIOXIDE
A-8-26	P-28	451'-0"		CARBON DIOXIDE
A-8-27	L-26	451'-0"		CARBON DIOXIDE
A-8-28	N-27	451'-0"		CARBON DIOXIDE
A-8-29				
A-8-30	S-19	451'-0"		DRY CHEMICAL
A-8-31	S-24	451'-0"		DRY CHEMICAL
A-8-32	L-22	451'-0"		HALON
A-9-1	L-12	463'-4"		DRY CHEMICAL
A-9-2	N-17	463'-4"		DRY CHEMICAL
A-9-3	P-18	463'-4"		DRY CHEMICAL

EXTINGUISHER IDENTIFICATION NUMBER	LOCATION COLUMN ROW	ELEVATION	FIRE PROTECTION REPORT FIGURE NUMBER	TYPE
A-9-4	N-18	463'-4"		DRY CHEMICAL
A-9-5	L-23	463'-4"		DRY CHEMICAL
A-9-6	Q-15	463'-0"		CARBON DIOXIDE
A-9-7	S-17	459'-0"		DRY CHEMICAL
A-9-8	Q-19	463'-0"		CARBON DIOXIDE
A-9-9				
A-9-10	S-23	467'-4"		DRY CHEMICAL
A-9-11	Q-18	475'-6"		CARBON DIOXIDE
A-9-12	S-18	475'-6"		DRY CHEMICAL
A-9-13	V-18	459'-0"		DRY CHEMICAL
A-9-14	U-15	459'-0"		DRY CHEMICAL
A-9-15	U-21	459'-0"		DRY CHEMICAL
A-9-16	S-17	467'-4"		DRY CHEMICAL
A-9-17	M-17	475'-6"		DRY CHEMICAL
A-9-18	Q-18	477'-0"		DRY CHEMICAL

FX-1-1	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-2	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-3	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-4	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-5	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-6	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-7	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-8	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-1-9	ROBUST FLEX BUILDING	401'-0"		DRY CHEMICAL
FX-2-1	COMMERCIAL BUILDING	401'-0"		DRY CHEMICAL
FX-2-2	COMMERCIAL BUILDING	401'-0"		DRY CHEMICAL
FX-2-3	COMMERCIAL BUILDING	401'-0"		DRY CHEMICAL

FSI-01	ISFSI BLDG. N. ACCESS DOOR	401'-0"		DRY CHEMICAL
FSI-02	ISFSI BLDG. E. ACCESS DOOR	401'-0"		DRY CHEMICAL
FSI-03	ISFSI BLDG. CRAWLER	401'-0"		DRY CHEMICAL

NOTES:

1. REFERENCE TO FIGURES IN FIRE PROTECTION REPORT ARE PROVIDED FOR REFERENCE ONLY.
2. SEE M-545-69 FOR BRACKET MOUNTING DETAILS.

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
M	EDSF	FOR RECORD-INCORP. OF EC# 403014	EDSF	EDSF	EDSF
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DIAGRAM OF FIRE PROTECTION
PORTABLE FIRE EXTINGUISHER

Exelon Generation
Byron Station 6 Unit: 1&2

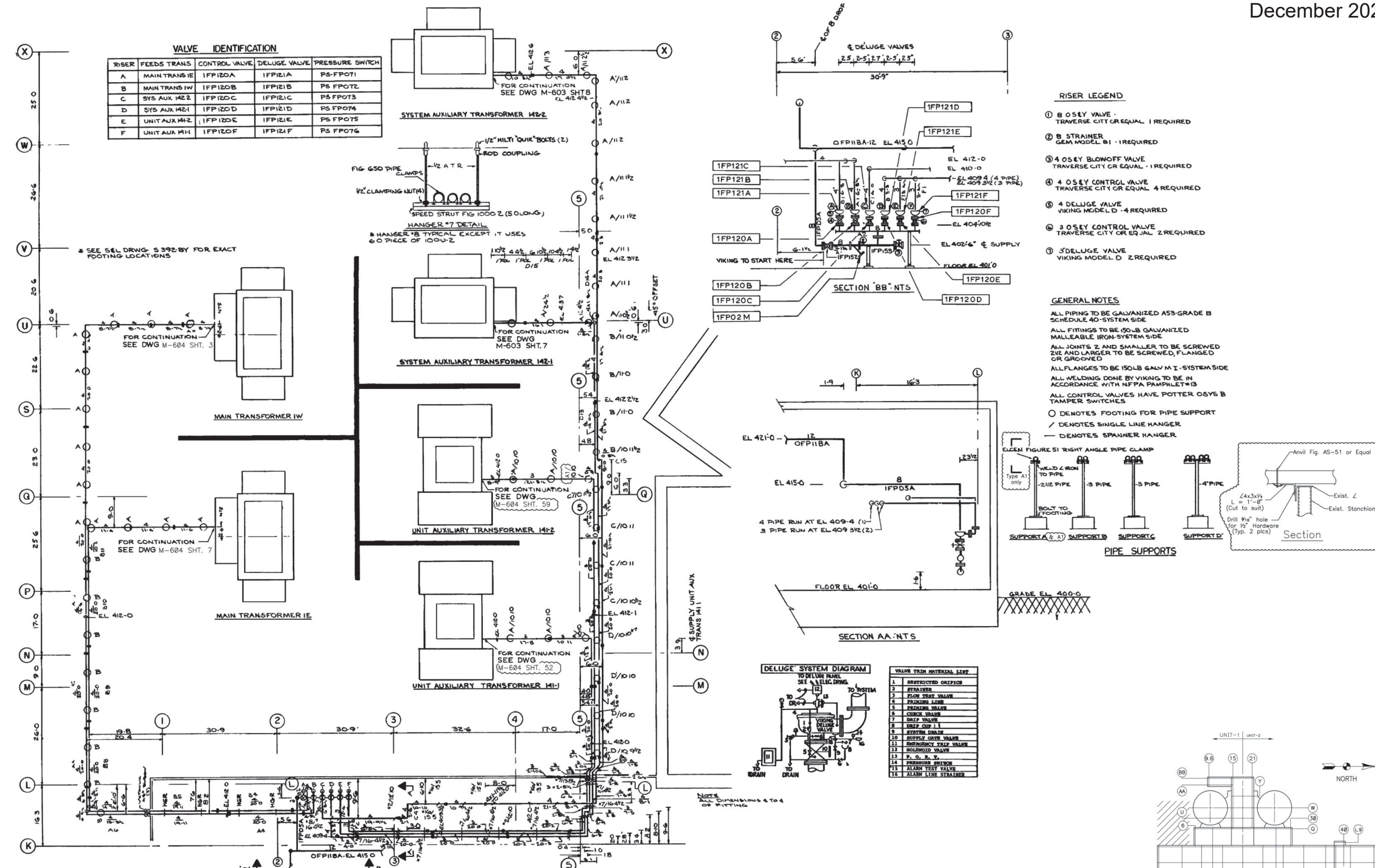
BYRON STATION 6

SCALE : NONE
DATE : 01/22/02
DRAWN BY: BHD
ORG. BY : S040

M-58

SHEET NUMBER: 6 SIZE: D M05

Amendment 29
December 2020



VALVE IDENTIFICATION

RISER	FEEDS TRANS	CONTROL VALVE	DELUGE VALVE	PRESSURE SWITCH
A	MAIN TRANS 1E	1FP120A	1FP121A	PS-FP071
B	MAIN TRANS 1W	1FP120B	1FP121B	PS FP072
C	SYS AUX 142 2	1FP120C	1FP121C	PS FP073
D	SYS AUX 142-1	1FP120D	1FP121D	PS FP074
E	UNIT AUX 141-2	1FP120E	1FP121E	PS FP075
F	UNIT AUX 141-1	1FP120F	1FP121F	PS FP076

RISER LEGEND

1. 8 OS&Y VALVE - TRAVERSE CITY OR EQUAL 1 REQUIRED
2. 8 STRAINER GEM MODEL B1 - 1 REQUIRED
3. 4 OS&Y BLOWOFF VALVE TRAVERSE CITY OR EQUAL - 1 REQUIRED
4. 4 OS&Y CONTROL VALVE TRAVERSE CITY OR EQUAL 4 REQUIRED
5. 4 DELUGE VALVE VIKING MODEL D - 4 REQUIRED
6. 3 OS&Y CONTROL VALVE TRAVERSE CITY OR EQUAL 2 REQUIRED
7. 3" DELUGE VALVE VIKING MODEL D 2 REQUIRED

GENERAL NOTES

ALL PIPING TO BE GALVANIZED A53-GRADE B SCHEDULE 40-SYSTEM SIDE

ALL FITTINGS TO BE 150 LB GALVANIZED MALLEABLE IRON-SYSTEM SIDE

ALL JOINTS 2 AND SMALLER TO BE SCREWED 2 1/2 AND LARGER TO BE SCREWED, FLANGED OR GROOVED

ALL FLANGES TO BE 150 LB GALV M I-SYSTEM SIDE

ALL WELDING DONE BY VIKING TO BE IN ACCORDANCE WITH NFPA PAMPHLET #13

ALL CONTROL VALVES HAVE POTTER OSYS B TAMPER SWITCHES

○ DENOTES FOOTING FOR PIPE SUPPORT

/ DENOTES SINGLE LINE HANGER

— DENOTES SPANNER HANGER

NOTES: FOR DELUGE VALVES

1. ALL PIPING TO BE GALVANIZED A53 GRADE B OR A106 GRADE B, SCHEDULE 40.
2. ALL PIPE FITTINGS TO BE 150 LB. GALVANIZED MALLEABLE IRON.

S&L SPECIFICATION F 2817

C.E.CO. PO 207538

FIRE PROTECTION PIPING FOR POWER TRANSFORMERS (BULK PIPING ONLY)

REVISIONS: BYRON AS BUILT; REVISED PER S-L COMMENTS; REROUTED SUPPLY PIPING PER S&L COMMENTS

BYRON UNIT 1
COMMONWEALTH EDISON
CHICAGO ILLINOIS

VIKING FIRE PROTECTION COMPANY
5520 N WOLCOTT AVE.
CHICAGO ILLINOIS

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
F	EDSF	FOR RECORD-INCORP. OF EC# 626215	EDSF	EDSF	EDSF
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--	--		--	--	--
--	--		--	--	--

Exelon Generation
Byron Station 6 Unit: 1

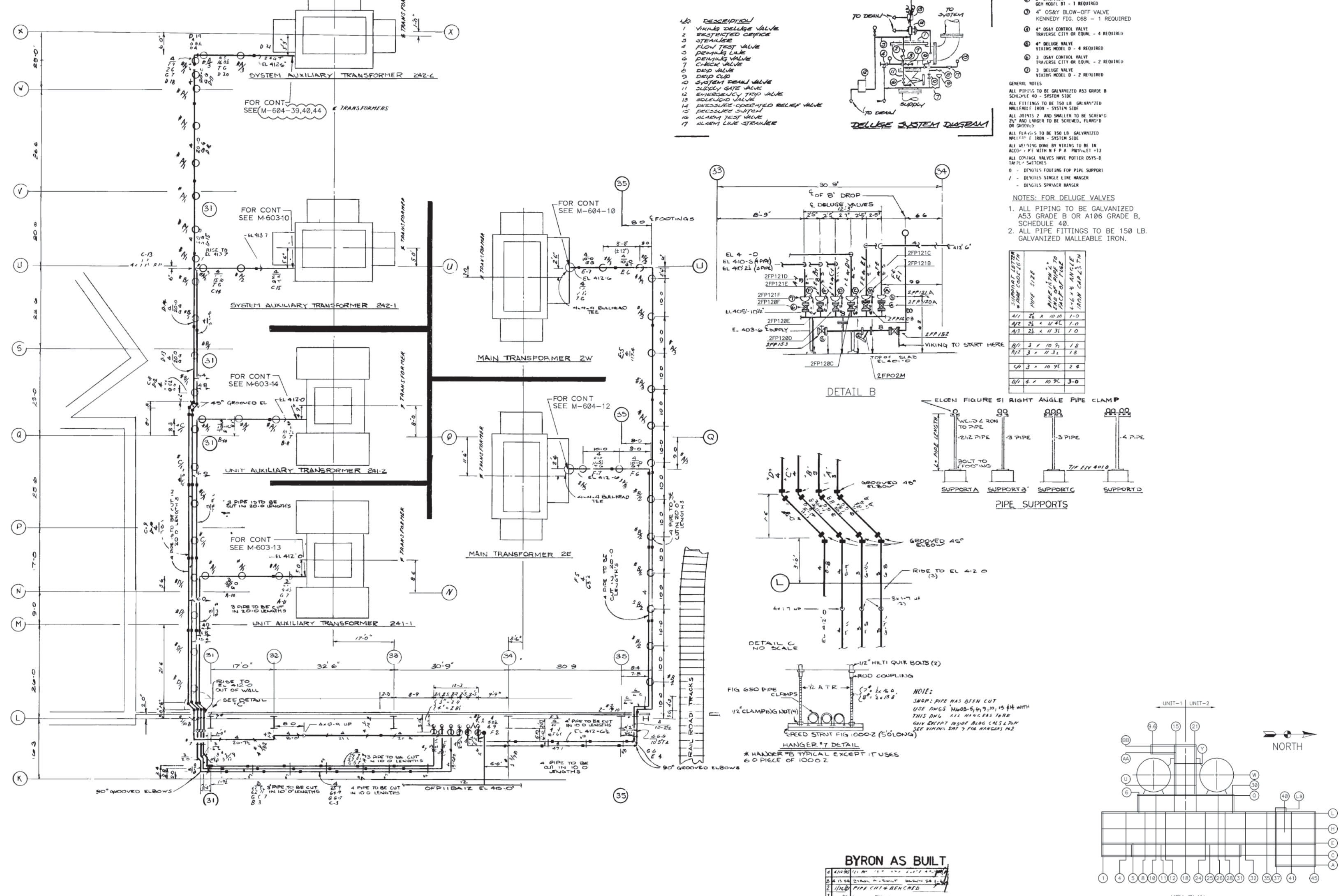
POWER TRANSFORMERS
VIKING SPRINKLER SYSTEMS
AREA ABC GRADE FL. EL. 400'-0"

SCALE : NONE
DATE : 06/10/97
DRAWN BY: JLR
ORG. BY : S040

M-603

SHEET NUMBER: 2 SIZE: F M98

Amendment 29
December 2020



BYRON AS BUILT

BYRON UNIT #2
COMMONWEALTH EDISON
CHICAGO, ILLINOIS

VIKING FIRE PROTECTION COMPANY
SPECIAL HAZARDS
WHEELING, ILLINOIS

REV	DATE	DESCRIPTION	PREP.	REVR.	APPR.
G	EDSF	FOR RECORD-INCORP. OF EC# 625276	EDSF	EDSF	EDSF
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POWER TRANSFORMERS
VIKING SPRINKLER SYSTEMS
AREA 2-A
GRADE EL. 400'-0"

Exelon Generation
Byron Station 6 Unit: 2

BYRON STATION 6

SCALE : NONE
DATE : 05/14/98
DRAWN BY: RGQ
ORG. BY : S040

M-603

SHEET NUMBER: 15 | SIZE: F | M98

APPENDIX 5.5

GLOSSARY OF TERMS

~~APPENDIX 5.5 - GLOSSARY OF TERMS~~

~~ANSI~~ - American National Standards Institute.

~~Combustible Liquids~~ - Liquids have a flash point at or above 100°F. Combustible liquids are subdivided as follows:

1. ~~Class II~~ - includes liquids having flash points at or above 100°F and below 140°F.

2. ~~Class IIIA~~ - liquids having flash points at or above 140°F and below 200°F.

3. ~~Class IIIB~~ - liquids having flash points at or above 200°F.

~~ESF~~ - Engineered safety feature.

~~ESW~~ - Essential service water.

~~Fire Door~~ - A tested, listed or approved 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 No. 80 for classification and types of fire doors.)

~~Fire Hazard~~ - Any situation, process, material, or condition which on the basis of applicable data, may cause a fire or explosion or provide a ready fuel supply to augment the spread or intensity of the fire or explosion and which poses a threat to life, property, or reactor safety.

~~Fire Load~~ - The amount of combustibles present in a given situation, usually expressed in terms of weight of combustible material (or potential heat release due to combustion) per square foot. This measure is employed frequently to calculate the degree of fire resistance required to withstand a fire or judge the rate of application and quantity of extinguishing agent needed to control or extinguish a fire.

~~Fire Point~~ - Lowest temperature of a liquid in an open container at which vapors are evolved fast enough to support continuous combustion. The fire point is usually a few degrees above the flash point.

~~Fire Resistance~~ - Relative term used with a numerical or modifying adjective to indicate the extent to which a material or structure resists the effect of fire.

~~Fire Resistive~~ - Properties or designs to resist the effects of any fire to which a material or structure may be expected to be subjected. Fire resistive materials or assemblies of materials are noncombustible, but noncombustible materials are not necessarily fire resistive; fire resistive implies a higher degree of fire resistance than noncombustible.

~~Fire Retardant~~ - Denotes a substantially lower degree of fire resistance than fire resistive and is often used to refer to materials or structures which are combustible in whole or part, but have been subjected to treatments or have surface coverings to prevent or retard ignition or the spread of fire under the conditions for which they are designed.

Flamespread Rating - The comparative performance of fire travel over the surface of a material when tested in accordance with the provisions of NFPA No. 255.

Flammable - Describes a combustible material that ignites very easily, burns intensely, or has a rapid rate of flamespread. Flammable and inflammable are identical in meaning.

4. Flammable Liquids - any liquid having a flash point below 100°F and having a vapor pressure not exceeding 40 psi absolute at 100°F.

Flashover - Phenomena of a slowly developing fire producing radiant energy at wall and ceiling surfaces. The radiant feedback from those surfaces gradually heats the contents of the fire area, and when all the combustibles in the space have become heated to their ignition temperature, simultaneous ignition occurs as from a pilot ignition source.

Flash Point - Corresponds roughly to the lowest temperature at which the vapor pressure of the liquid is just sufficient to produce a flammable mixture at the lower limit of flammability.

GA - General arrangement.

HM - Hollow metal.

HVAC - Heating, Ventilating, and Air Conditioning.

Hydraulic Designed Sprinkler System - A system in which sprinkler spacing and pipe sizing is, within limits, determined by hydraulic calculations rather than a standard schedule of allowable pipe sizes.

Ignition Temperature - Minimum temperature to which a substance in air must be heated in order to initiate, or cause, self-sustained combustion independently of the heating or heating element.

MCC - Motor control center.

NFPA - National Fire Protection Association.

NLOSH - National Laboratory for Occupational Safety and Health.

NML - Nuclear Mutual Limited.

Noncombustible - Material which, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Materials reported as noncombustible, when tested to ASTM E136-1973, shall be considered noncombustible.

5. Noncombustible and incombustible are identical in meaning.

6. ~~Limited combustible~~ - material which, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb and complies with (a) or (b). Materials subject to increase in combustibility or flame spread rating beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.

   a) Materials having a structural base of incombustible material, with a surfacing not exceeding a thickness of 1/8 inch which has a flame rating not greater than 50.

   b) Materials, in the form and thickness used, other than described in (a), having neither a flame spread rating greater than 25 nor evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread rating greater than 25 nor evidence of continued progressive combustion.

~~Qualified Fire Protection Engineer~~ - An engineer who has had sufficient technical training, knowledge, and experience in the field of fire protection to qualify for full membership in the Society of Fire Protection Engineers.

~~RPS~~ - Reactor Protection System - All equipment which is Category I regardless of whether or not it is required for reactor shutdown.

~~Standard Time-Temperature Curve~~ - Represents the maximum severity, given in a time-temperature relationship, of a fire completely burning out a brick, wood-joisted building and its contents. This curve is utilized in NFPA No. 251 and ASTM E119 as a standard for construction fire resistive rating.

APPENDIX 5.6

REGULATORY GUIDE 1.120

FIRE PROTECTION GUIDELINES FOR NUCLEAR

POWER PLANTS

REVISION 1, NOVEMBER 1977

(Regulatory guide is provided
as a reference only and
is not entered in
the WordPerfect 5.1 or
Word Search package versions)

APPENDIX 5.7

APPENDIX R--FIRE PROTECTION PROGRAM FOR NUCLEAR POWER FACILITIES OPERATING PRIOR TO JANUARY 1, 1979

Introduction

Appendix A5.7 now applies to both the Byron and Braidwood stations. In cases where the description of conformance is only applicable to one of the stations, this is so indicated by following the description with the station name in parentheses.

APPENDIX R--FIRE PROTECTION PROGRAM FOR NUCLEAR POWER FACILITIES OPERATING PRIOR TO JAN. 1, 1979

10 CFR 50 APPENDIX R	BYRON/BRAIDWOOD CONFORMANCE	REMARKS
I. Introduction and Scope		
This Appendix applies to licensed nuclear power electric generating stations that were operating prior to January 1, 1979, except to the extent set forth in paragraph 50.48(b) of this part. With respect to certain generic issues for such facilities it sets forth fire protection features required to satisfy Criterion 3 of Appendix A to this part[5].		Although Appendix R to 10 CFR 50 applies strictly to plants licensed to operate prior to January 1, 1979, the NRC has made conformance to 10 CFR 50 Appendix R a licensing requirement for Byron/Braidwood. See NRC question 600.01 (June 3, 1981).
Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."		
When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boiloff.		
The phrases "important," or "safety-related," will be used throughout this Appendix R as applying to all safety functions. The phrase "safe shutdown" will be used throughout this Appendix R as applying to both hot and cold shutdown functions.		The design basis of the Byron/Braidwood plant has from the beginning been that Hot Standby (as defined in the Technical Requirements Manual) is a "safe shutdown" condition, since the plant can be maintained in Hot Standby for an extended period of time from outside the control room.
Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under postfire conditions does not per se impact public safety, the need to limit fire damage to		

10 CFR 50 APPENDIX R	BYRON/BRAIDWOOD CONFORMANCE	REMARKS
systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents. Three levels of fire damage limits are established according to the safety functions of the structure, system, or component:		
Safety Function Fire Damage Limits		
Hot Shutdown...One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) must be maintained free of the damage by a single fire, including an exposure fire.[1]		
Cold Shutdown...Both trains of equipment necessary to achieve cold shutdown may be damaged by a single fire, including an exposure fire, but damage must be limited so that at least one train can be repaired or made operable within 72 hours using onsite capability.		
Design Basis Accidents...Both trains of equipment necessary for mitigation of consequences following design basis accidents may be damaged by a single exposure fire.		
The most stringent fire damage limit shall apply for those systems that fall into more than one category. Redundant systems used to mitigate the consequences of other design basis accidents but not necessary for safe shutdown may be lost to a single exposure fire. However, protection shall be provided so that a fire		

10 CFR 50 APPENDIX R	BYRON/BRAIDWOOD CONFORMANCE	REMARKS
within only one such system will not damage the redundant system.		
II. General Requirements		
A. Fire Protection Program	The applicant's fire protection program complies with these requirements as described below.	
A fire protection program shall be established at each nuclear power plant. The program shall establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.	Administrative procedures define the requirements for fire prevention. The Fire Protection Report Section 2.3, "Fire Hazards Analysis" and Section 2.4, "Safe Shutdown Analysis" establish the components for safe shutdown. Prefire plans establish the components needed and the protection for the area.	
	Administrative Procedures define the responsibilities, procedures, and personnel for the Fire Protection Program.	
The fire protection program shall be under the direction of an individual who has been delegated authority commensurate with the responsibilities of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.	Administrative Procedures identify the individual delegated the authority for establishing the fire protection program. Administrative Procedures describe the organization and staff available to implement the program.	
The fire protection program shall extend the concept of defense-in-depth to fire protection in fire areas important to safety, with the following objectives;	Comply. The B/B fire protection program includes these general objectives within it.	
• to prevent fires from starting;	Administrative Procedures outline inspection requirements for spill prevention.	

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	Administrative Procedures control lumber plus other combustibles in the plant including safety-related areas.	
	Administrative Procedure control combustibles and flammable liquids.	
	Administrative Procedures address plant housekeeping and requires periodic instructions for fire hazards.	
	Administrative Procedures outline fire prevention when welding and cutting.	
	Administrative Procedures govern the handling and usage of combustible and flammable gas cylinders.	
• to detect rapidly, control, and extinguish promptly those fires that do occur;	The detection system alarms in the main control room. The proper method of reporting fires is identified in Administrative Procedures.	
	The Fire Marshall, Chief and brigade respond during a fire in accordance with Administrative Procedures.	
	Governing Administrative Procedures provide for a Fire Watch or other compensatory measures in areas where detection or suppression systems are inoperable.	
	Implementation of the prefire plans for the station is in accordance with Administrative Procedures.	
	Fire extinguishing is described by Administrative Procedures. In addition, agreements have been made with the local fire department for assistance.	
	Administrative Procedures address the implementation of the Fire Marshall, Fire Chief and Fire Brigade, respectively, in a fire situation. Administrative Procedures address Fire Department response, notification, mutual aid agreements and expected chain of events during a fire.	

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• to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.	Fire Protection Operating Procedures outline the manual initiation of CO_2 with loss of power.	
	Fire Protection Operating Procedures outline manual initiation of the charcoal filter deluge systems.	
	Fire Protection Operating Procedures outline manual initiation of Halon. These apply to areas where fire protection may fail to respond and allow for a longer duration.	
	The Fire Hazards Analysis 2.3 and Safe Shutdown Analysis 2.4 address components, structures, and safe shutdown capability.	
	Prefire plans address protection of equipment.	
B. Fire Hazards Analysis		
A fire hazard analysis shall be performed by qualified fire protection and reactor systems engineers to (1) consider potential in situ and transient fire hazards; (2) determine the consequences of fire in any location in the plant on the ability to safely shut down the reactor or on the ability to minimize and control and release of radioactivity to the environment; and (3) specify measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, systems, and components important to	A Fire Hazards Analysis was performed for the Byron/Braidwood stations and was included with the Fire Protection Report, filed with the NRC on October 31, 1977. This report documented conformance with BTP APCSB 9.5-1, Appendix A, but did not specifically address safe shutdown capability, the subject of Appendix R. The Applicant has performed Safe Shutdown Analyses for the Byron and Braidwood units which demonstrate the ability to safely shut down the units following a fire in any zone. The analyses are included in Section 2.4 of the Fire Protection Report. The fire hazards analysis and the safe shutdown analysis were performed primarily by the architect/engineer for this plant. Engineering personnel from the AE's mechanical, electrical and structural	

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safety in accordance with NRC guidelines and regulations.	disciplines participated in these efforts. They are thoroughly familiar with the overall plant design and with the design of the many systems and components within the plant, including the reactor and related systems. Significant participation was also obtained from the applicant's engineering staff and the station personnel (fire marshall and operating staff). A qualified fire protection engineer participated in the preparation of the fire hazards analysis, and reviewed the final results. The participation by engineers from all of the relevant disciplines, and personnel experienced in operation as well as design ensures that the requirements set forth here have been met. Also see FPR Section 3.1.b.	
C. Fire Prevention Features Fire Protection features shall meet the following general requirements for all fire areas that contain or present a fire hazard to structures, systems, or components important to safety.	Comply. The fire prevention program and plant features meet these requirements.	
1. In situ fire hazards shall be identified and suitable protection provided.	Fire hazards were considered in the plant design as shown in the Fire Protection Report Section 2.3. In situ combustible materials have been identified for all fire zones in the plant and they are listed in Table 2.2-1 of the Fire Protection Report. Suitable protection has been provided for all plant areas. Table 2.2-3 also lists all detection and suppression available in each fire zone.	
2. Transient fire hazards associated with normal operation, maintenance, repair, or modification activities shall be identified and eliminated where possible. Those transient fire hazards that	The fire hazard analysis includes an allowance for transient combustibles in the combustible inventory for each fire zone unless the fire zone is a controlled access area. Specific transient materials which could be present are not identified; rather, a transient hazard equivalent in Btu content to one or more 55-gallon drums	

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cannot be eliminated shall be controlled and suitable protection provided.	of lubricating oil is assumed and the Btu content is added to that of the identified in situ combustibles in calculating the fire zones fire load. Administrative controls relating to the control of transient combustibles are established as discussed in FPR Section 3.2.a through 3.2.c.	
3. Fire detection systems, portable extinguishes, and standpipe and hose stations shall be installed.	Byron/Braidwood Stations comply with exceptions as documented in the FPR Section 3.6.	
4. Fire barriers or automatic suppression systems or both shall be installed as necessary to protect redundant systems or components necessary for safe shutdown.	Redundant safe shutdown components and systems are not always separated by fire barriers and/or protected by automatic suppression systems. All deviations from this requirement are identified and justified in Appendix A5.8 and Generic Letter 86-10 evaluations.	
5. A site fire brigade shall be established, trained, and equipped and shall be on site at all times.	The site fire brigade is established as described in Administrative Procedures. Refer to Section III.H and III.I of this Appendix.	
6. Fire detection and suppression systems shall be designed, installed, maintained, and tested by personnel properly qualified by experience and training in fire protection systems.	Byron/Braidwood Stations fire protection and suppression systems are designed and constructed as described in FPR Section 3.1 of Paragraph 1.a., <u>Responsibility for Fire Protection Program, Design Phase</u> and 1.b, <u>Construction and Operating Phase.</u> Surveillance procedures are established for the maintenance and testing of fire detection and suppression systems. See also FPR Sections 3.1.a(3) and 3.1.a(5). Surveillance procedures have been established to ensure that fire barriers are in place and fire suppression systems are operable. See also FPR Section 3.2.j.	

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7. Surveillance procedures shall be established to ensure that fire barriers are in place and that fire suppression systems and components are operable.		
D. Alternative or Dedicated Shutdown Capability In areas where the fire protection features cannot ensure safe shutdown capability in the event of a fire in that area, alternative or dedicated safe shutdown capability shall be provided.	Byron/Braidwood complies with this requirement. Specific plant areas for which alternate shutdown components or systems have been installed include the control room and the auxiliary electrical equipment room. Specific details for each room are described in Section 2.4 of the Fire Protection Report.	
III. Specific Requirements		
A. Water supplies for Fire Suppression Systems		
Two separate water supplies shall be provided to furnish necessary water volume and pressure to the fire main loop.	The B/B design complies with these requirements in Part A as described in Section 3.6.b and Appendix 5.4, Subsection A5.4.1 of the FPR.	
Each supply shall consist of a storage tank, pump, piping, and appropriate isolation and control valves. Two separate redundant suctions in one or more intake structures from a large body of water (river, lake, etc.) will satisfy the requirement for two separated water storage tanks. These supplies shall be separated so that a failure of one supply will not result in a failure of the other supply.		
Each supply of the fire water distribution system shall be capable of providing for a period of 2 hours the maximum expected water demands as determined by the fire hazards analysis for safety-related areas or other		

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areas that present a fire exposure hazard to safety-related areas.		
When storage tanks are used for combined service-water/fire-water uses the minimum volume for fire uses shall be ensured by means of dedicated tanks or by some physical means such as vertical standpipe for other water service. Administrative controls, including locks for tank outlet valves, are unacceptable as the only means to ensure minimum water volume.		
Other water systems used as one of the two fire water supplies shall be permanently connected to the fire main system and shall be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems shall satisfy the requirements for the main fire pumps. The use of other water systems for fire protection shall not be incompatible with their functions required for safe plant shutdown. Failure of the other system shall not degrade the fire main system.		
B. Sectional Isolation Valves		
Sectional isolation valves such as post indicator valves or key-operated valves shall be installed in the fire main loop to permit isolation of portions of the main fire main loop for maintenance or repair without interrupting the entire water supply.	The B/B design complies with this requirement as described in Section 3.6.b(2) and Appendix 5.4, Subsection 5.4.1 of the FPR.	

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C. Hydrant Isolation Valves		
Valves shall be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.	The B/B design complies with this requirement as described in Section 3.6.b(3) and Appendix 5.4, Subsection 5.4.1 of the FPR.	
D. Manual Fire Suppression		
Standpipe and hose systems shall be installed so that at least one effective hose stream will be able to reach any location that contains or presents an exposure fire hazard to structures, systems, or components important to safety.	B/B complies with exceptions as noted in FPR Section 3.6.c(4) and Appendix 5.4, Subsection A5.4.7.	
Access to permit effective functioning of the fire brigade shall be provided to all areas that contain or present an exposure fire hazard to structures, systems, or components important to safety.	B/B complies. Access routes for fire fighting are listed in the Pre-Fire Plans.	
Standpipe and hose stations, shall be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment. For BWR drywells, standpipe and hose stations shall be placed outside the drywell with adequate lengths of hose to reach any location	B/B complies. See FPR Sections 2.3.1, 3.7.a, and Appendix 5.4, Subsection A5.4.7.	

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inside the drywell with an effective hose stream.		
E. Hydrostatic Hose Tests		
Fire hose shall be hydrostatically tested at a pressure of 150 psi or 50 psi above maximum fire main operating pressure, whichever is greater. Hose stored in outside hose houses shall be tested annually. Interior standpipe hose shall be tested every three years.	Byron/Braidwood comply by satisfying the recommendations of NFPA 1962 and BTP CMEB 9.5.1. See also FPR Section 3.6.c(6).	
F. Automatic Fire Detection		
Automatic fire detection systems shall be installed in all areas of the plant that contain or present an exposure fire hazard to safe shutdown or safety-related systems or components. These fire detection systems shall be capable of operating with or without offsite power.	B/B complies. See FPR Section 3.6.a and Appendix 5.4, Subsection A5.4.8.	
G. Fire Protection of Safe Shutdown Capability		
1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that: a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and	Byron/Braidwood complies with this requirement. Certain plant configurations exist, each of which is described and justified below under the discussion for Section III.G.2 and Appendix A5.8, where separation of redundant safe shutdown components or systems is not as specified in Section III.G.2. Taking credit for the alternative separation and protection features identified in these deviations from the requirements of Section III.G.2, one train of systems necessary to achieve and maintain hot shutdown will remain free of fire damage, and systems required to achieve and maintain cold shutdown will either remain free of fire damage or will be repairable so that cold shutdown can be	

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b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.	achieved within 72 hours, for each fire area in the plant.	
2. Except as provided for Paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, or redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:	Deviations from the requirements of Section III.G.2 are described in Appendix A5.8 and Generic Letter 86-10 evaluations. In each case, a detailed description of the deviations is included, modifications (if any) implemented as a result of the deviation are described, and a justification for the deviation is provided.	
a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be provided to provide fire resistance equivalent to that required of the barrier;		
b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a		

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horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or		
c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area;		
Inside noninerted containments one of the fire protection means specified above or one of the following fire protection means shall be provided:		
d. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards;		
e. Installation of fire detectors and an automatic fire suppression system in the fire area; or		

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f. Separation of cables and equipment and associated non-safety circuits of redundant trains by a noncombustible radiant energy shield.		
3. Alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room or zone under consideration, shall be provided;	Taking credit for the alternative separation and protection features described above for those plant areas which deviate from the requirements of Section III.G.2, Byron/Braidwood complies with this requirement.	
a. Where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G.2 of this section; or		
b. Where redundant trains of systems required for hot shutdown located in the same fire area may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems.		
In addition, fire detection and a fixed fire suppression system shall be installed in the area, room, or zone under consideration.		
H. Fire Brigade		
A site brigade trained and equipped for fire fighting shall be established to ensure adequate manual fire fighting capability for all areas of the plant	Byron and Braidwood comply, except as noted below. The fire brigade will meet the requirements stated herein, except that exception is taken to the performance standards required by the	

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containing structures, systems, or components important to safety. The fire brigade shall be at least five members on each shift. The brigade leader and at least two brigade members shall have sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The qualification of fire brigade members shall include an annual physical examination to determine their ability to perform strenuous fire fighting activities. The shift supervisor shall not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.	annual physical examination. The wording "ability to perform strenuous fire fighting activities" is lacking in specific detail and is open to wide interpretation. The annual physical will demonstrate that fire brigade members are capable of performing unrestricted physical activity. The Fire Protection Program Administrative Procedures sets forth the qualifications for the members of the fire brigade. These requirements set forth the training and physical condition of the members of the brigade. All brigade members complete the training course set forth by the Production Training Department Technical Training Section "Training Standard for Initial Training of Nuclear Station Fire Brigade Members." A competent fire brigade leader will respond to a fire. The Braidwood off-site fire department is the primary responder in the event of a fire at the Braidwood Lake Screen House (LSH). The site Fire Brigade Chief may also respond to a fire at the LSH. The Custer Park Fire Department is the primary responder in the event of a fire at the Braidwood River Screen House. The Byron offsite fire department is the primary responder in the event of a fire at the Byron River Screen House (RSH). A Byron Station operator will also respond to a fire at the RSH.	Reference EC 361785. Reference EC 368713
The minimum equipment provided for the brigade shall consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishes. Self-contained breathing apparatus using full-face positive-pressure masks approved by NIOSH (National Institute for Occupational Safety and Health-approval formerly given by the U.S. Bureau of Mines) shall be provided for fire brigade, damage control, and control room personnel. At least 10 masks shall be available for fire brigade personnel. Control	Comply. The Fire Protection Program Administrative Procedures provides the requirement of the Fire Brigade inventory to be performed and lists the equipment to be inventoried.	

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room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or rated operating life shall be a minimum of one-half hour for the self-contained units.		
At least two extra air bottles shall be located onsite for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air shall be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air shall be used; compressors shall be operable assuming a loss of offsite power. Special care must be taken to locate the compressor in areas free of dust and contaminants.	Comply. The extra air bottles are included in inventory procedures for the fire brigade equipment. The 6-hour supply of reserve air is supplied by a bank of cylinders and/or bottles which is under the control of the Rad-Chem department. Compressors are not used to meet supply requirements for breathing air for the fire brigade.	
I. Fire Brigade Training		
The fire brigde training program shall ensure that the capability to fight potential fires is established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire fighting practice, and fire drills.	The fire brigade training program meets the requirements presented herein. The fire brigade training program is administered through a Training Standard for Nuclear Station Fire Brigade Members developed by the Braidwood Production Training Center.	
1. Instruction		
a. The initial classroom instruction shall include:		
(1) Indoctrination of the plant fire fighting plan with	Byron and Braidwood comply with Parts a through e. See Fire Protection Administrative Procedures.	

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Specific identification of each individual's responsibilities.		
(2) Identification of the type and location of fire hazards and associated types of fires that could occur in the plant.		
(3) The toxic and corrosive characteristics of expected products of combustion.		
(4) Identification of the location of fire fighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area.		
(5) The proper use of available fire fighting equipment and the correct method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in cables and cable trays, hydrogen fires, fires involving flammable and		

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Combustible liquids or hazardous process chemicals, fires resulting from construction or modifications (welding), and record file fires.		
(6) The proper use of communication, lighting, ventilation, and emergency breathing equipment.		
(7) The proper method for fighting fires inside buildings and confined spaces.		
(8) The direction and coordination of the fire fighting activities (fire brigade leaders only).	All brigade members get the leadership course.	
(9) Detailed review of fire fighting strategies and procedures.	Training of fire-fighting strategies and procedures is included in the initial and continued training.	
(10) Review of the latest plant modifications and corresponding changes in fire fighting plans.	This subject is covered during fire brigade training.	
NOTE: Items (9) and (10) may be deleted from the training of no more than two of the non-operations personnel who		

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may be assigned to the fire brigade.		
b. The instruction shall be provided by qualified individuals who are knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.	Licensed qualified instructors from the company training department or local fire department have provided the initial training of the fire brigade (Byron). The training of the fire brigade is conducted by a qualified member of the training department. State-certified members of the Fire Marshall's staff monitor this training (Braidwood).	
c. Instruction shall be provided to all fire brigade members and fire brigade leaders.		
d. Regular planned meetings shall be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.	Comply. The Fire Protection Program sets forth the requirements to hold planned meetings quarterly for all brigade members to review changes in the fire protection program, etc.	
e. Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a two-year period. These sessions may be concurrent with the regular planned meetings.	Comply. Periodic refresher training is included in the Training Standard for Nuclear Station Fire Brigade Members.	
2. Practice		
Practice sessions shall be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide	Byron and Braidwood comply. Practice sessions in actual fire extinguishment and use of emergency breathing apparatus under strenuous conditions is accomplished through the annual fire extinguisher	

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brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting. These practice sessions shall be provided at least once per year for each fire brigade member.	training on live fires and annual smokehouse/live fire training. Practice sessions are also addressed in Administrative Procedures.	
3. Drills		
a. Fire brigade drills shall be performed in the plant so that the fire brigade can practice as a team.	Items 3a through 3e are accomplished by Administrative Procedures on Fire Drills. The type of drills and assessment of the drills are documented on a "Fire Drill Critique Record." Byron and Braidwood comply with parts a through e, except as noted.	
b. Drills shall be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each fire brigade member should participate in each drill, but must participate in at least two drills per year. A sufficient number of these drills, but not less than one for each shift fire brigade per year, shall be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill shall ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is	Comply except as noted below: Byron/Braidwood Stations will perform fire brigade drill training such that the fire brigade drills once per quarter, so that each fire brigade member participates in at least two fire brigade drills per year. The brigade performs during the drill as a team. The members may not always be the same personnel.	

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begun. Unannounced drills shall not be scheduled closer than four weeks.		
At least one drill per year shall be performed on a "back-shift" for each shift fire brigade.		
c. The drills shall be preplanned to establish the training objectives of the drill and shall be critiqued to determine how well the training objectives have been met. Unannounced drills shall be planned and critiqued by members of the management staff responsible for plant safety and fire protection. Performance deficiencies of a fire brigade or of individual fire brigade members shall be remedied by scheduling additional training for the brigade or members.		
Unsatisfactory drill performance shall be followed by a repeat drill within 30 days.		
d. At 3-year intervals, a randomly selected unannounced drill shall be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals shall be available for NRC review.		
e. Drills shall as a minimum include the following:		
(1) Assessment of fire alarm effectiveness, time required to notify and		

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assemble fire brigade and selection, placement and use of equipment, and fire fighting strategies.		
(2) Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade member's conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment to the extent practicable.		
(3) The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should differ from those used in the previous drill so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain		

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equipment and organize for the fire assuming loss of automatic suppression capability.		
(4) Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.		
4. Records		
Individual records of training provided to each fire brigade member, including drill critiques, shall be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training shall be available for NRC review. Retraining or broadened training for fire fighting within buildings shall be scheduled for all those brigade members whose performance records show deficiencies.	Comply. Individual records of training for each brigade member are retained by the training department and will be available for review. The drill critique is retained in central file and will be available for review.	
J. Emergency Lighting		
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.	B/B complies. Eight-hour, battery-powered emergency lights are provided for plant areas that need to be manned for safe shutdown and in access and egress routes thereto. Testing will demonstrate the 8-hour rating of these units.	
K. Administrative Controls		
Administrative controls shall be established to minimize fire hazards in areas containing structures, systems, and components important to safety.	Byron and Braidwood comply. Administrative controls will be in effect which will comply with the requirements of this section.	

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These controls shall establish procedures to:		
1. Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high efficiency particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.	Comply. Administrative Procedures on "Fire Prevention For Use of Lumber and Other Combustibles" govern the handling and limitation of ordinary combustible materials. Administrative Procedures on "Control of Flammable and Combustible Liquids" govern the handling and limitation of flammable gases and liquids. Administrative Procedures govern the handling and usage of combustible/ flammable gas cylinders.	
2. Prohibit the storage of combustibles in safety-related areas or establish designated storage areas with appropriate fire protection.	Comply. Routine fire prevention operator rounds are performed on each shift by the Equipment Operator or Equipment Attendant. Special periodic fire inspections are conducted in the storage areas inside or adjacent to safety-related structures or systems to identify any buildup of combustible material or other fire hazards. Periodic fire inspections are conducted. Administrative Procedures prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods.	
3. Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating and especially during maintenance, modification, or refueling operations.	Comply. Byron will incorporate into administrative procedures provisions to control transient combustibles. The procedures will state that transient combustibles in safety-related areas, which are not in approved containers, shall not be left unattended. Administrative Procedures govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, compressed gas cylinders, or other combustible materials in buildings containing safety-related systems or equipment.	

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4. Designate the onsite staff member responsible for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure.	Same procedures as in Item 1 above govern. Comply. The station Fire Marshall is the designated staff member as set forth in Administrative Procedures.	
5. Govern the use of ignition sources by use of a flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit shall be issued for each area where work is to be done. If work continues over more than one shift, the permit shall be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown.	Comply. The welding and flame cutting work is done at each station in accordance with NFPA 51B. Administrative Procedures cover preparation and inspection for fire prevention when welding and cutting is performed. It also covers filling out cutting and welding permits and precautions during cutting and/or welding.	
6. Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity, immediately following completion of the activity, or at the end of each work shift, whichever comes first.	Comply. Administrative Procedures on "Station Housekeeping Equipment Preservation Procedure," specifies that combustible material can not be left unattended in safety-related areas.	
7. Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.	Comply. Administrative Procedure assures that good housekeeping inspections are met.	
8. Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas	Comply, with exceptions below:	

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during maintenance, modification, or refueling operations (such as lay-down blocks or scaffolding) shall be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all combustible materials shall be removed from the area immediately following the unpacking. Such transient combustible materials, unless stored in approved containers, shall not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing material such as wood or paper excelsior, or polyethylene sheeting shall be placed in metal containers with tight-fitting self-closing metal covers.	The reactor facility at Byron/Braidwood was designed to ensure that the probability of events such as fires and explosions and other potential consequences of such events will not result in undue risk to the health and safety of the public. Noncombustible and fire resistant materials were used throughout the facility wherever necessary to preclude such risks, particularly in areas containing critical portions of the facility such as containment, control room, and components of engineered safety features. Combustible materials are not used when substitutes are available. When combustible materials are used, they are treated with fire retardant material or they are controlled as to their fire hazard. The control and use of specific combustibles in safety-related areas is assured by Administrative Procedures on "Fire Protection for Use of Lumber and Other Combustibles." Exception is taken in regards to new fuel which is stored wrapped in polyethylene bags for cleanliness requirements.	
9. Control actions to be taken by an individual discovering a fire. For example, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.	Comply. Administrative Procedures on "Fire and Emergency Notification and Evacuation Plan" states actions to be taken by an individual discovering a fire. Comply. Administrative Procedures on "Fire Protection Program", states actions to be taken by an individual discovering a fire.	
10. Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, for	Comply. Administrative Procedures on "Fire and Emergency Notification and Evacuation Plan" states the actions to be taken by the control room operator on the report of a fire.	

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example, announcing location of fire over PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.	Administrative Procedures also describe the sequence of events to take place in the event of a fire at the Braidwood Station. Operating procedures address "Plant Wide Fire Alarm Actuation."	
11. Control actions to be taken by the fire brigade after notification by the control room operator of a fire, for example, assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific fire fighting responsibilities including selection and transportation of fire fighting equipment to fire location, selection of protective equipment, operating instructions for use of fire suppression systems, and use of preplanned strategies for fighting fires in specific areas.	Comply. The actions to be taken by the fire brigade after notification by the control room operator of a fire is identified in Administrative Procedures.	
12. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies shall designate:	Comply, with exceptions noted below. Pre-fire plans have been developed which address the concerns listed here as described below.	
a. Fire hazards in each area covered by the specific pre-fire plans.	Comply. The pre-fire plans identify major in situ combustibles for the areas they cover.	
b. Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the	The pre-fire plans identify all automatic and manual suppression equipment in the area, and its location. The extinguishing methods provided are chosen to be the best available to cover identified in situ fire hazards.	

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nearest location of these extinguishants.		
c. Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.	The pre-fire plans identify available access routes for each zone. The most favorable direction or location to fight specific fires from are not identified. The fire brigade can best determine this upon reaching the scene of an actual fire.	Particularly for large rooms and general areas, the number of possible fire locations are too numerous to attempt to develop specific strategies beforehand.
d. Plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).	Important plant systems and components and potentially hazardous electrical components are identified in the pre-fire plans.	
e. Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles	Comply. Vital components have been defined in pre-fire plans.	

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that need cooling should be designated.		
f. Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the scenes, applying the extinguishant to the fire, communication with the control room, and coordination with outside fire departments.	Byron and Braidwood comply. See Administrative Procedures at the stations. All fire brigade members receive all of the specialized training mentioned here.	
g. Potential radiological and toxic hazards in fire zones.	Comply. Potential radiological and toxic hazards are identified in the pre-fire plans.	
h. Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operations.	Comply. Ventilation system operation for smoke removal is addressed. Ventilation system design is such that fires in specific rooms will affect only the ventilation for that room or division.	
i. Operations requiring control room and shift engineer coordination or authorization.	Fire fighting operations per se are not expected to require control room or shift engineer coordination.	
j. Instructions for plant operators and general plant personnel during fire.	This is addressed by station procedures other than the pre-fire plans.	

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L. Alternative and Dedicated Shutdown Capability		
1. Alternative or dedicated shutdown capability provided for a specific fire area shall be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby[7] conditions for a PWR (hot shutdown[7] for a BWR) and achieve cold shutdown[7] conditions within 72 hours and maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture or any primary coolant boundary, or rupture of the containment boundary.	Byron and Braidwood comply. Alternate shutdown components or systems are provided for all plant areas where the separation requirements of Section III.G cannot be met. The requirements stated herein are met as described in Section 2.4 of the Fire Protection Report.	
2. The performance goals for the shutdown functions shall be:	Byron/Braidwood complies with this requirement as described in Section 2.4 of the Fire Protection Report.	The performance goals listed have been implemented in conducting the Safe Shutdown Analysis.
a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.		
b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of		

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the core for BWRs and be within the level indication in the pressurizer for PWRs.		
c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.		
d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.		
e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.		
3. The shutdown capability for specific fire areas may be unique for each such area, or it may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures shall be in effect to implement this capability.	Byron/Braidwood complies with this requirement. Refer to Section 2.4 of the Fire Protection Report for a description of safe shutdown capability for each fire zone.	

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4. In the capability to achieve and maintain cold shutdown will not be available because of fire damage, the equipment and systems comprising the means to achieve and maintain the hot standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be on site at all times.	B/B complies. Refer to Safe Shutdown Analysis, (Section 2.4 of FPR).	
5. Equipment and systems comprising the means to achieve and maintain cold shutdown conditions shall not be damaged by fire; or the fire damage to such equipment and systems shall be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available on site and procedures shall be in effect to implement such repairs. If such equipment and systems used prior to 72 hours after the fire will not be capable of being powered by both onsite and offsite electrical power systems because of fire	Byron/Braidwood complies with this requirement provided credit is taken for alternative separation and protection features for certain plant areas described above under Section III.G.2.	

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damage an independent onsite power system shall be provided. Equipment and systems used after 72 hours may be powered by offsite power only.		
6. Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.	Byron/Braidwood complies with this requirement. The only equipment which has been installed to ensure postfire safe shutdown capability is the Fire Hazards Panel which includes certain instruments which would otherwise be unavailable following a fire in either the control room or the auxiliary electrical equipment room. This panel is described in Subsection 2.4.2.16 of the Fire Protection Report. Its design complies with the requirements stated herein.	
7. The safe shutdown equipment and systems for each fire area shall be known to be isolated from associated non-safety circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown division cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, shall be such that a postulated fire involving associated circuits will not prevent safe shutdown.	There are no associated circuits as defined in IEEE 384-1974 at B/B. Associated circuits as defined in NRC's April 6, 1982, clarification letters to Generic Letter 81-12 are addressed in Subsection 2.4.1 of the Fire Protection Report.	

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M. Fire Barrier Cable Penetration Seal Qualification Penetration seal designs shall utilize only noncombustible materials and shall be qualified by tests that are comparable to tests used to rate fire barriers. The acceptance criteria for the test shall include: 1. The cable fire barrier penetration seal has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier; 2. The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature is sufficiently below the cable insulation ignition temperature; and 3. The fire barrier penetration seal remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.	B/B complies. See FPR Sections 3.5(a)(3)(a) through (c) and Appendix 5.2, Subsection A5.2.2. Fire-rated penetration seals in fire-rated assemblies separating safety-related fire areas or separating portions of redundant systems important to safe shutdown within a fire area are inspected by Surveillance Procedures. See contractors test reports for details on the acceptability of seals.	
N. Fire Doors Fire doors shall be self-closing or provided with closing mechanisms and shall be inspected semiannually to verify that automatic hold-open, release, and closing mechanisms and latches are operable.	Byron/Braidwood complies. See FPR Section 3.5.a (5).	

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One of the following measures shall be provided to ensure they will protect the opening as required in case of fire:		
1. Fire doors shall be kept closed and electrically supervised at a continuously manned location;	All fire doors have automatic closures. Cable spreading rooms have electrically supervised doors alarming in the control room.	
2. Fire doors shall be locked and inspected weekly to verify that the doors are in the closed position;	Personnel will walk down fire doors, which are unlocked or nonelectrically supervised, once per day at Braidwood and every 7 days at Byron. Locked doors will be surveilled once per week at Braidwood and every 31 days at Byron. Electrically supervised fire doors will be surveilled monthly at Braidwood and every 92 days at Byron. The Byron surveillance frequency is based on historical analysis of plant specific records (document identification number DG99-000873).	
3. Fire doors shall be provided with automatic hold-open and release mechanisms and inspected daily to verify that doorways are free of obstructions; or		
4. Fire doors shall be kept closed and inspected daily to verify that they are in the closed position. The fire brigade leader shall have ready access to keys for any locked fire doors. Areas protected by automatic total flooding gas suppression systems shall have electrically supervised self-closing fire doors or shall satisfy option 1 above.		

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O. Oil Collection System for Reactor Coolant Pump The reactor coolant pump shall be equipped with an oil collection system if the containment is not inerted during normal operation.	B/B complies. A drip pan system which meets the guidelines of Appendix R to 10 CFR 50 has been designed for the reactor coolant pump (RCP) motors for the Byron/Braidwood Stations.	

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The oil collection system shall be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake.[9]	Seven drip pans will be installed on each pump. These seven pans will collect oil drips from all potential leakage points and route this oil to a safe collection point. The following seven pans are installed on each pump:	
Such collection systems shall be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage shall be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines, and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line shall be large enough to accommodate the largest potential oil break.	a. A drip pan inside the motor housing below the lower motor bearing. b. A drip pan under the bottom of the oil cooler. c. A drip pan around the oil cooler under the upper flange. d. A drip pan which encloses the oil lift pump. e. A drip pan under the oil level alarm and sight gauge. f. A drip pan under the flange on the oil line from the RCP motor to the oil cooler inlet. g. A drip pan under the flange on the oil line from the oil cooler outlet to the RCP motor; this pan also encompasses the oil drain valve connection. The pans are designed such that all external piping connections are above the pans. A piping system collects all the oil drips and seepage and routes the oil to closed containers in the containment which are sized to collect the amount of oil expected to be collected between outages. In the event of a major leak, an overflow line from the containers will transfer the oil directly into the containment oil collection vault. In the unlikely event the vault is overfilled, the oil would back up into the containment floor drain sump. Under no conditions would the oil drain into an area which is not closed.	

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	A spare RCP motor is located on elevation 401 feet 0 inch in the Fuel Handling Building at Braidwood. The RCP assembly contains 240 gallons of lubricating oil. An oil collection system is not provided. Except during a periodic preventative maintenance surveillance to rotate the motor, the oil is not normally pressurized.	This configuration does not present a similar fire hazard as an inservice RCP inside containment. The hazard presented by the spare RCP configuration without an oil collection system has been evaluated, and the design features are adequate for the level of hazard.

APPENDIX 5.8

DEVIATIONS FROM
BRANCH TECHNICAL POSITION
CMEB 9.5-1 SECTION C.5.b

TABLE OF CONTENTS

A5.8 DEVIATIONS FROM SECTION C.5.b OF BTP CMEB 9.5-1

INTRODUCTION

This appendix addresses deviations from Section C.5.b “Safe Shutdown Capability” of BTP CMEB 9.5-1 that exist because of redundant safe shutdown equipment located in a fire zone. Deviations common to both Unit 1 and Unit 2 begin with the number "0". Unit 1 deviations begin with the number "1" and Unit 2 deviations begin with the number "2".

A5.8.1 Deviation No: 0A.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone, and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 2.1-0)

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 2.1-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables located in Fire Zone 2.1-0 are not separated by a 20-foot space free of combustible materials and the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.20 and 2A.20 in FPR Amendment 20.)

Justification for Deviation(s)

Controls and instrumentation for all plant systems are located in the control room. Although separation of redundant trains does not meet the requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1, alternative shutdown systems and equipment independent of this zone are provided. Specifically, the remote Shutdown Panel and Fire Hazards Panel have sufficient controls and instrumentation to bring the plant to hot standby, and taking credit for local manual operations, cold shutdown can be achieved. This meets the requirements of Section C.5.B(3),and is therefore acceptable.

A5.8.2 Deviation No: 0A.2

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the auxiliary building general area at elevation 364 feet).

Fire Zone(s) or Elevations Involved

364 feet 0 inch (Fire Zone 11.3-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.3-0 are listed in Table 2.4-4. However, not all of these cables and components are the subject of this deviation.

Description of Deviation

The five component cooling pumps for both units ("0", 1A, 1B, 2A and 2B) and pump power cables are present in Fire Zone 11.3-0, and are located in a small area. For either of the two units, the separation between the redundant pumps and their associated power cables is less than 20 horizontal feet.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant pumps and their power cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This requirement is not met because the redundant pumps and their associated power cables are less than 20 feet apart, and intervening combustibles are present. Although detection is available in this fire zone, this requirement is also not met because an area-wide automatic fire suppression system is not provided in the fire zone (note that a partial coverage automatic suppression system is installed in the immediate area of the component cooling water pumps). Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an area-wide automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.15 and 2A.15 in FPR Amendment 20.)

Justification for Deviation

In order to ensure that a single fire cannot damage all of the component cooling water pumps and cables in the zone, the following fire protection measures are employed:

Partial height masonry walls separate the redundant component cooling water pumps. One partial height wall separates the 1A and 1B pumps from the common pump and the two Unit 2 pumps. A second partial height wall separates the 2A and 2B pumps from the common pump and the two Unit 1 pumps.

The routing of the power cable for the common component cooling water pump is limited to the area directly adjacent to the pump motor and is separated from the redundant cables by the partial height masonry walls. This cable is terminated at the motor and is routed directly through the 364-foot slab into the fire zone below.

An automatic fixed water suppression system is installed over the component cooling water pumps. This sprinkler system provides adequate coverage for an area out to at least 20 feet past the pumps in all directions. The pump motors have spray shields to prevent water damage.

The component cooling water heat exchangers separate the pumps from the rest of the area and will act as radiant energy shields should a fire break out elsewhere in the room.

This is a large open area with a low combustible loading. Area wide detection is provided.

Because of the partial height masonry walls, the common pump power cable routing, the area wide detection and the automatic water suppression system over the component cooling water pumps, and the large area and low combustible loading of this zone, the damage from a single fire will be limited such that at most two of the pumps could be affected. For each single fire in the area of the pumps, at least three of the pumps will remain available to serve the demand for both units. Thus, a level of protection equivalent to that of Section C.5.B(2) is achieved.

A5.8.3 Deviation No: 0A.3

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 383 feet).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables located in Fire Zone 11.4-0 are less than 20 feet apart and the intervening space contains combustible materials and the area is not covered by a total suppression system which is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.16 and 2A.16 in FPR Amendment 20.)

Justification for Deviation(s)

The diesel-driven auxiliary feedwater pumps are located within their own rooms, which have 3-hour fire-rated barriers separating them from the general area outside. These pumps can be manually started from a local control panel in these rooms, and they will operate by manual remote start capability completely independent of the associated cables located outside of the room in the general area on Elevation 383 feet 0 inch (Fire Zone 11.4-0). Thus, the fact that cables for the motor driven and diesel driven AFW pumps are present in the same area in Fire Zone 11.4-0 and could be damaged by a single fire is acceptable, since the Division 1(2)2 diesel-driven AFW pump can still be manually started and operated.

In order to provide an adequate supply of water to the secondary heat sink in a timely manner following a fire in this zone, remote start capability for the diesel-driven auxiliary feedwater pumps is required. Therefore, a remote switch has been installed at the elevation below in Fire Zone 11.3-0 to ensure that the diesel-driven auxiliary feedwater pumps can be manually started in the case of a fire in Fire Zone 11.4-0.

Cables 1(2)AF346 and 1(2)AF338 routed through Fire Zone 11.4-0 supply a low-low suction pressure signal that could trip the 1(2)B auxiliary feedwater pump. If this happens, the 1(2)B pump can be manually started even if cables 1(2)AF346 and 1(2)AF338 are damaged by a fire. Several other cables associated with both AFW pumps are routed through Fire Zone 11.4-0; however, an evaluation has shown that the 1(2)B AFW pump can be started locally if a fire destroyed these cables. Although cables for both AFW pumps are present in the same area in Fire Zone 11.4-0 and could be damaged by a single fire, the Division 1(2)2 diesel-driven AFW can still be manually started and operated.

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system. The fire zone is provided with fire detection and manual suppression capability.

In summary, the automatic fire detection and manual suppression capabilities, controlled access, and manual provisions to manually start the 1(2)B AFW pump and provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.4 Deviation No: 0A.4

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (Auxiliary Building, Remote Shutdown Panel Rooms, elevation 383 feet).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4C-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4C-0 are listed in Table 2.4-4.

Description of Deviation(s)

The Units 1 and 2 remote shutdown panels are located in this zone. A fire in this zone could render inoperable the remote shutdown panels and the corresponding controls in the control room. As a result, redundant systems required for safe shutdown could be adversely affected. In addition, no area-wide automatic fire suppression is provided. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.24 and 2A.24 in FPR Amendment 20.)

Justification for Deviation(s)

Fire Zone 11.4C-0 is separated from the rest of the plant by 3-hour-rated fire barriers. The remote shutdown control panels for Unit 1 are contained in a room that is separated from the room containing the Unit 2 remote shutdown control panels by approximately 90 feet. One manual hose station and several portable fire extinguishers are available in this zone. Ionization detectors are provided throughout the fire zone, including the rooms with the remote shutdown panels, which annunciate and alarm in the control room. The fire load is moderately low and the bulk of combustible materials consist of cable insulation. In the event of a fire in this zone, safe shutdown of the plant can be achieved by local operation of equipment. Also, instruments located at the remote shutdown panels are isolated so that a fire in the room will not affect the instruments in the control room.

In summary, the low combustible loading, automatic fire detection and manual suppression capabilities, and local operation of safe shutdown equipment provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.5 Deviation No: 0A.5

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 401 feet).

Fire Zone(s) or Elevations Involved

401 feet 0 inch (Fire Zone 11.5-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.5-0 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.27 and 2A.29 in FPR Amendment 20.)

Justification for Deviation(s)

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system. The fire zone is provided with fire detection and manual suppression capability.

The automatic fire detection and manual suppression capabilities described in the Fire Hazard Analysis and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.6 Deviation No: 0A.6

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 426 feet).

Fire Zone(s) or Elevations Involved

426 feet 0 inch (Fire Zone 11.6-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.6-0 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.28 and 2A.30 in FPR Amendment 20.)

Justification for Deviation(s)

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system. The fire zone is provided with fire detection and manual suppression capability.

The automatic fire detection and manual suppression capabilities described in the Fire Hazard Analysis and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.7 Deviation No: 0A.7

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the auxiliary building HVAC exhaust complex).

Fire Zone(s) or Elevations Involved

Auxiliary Building HVAC Exhaust Complex (Fire Zone 11.7-0). This fire zone encompasses multiple elevations of the auxiliary building, including portions of 451 feet – 0 inch, 459 feet – 0 inch, 467 feet – 4 inch and 475 feet – 6 inch.

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.7-0 are listed in Table 2.4-4. However, not all of these cables and components are the subject of this deviation. The equipment and cables that are the subject of this deviation include the four auxiliary building HVAC supply fans, their respective power cables, the four auxiliary building HVAC exhaust fans and their respective power cables.

The four VA system exhaust fans are located on the 475 feet – 6 inch level. The A and B fans are located close together on the Unit 1 side. The C and D fans are located close together on the Unit 2 side. The A and B fans and their cables are separated from the C and D fans and their cables by approximately 40 feet with no significant quantities of intervening combustibles. The four VA system supply fans are located on the 451 feet –0 inch level. The A and B fans are located close together on the Unit 1 side. The C and D fans are located close together on the Unit 2 side. The A and B fans and their cables are separated from the C and D fans and their cables by a minimum of 40 feet with no significant quantities of intervening combustibles (although the charcoal filter units are located to the east side of this room on this elevation).

Description of Deviation

The four VA system supply fans and their power cables, and the four VA system exhaust fans and their power cables are present in the same zone.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant fans and their power cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. Although detection is available in this fire zone (except on elevation 475 feet 6 inch), this requirement is not met because an automatic fire suppression system is not provided in the fire zone. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.22 and 2A.22 in FPR Amendment 20.)

Justification for Deviation

The primary justification for this deviation consists of the judgement that a single fire in this zone will not affect all four trains of the auxiliary building ventilation system. This conclusion is based on the following information. The two Unit 1 (A and B) exhaust fans and their power feed cables are separated from the two Unit 2 (C and D) exhaust fans and their power feed cables by approximately 40 feet with no significant quantities of intervening combustible materials. The two Unit 1 (A and B) supply fans and their power feed cables are separated from the two Unit 2 (C and D) supply fans and their power feed cables by approximately 40 feet with no significant quantities of intervening combustible materials. The charcoal filters are present in this area. The filter units are housed in substantial steel enclosures that separate the combustible charcoal from the rest of the area. The charcoal filter units are provided with an independent detection system, and a manual deluge suppression system. This area is provided with ionization detection (except for El. 475 feet - 6 inch) that annunciates and alarms in the main control room. Manual hose stations and portable extinguishers are provided. Because of the type and configuration of combustible materials, the detection and suppression capabilities provided, and the existing physical separation between the Unit 1 / Unit 2 supply and exhaust fans and their cables, a single fire will not affect all four trains of the system.

Additional justification for the deviation is provided by an evaluation of the safe shutdown function of these components. The supply and exhaust fans together provide airflow to the auxiliary building general areas and the various cubicles and rooms containing plant equipment. This airflow serves the dual purpose of providing temperature control for the auxiliary building general areas, and establishing pressure balances to ensure air flows from general areas towards potentially contaminated areas (i.e., for radiological control). For major safe shutdown components located in their own rooms or cubicles, the primary cooling function is provided by cubicle coolers. Although the auxiliary building supply and exhaust fans are relied upon for cooling of some safe shutdown components in some fire zones, that is not the case for this particular fire zone. The safe shutdown cubicle coolers for the affected components are independent of the auxiliary building supply and exhaust fans and this fire zone. Therefore, a fire in this zone would not result in loss of the cooling function for major safe shutdown components, even should all four trains of the auxiliary building ventilation system be disabled. Loss of the radiological control function could not prevent safe shutdown of the plant, although it would present operation difficulties to the operating staff.

In consideration of the conditions and features discussed above, the separation between the A/B and C/D trains of the VA system supply and exhaust fans is judged to be adequate to prevent a fire from disabling all four trains. In addition, redundant cooling capability independent of this zone and the VA system supply and exhaust fans is provided for major safe shutdown components. Thus, a level of protection equivalent to that of Section C.5.B(2) is achieved.

A5.8.8 Deviation No: 1A.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 main steam tunnel).

Fire Zone(s) or Elevations Involved

Unit 1 Main Steam and Feedwater Pipe Tunnels at various elevations between 357 feet 0 inch and 377 feet 0 inch (Fire Zone 18.3-1). The two valve enclosures that extend up to grade elevation are also a part of this fire zone.

Description of Equipment/Cables Involved

The cables and equipment, required for safe shutdown and located in Fire Zone 18.3-1, are listed in Table 2.4-4. The redundant components and cables consist of valves and instruments in the main steam and auxiliary feedwater systems.

Description of Deviation

This fire zone encompasses two pipe tunnels and two physically separated valve houses. The two valve houses are located approximately 120 degrees apart at the northeast and northwest sides of the exterior containment wall. The below grade main steam and feedwater pipe tunnels connect the two valve houses. The northeast valve house contains safe components and piping associated with the "B" and "C" steam generators. The northwest valve house contains safe shutdown components and piping associated with the "A" and "D" steam generators. Safe shutdown components located in (or near to) the valve houses include the main steam safety valves, the steam generator PORVs, the MSIVs, MSIV bypass valves, steam generator pressure instruments and auxiliary feedwater system containment isolation valves. Cables associated with these components are present in the valve houses, and are also routed through the main steam and/or feedwater pipe tunnels to the auxiliary building. In the area of the pipe tunnels bounded by column-rows 5 to 10 and P to Q, cables for all of the redundant components may be present.

The combustible material present in this zone consists of hydraulic fluid that is located in the two valve houses. All cables routed through the pipe tunnels are located in conduit, and thus do not count as exposed combustibles. The main steam and feedwater pipe tunnels themselves have no combustible materials and no fire loading. Ionization detection is available in the two valve houses. The pipe tunnels themselves have no detection. Manual extinguishing capability consisting of portable extinguishers and a hose station is available to the area.

Separation between redundant component located in the two valve houses: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant components involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by

20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. The separation through the pipe tunnels between the two valve houses is in excess of 200 linear feet with no intervening combustibles. However, this requirement is not met because neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed. Therefore, the separation between redundant components in the two valve houses deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Separation between redundant cables within the pipe tunnels: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. Although the pipe tunnels have no fire loading (i.e., no combustible materials), this requirement is not met because existing separation is less than 20 horizontal feet. In addition, neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed in the pipe tunnels. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviation 1A.23 in FPR Amendment 20.)

Justification for Deviation

Separation between redundant component located in the two valve houses: Other than the oil associated with the valve hydraulic systems in both valve enclosures, there are no combustible materials in the main steam and feedwater tunnels, which then have no fire load. Detection and manual suppression capability are provided in the valve enclosures. The separation between the two valve houses, coupled with the absence of combustible materials in the connecting pipe tunnels, is sufficient to ensure that no single fire could affect both valve enclosures at once.

Separation between redundant cables within the pipe tunnels: All safe shutdown cables located in this fire zone are routed in conduit. This fact, in conjunction with the absence of combustible materials within the pipe tunnels, is sufficient to ensure a single fire (involving transient combustible materials) will not affect redundant safe shutdown cables.

In summary, because the cables are routed in conduit, and considering the configuration of combustible materials, and detection and manual suppression capability, a level of protection equivalent to Section C.5.B(2) of BTP CMEB 9.5-1 is achieved. The existing separation is judged to be adequate to preclude a single fire in the pipe tunnels or within one of the valve houses from affecting redundant safe shutdown components or cables.

A5.8.9 Deviation No.: 1A.2

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) between fire zones (1A RHR pump room and 1B RHR pump room).

Fire Zone(s) or Elevations Involved

346 feet 0 inch (Fire Zone 11.2A-1)

346 feet 0 inch (Fire Zone 11.2D-1)

Description of Equipment/Cables Involved

The cables and equipment, required for safe shutdown and located in Fire Zones 11.2A-1 and 11.2D-1, are listed in Table 2.4-4. The redundant components and cables consist of RHR pump 1A and its cubicle cooler located in Fire Zone 11.2A-1 and RHR pump 1B and its cubicle cooler located in Fire Zone 11.2D-1.

Description of Deviation(s)

The RHR pumps and cubicle coolers located in Fire Zone 11.2A-1 are separated from the redundant RHR pump and cubicle cooler, located in Fire Zone 11.2D-1, by a 2-hour-rated fire barrier. Also, area-wide automatic fire suppression is not provided in either zone; nor is it provided in Fire Zones 11.2B-1and 11.2C-1 (containment spray pump rooms), which are located between the RHR pump rooms. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviation 1A.8 in FPR Amendment 20.)

Justification for Deviation(s)

Due to the presence of the containment spray pump rooms between the RHR pump rooms, the separation between the two trains of RHR components is greater than 75 feet. The 3 walls between the two trains of RHR components are all of 3-hour construction. Two of the walls contain unsealed penetrations or penetrations with non-fire-rated seals. The wall at column-row W between the two containment spray pump rooms is upgraded to a 2-hour-rated fire barrier. The RHR pump rooms and the containment spray pump rooms have low combustible loadings. All of these rooms are provided with automatic fire detection. Fire Zone 11.2B-1 contains a manual hose station having hose of adequate length to reach Fire Zones 11.2A-1, 11.2C-1, and 11.2D-1. Also, portable extinguishers are provided in adjacent Fire Zone 11.2-0 (auxiliary building general area).

The residual heat removal system is not required for hot shutdown of the plant. Station repair procedures have been written to ensure that the RHR system will be repaired and available to achieve cold shutdown conditions within 72 hours after a fire.

In summary, the large distance separating the two trains of RHR pumps and cubicle coolers, the 2 hour-rated fire barrier, fire detection and manual fire suppression provided, establish a level of fire protection commensurate with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.10 Deviation No: 1A.3

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 Auxiliary Electric Equipment Room), and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 5.5-1)

Description of of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 5.5-1 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables present in Fire Zone 5.5-1 are not separated by 20 feet with the intervening space free of combustible materials. Also the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.21 in FPR Amendment 20.)

Justification for Deviation(s)

Instrumentation for both trains of safe shutdown equipment is located in this zone. Although separation of this redundant equipment does not meet the requirements of guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1, alternative shutdown instrumentation independent of this zone is provided. Specifically, the Fire Hazards Panel, described in Subsection 2.4 of the Fire Protection Report, has sufficient instrumentation to bring the plant to the hot standby condition, and taking credit for local manual operation, cold shutdown can be achieved. This meets the requirements of Section C.5.B(3) and is therefore acceptable.

A5.8.11 Deviation No: 1A.4

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone.

Fire Zone(s) or Elevations Involved

439 feet 0 inch (Fire Zone 3.2A-1)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 3.2A-1 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.19 in FPR Amendment 20.)

Justification for Deviation(s)

The fire zone is provided with fire detection and an area-wide automatic suppression system.

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system.

The automatic fire detection and suppression capabilities described in the Fire Hazard Analysis, controlled access, and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.12 Deviation No: 1A.5

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone.

Fire Zone(s) or Elevations Involved

439 feet 0 inch (Fire Zone 3.2B-1)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 3.2B-1 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1A.29 in FPR Amendment 20.)

Justification for Deviation(s)

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system. The fire zone is provided with fire detection and an area-wide automatic suppression system.

The automatic fire detection and suppression capabilities described in the Fire Hazard Analysis, controlled access, and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.13 Deviation No: 1C.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) for a single fire zone (the containment).

Fire Zone(s) or Elevations Involved

Unit 1 Containment (Fire Zone 1-1)

A5.8.13.1 Description of Equipment/Cables Involved

Pressurizer Power-Operated Relief Valves (PORV) and Block Valves
Pressurizer power-operated relief valves, block valves and associated power and control cables which are required for safe shutdown are located in containment. For the Division 11 PORV, the associated control cables are 1RY247, 1RY248, 1RY249, 1RY388 and 1RY490. Cable 1RY490 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 11 PORV block valve, the associated power and control cables are 1RY002 and 1RY004, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

For the Division 12 PORV, the associated control cables are 1RY253, 1RY254, 1RY255, 1RY389 and 1RY491. Cable 1RY491 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 12 PORV block valve, the associated power and control cables are 1RY007 and 1RY009, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

A5.8.13.1 Description of Deviation

Due to the proximity of both power-operated relief valves and block valves within the pressurizer cubicle, Division 11 cables (1RY002, 1RY004, 1RY247, 1RY248, 1RY249, 1RY388 and 1RY490) and Division 12 cables (1RY007, 1RY009, 1RY253, 1RY254, 1RY255, 1RY389 and 1RY491) are separated by as little as 1 foot. The pressurizer cubicle is separated from the rest of containment by concrete walls that extend between Elevations 426 feet 0 inch and 471 feet 0 inch.

Outside of the pressurizer cubicle, all Division 11 and Division 12 cables are horizontally separated by approximately 15 feet on the vertical run along the shield wall between Elevations 448 feet 0 inch and 467 feet 0 inch, and azimuth angles R7 and R8. Also, between Elevations 421 feet 0 inch and 448 feet 0 inch, azimuth angles R8 and R9, all cables are separated by a vertical distance of approximately 14 feet with intervening combustibles in the form of cable trays.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.1 in FPR Amendment 20.)

A5.8.13.1 <u>Justification for Deviation</u>

Within the pressurizer cubicle, all cables are routed in rigid or flexible conduit. There are no exposed combustible materials within the cubicle that represent a fire hazard. Thus, a fire within the pressurizer cubicle is considered to be extremely unlikely and the existing separation is considered to be adequate.

Immediately outside of the pressurizer cubicle, where the cables run vertically along the outside of the shield wall, both sets of cables are in conduit. The minimum horizontal separation is about 15 feet. The only combustible materials here are in cable trays and negligible amounts of free-air routed cable. The only combustible materials here are cables in cable trays. In this area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of combustible materials present and the fact that the cables in question are routed in conduit.

Elsewhere outside of the pressurizer cubicle, Division 11 cables pass underneath Division 12 cables with a minimum vertical separation of 14 feet. This occurs near the penetration area between R8 and R9. In this area, the Division 11 and Division 12 PORV control cables (1RY490 and 1RY491, respectively) are routed individually in conduit from their respective penetrations to inside the pressurizer enclosure. Therefore, in the penetration area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of the combustible materials present and the fact that the PORV control cables are routed in conduit.

Furthermore, even if both pressurizer PORVs were inoperable, the ability to safely shut down the plant would not be lost. Hot standby could be maintained utilizing the pressurizer safety valves for overpressure protection. Cooldown and depressurization could be accomplished using the steam generators to remove decay heat, and if required, utilizing the letdown system. This mode of operation will take the primary system to a low enough temperature and pressure to initiate RHR system operation.

In summary, because of the low combustible loading coupled with the large size of the area, and the routing of the affected PORV cables within conduit from the electrical penetrations to the valves, a level of fire protection equivalent to that specified in paragraphs (a), (b) or (c) of BTP CMEB 9.5-1 Section III. G. 2 is provided. The existing separation between the redundant safe shutdown cables for these components is judged to be adequate to prevent a single fire from simultaneously damaging both pressurizer PORVs.

A5.8.13.2 Description of Equipment/Cables Involved

Steam Generator Wide Range Level Instrumentation

Cables for all four channels of steam generator wide range level instrumentation are located in containment. Only one steam generator is required to achieve and maintain hot standby. Each of the steam generators has one instrumentation cable which provides wide range level indication; steam generator (SG) 1A - instrumentation cable 1FW018, SG 1B - 1FW020, SG 1C - 1FW022, and SG 1D - 1FW024.

A5.8.13.2 Description of Deviation

All four water level instrumentation cables (Division 11 - 1FW018 and 1FW024, Division 12 - 1FW020 and 1FW022) have a minimum separation of approximately 15 feet vertically and 60 feet horizontally in the area bounded by elevations 421 feet 0 inch and 438 feet 0 inch, azimuth angles 141 -15' and 197 -30', at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.2 in FPR Amendment 20.)

A5.8.13.2 Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.13.3 Description of Equipment/Cables Involved

Source Range Neutron Monitoring Instruments
Two channels of source range neutron monitoring instruments are provided. Two channels of post-accident nuclear instrumentation are also provided. A single channel of nuclear indication (of either system) is required to achieve and maintain hot standby. Cables for the two available channels of source range neutron monitoring instruments are 1NR009 (Division 11) and 1NR130 (Division 12). Cables for the two available channels of post-accident nuclear instrumentation are 1NR251 and 1NR252 (Division 11) and 1NR267 and 1NR 268 (Division 12). All of these cables are routed in containment.

The detectors for the Division 11 and Division 12 channels of the source range nuclear instrument system are located 180 degrees apart to the east and west of the reactor vessel. The Division 11 detector is located on the west side of the reactor vessel. Its cable (1NR009) is routed directly south toward the missile barrier. It passes through the missile barrier and is routed to an electrical penetration between azimuth R7 and R8. The Division 12 detector is located on the east side of the reactor vessel. Its cable (1NR130) is routed around the north side of the primary shield wall and over to the missile barrier. It follows along the interior side of the missile barrier to near azimuth angle R12. There it passes through the missile barrier and is routed over to an electrical penetration near R12.

The detectors for the Division 11 and Division 12 post-accident nuclear instrument system are located 180 degrees apart to the north and south of the reactor vessel. The Division 11 detector is located on the north side of the reactor vessel. Cable 1NR252 is routed around the outside of the primary shield wall to a box on the east side of the primary shield wall. Cable 1NR251 is routed from this box directly east to the missile barrier, through the missile barrier, and to an electrical penetration near azimuth R11. The Division 12 detector is located on the south side of the reactor vessel. Cable 1NR267 is routed in a southwest direction from the detector to a box in the southeast quadrant of the containment building. Cable 1NR268 is routed from the box directly south to the missile barrier. After passing through the missile barrier, the cable follows along the exterior containment wall to an electrical penetration between azimuth R8 and R9.

A5.8.13.3 Description of Deviation

Inside the missile barrier (in the northwest quadrant of the containment building), the separation between cables 1NR009 (Division 11) and 1NR130 (Division 12) is approximately between 23 feet to 30 feet in the area bounded by Elevations 395 feet 1 inch and 409 feet 2 inches, azimuth angles R12 and R15. The cables for the Division 11 post-accident channel are also located in this same area. Intervening combustibles are also present in the form of cable trays and lubricating oil in the reactor coolant pump 1A. The cables for the Division 12 post-accident channel are located a substantial distance away in the southeast quadrant, and are separated from this area by the primary shield wall and other internal containment structures.

Outside of the missile barrier, both source range nuclear instrument channels are separated by approximately 65 feet in the area bounded by Elevations 408 feet 0 inch and 435 feet 0 inch, azimuth angles R/8 and R/12. Cables for the two post-accident channels are present between these two cables. Intervening combustibles are present in the form of cable trays. In addition, area-wide fire detection or suppression is not provided in these zones.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.3 in FPR Amendment 20.)

A5.8.13.3 Justification for Deviation

The cables are routed in conduit inside the missile barrier, in the area where cables for three of the four instruments are present. The reactor coolant pump is not considered to represent a major fire hazard since it is provided with an oil collection system. Furthermore, heat detectors are provided over the pump. Only two cable trays are located in the area. They are located near radii R12 and R13, where the separation is 30 feet, and not in the area where the separation is 23 feet. In addition, the cable trays are oriented parallel to the conduits carrying the neutron source range monitoring cables. Thus, they are not likely to serve as a means to transmit a fire between these cables. A negligible amount of free-air cable is routed along the primary shield wall at approximate elevation 409 feet 0 inch. In the area of the deviation (azimuth R12 to R15) in will not come in contact with either conduit for cable 1NR009 (Division 11) or 1NR130 (Division 12). The cables utilized at Braidwood are constructed per IEEE 383 and will not propagate a fire without the presence of an external flame. Therefore, these free-air cables are not likely to service as a means to transmit a fire between these cables. In addition, the cables for the other post-accident instrument are located on the opposite side of the primary shield wall, and are not subject to the same fire hazards. Outside of the missile barrier, the minimum separation between the two source range instrument cables (the pair which are farthest apart) is approximately 65 feet. In view of the fact that the neutron monitoring cables are in conduit for the majority of their routings, and in consideration of the nature and orientation of intervening combustibles, the existing separation is considered to be adequate to preclude a single fire from disabling all of the instruments.

A5.8.13.4 Description of Equipment/Cables Involved

Pressurizer Pressure Instrumentation
Four channels of pressurizer pressure instrumentation are provided. Only one of the four available pressurizer pressure instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the four channels. The four instrumentation cables are 1RY199 and 1RY207 in Division 11, and 1RY203 and 1RY211 in Division 12.

A5.8.13.4 Description of Deviation

All four pressurizer pressure instrumentation cables have a minimum separation of approximately 15 feet vertically and 60 feet horizontally in the area bounded by Elevation 421 feet 0 inch and 438 feet 0 inch, azimuth angles 141 -15' and 197 -30', at a radius at about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.4 in FPR Amendment 20.)

A5.8.13.4 Justification for Deviation

A single fire large enough to damage both Division 11 and Division 12 cables would have to span more than 60 feet in the horizontal direction between azimuth angles R9 and R12. Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.13.5 Description of Equipment/Cables Involved

Pressurizer Level Instrumentation
Three channels of pressurizer level instrumentation are provided. One of the three pressurizer level instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the three channels. The three instrumentation cables are 1RY20l and 1RY209 in Division 11, and 1RY205 in Division 12.

A5.8.13.5 Description of Deviation

All three pressurizer level instrumentation cables have a minimum separation of approximately 15 feet vertically and 22 feet horizontally in the area bounded by Elevations 410 feet 6 inches and 423 feet 6 inches, azimuth angles 178 -15' and 197 -30', at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.5 in FPR Amendment 20.)

A5.8.13.5 Justification for Deviation

The pressurizer level instrumentation cables are routed in conduit. Combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all three of these safe shutdown instruments.

A5.8.13.6 Description of Equipment/Cables Involved

Reactor Coolant Hot Leg Temperature Or Core Exit Temperature
Indication for reactor coolant hot leg temperature for one RCS loop or indication of core exit temperature from one division of the incore thermocouples is required to achieve and maintain hot standby.

Each reactor coolant system hot leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the east side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 1RC351, 1RC356, 1RC361 and 1RC366. All four of these cables are Division 11 cables. These four cables are routed in a generally southern direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 11 electrical penetration located near R8.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 1RC743, 1RC745, 1RC747 and 1RC749. All four of these cables are Division 12 cables. Starting at their respective RTDs, these four cables are routed in a generally northerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 12 electrical penetration located near R11.

The Division 11 incore thermocouple cables are 1IT308 through 1IT340, 1IT343, 1IT344, 1IT425 and the 33 incore thermocouple circuits combined into five multiconductor mineral insulated cables 1IT428, 1IT429, 1IT432, 1IT433, 1IT436, 1IT437, 1IT440, 1IT441, 1IT444, and 1IT445 (two cable numbers assigned per multiconductor cable) from junction box 1JB634R to the reactor vessel head. The Division 12 incore thermocouple cables are 1IT351 through 1IT382, 1IT347, 1IT348, 1IT427, and the 32 incore thermocouple circuits combined into five multiconductor mineral insulated cables 1IT430, 1IT431, 1IT434, 1IT435, 1IT438, 1IT439, 1IT442, 1IT443, 1IT446, and 1IT447 (two cable numbers assigned per multiconductor cable) from junction box 1JB635R to the reactor vessel head.

The Division 11 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 417 feet 6 inches between R8 and R9 to junction box 1JB634R outside the missile barrier at Elevation 431 feet 9 inches between R11 and R12. The Division 12 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 439 feet 3 inches near R8 to junction box 1JB635R outside the missile barrier at Elevation 435 feet 9 inches between R11 and R12. The mineral insulated cables for both divisions are routed in conduit from junction boxes 1JB634R and 1JB635R, between steam generators 1A and 1D, to the primary shield wall. These same cables are then routed in cable trays (Elevation 430 feet) from the primary shield wall to a connector plate above the reactor vessel, and from there routed vertically down to the reactor vessel head.

A5.8.13.6 Description of Deviation

Section C.5.B (2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. The Divisions 11 and 12 reactor coolant hot leg temperature and incore thermocouple cables are routed in the closest proximity to each other outside of the secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet in the sector bounded by R8 and R11. Section C.5.B (2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.6 in FPR Amendment 20.)

A5.8.13.6 Justification for Deviation

Between the primary and secondary shield walls, the RCS loop "B" and "C" RTDs and their cables are separated from the RCS loop "A" and "D" RTDs and their cables and the incore thermocouple cables by the primary shield wall and/or the refueling pool structure.

The primary shield wall is a concrete structure approximately 34 feet in diameter that encloses the reactor cavity and reactor vessel. These structures serve the purpose of a noncombustible radiant energy shield that separates the loop "B" and "C" RTDs and cables from the redundant loop "A" and "D" RTDs and cables and incore thermocouple cables. Away from the penetration, the divisional routings of the RTD cables provide good spatial separation, ensuring that indication for at least one loop of reactor coolant hot leg temperature will be available. As previously stated, the minimum separation of cables occurs between the containment penetrations and secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet at the containment penetrations in the sector bounded by R8 and R11. Therefore, a fire would have to span a horizontal distance of approximately 52 feet to damage all of the reactor coolant hot leg and incore thermocouple cables. Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments.

A5.8.13.7 Description of Equipment/Cables Involved

Reactor Coolant Cold Leg Temperature

Indication for reactor coolant cold leg temperature for one RCS loop is credited to achieve and maintain hot standby. Each reactor coolant system cold leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the east side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 1RC373, 1RC392, 1RC397 and 1RC402. All four of these cables are Division 12 cables. Some of these four cables are routed in a generally northerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 12 electrical penetration located near R12. The other cables remain inside the secondary shield wall until they pass through it in the immediate vicinity of the electrical penetration located by R12.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 1RC751, 1RC753, 1RC755 and 1RC757. All four of these cables are also

Division 12 cables. Starting at their respective RTDs, these four cables are routed in a generally northerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 12 electrical penetration located near R9.

A5.8.13.7 Description of Deviation

The eight cold leg RTD cables have a minimum separation of approximately 1 foot vertically near R12. Combustibles are present in the immediate area in the form of cable trays.

Section C.5.B(2) paragraph (a) is not met because the separation between these cables is less than the specified 20 horizontal feet, and because combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.7 in FPR Amendment 20.)

A5.8.13.7 Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments. Additionally, the loss of all cold leg RTDs is acceptable for the following reasons. The cold leg RTDs would normally be used in conjunction with the hot leg RTDs to verify adequate core cooling, i.e., that natural circulation is present. This condition can also be verified by trending the temperatures indicated by the core exit thermocouples. As noted in Section A5.8.4.6, the thermocouple cables are routed in conduit in the area of concern. Furthermore, cold leg temperature can be inferred from steam generator pressure. As indicated in Section 2.4, steam generator pressure instrumentation and cabling are independent of this zone. Plant emergency procedures are written to refer to these alternate methods of verifying primary system conditions In fact, the core exit thermocouples are the preferred method. The Byron and Braidwood plant procedures are written using guidance from the Westinghouse Owners Group. Therefore, this deviation from BTP CMEB 9.5-1 requirements is considered to be acceptable.

A5.8.13.8 Description of Equipment/Cables Involved

Reactor Containment Fan Cooler (RCFC) Fans
Two of the four RCFC fans are required to operate in the high-speed mode to achieve and maintain hot standby. The four RCFCs themselves are located outside of the secondary shield wall at widely spaced intervals around the containment. The high speed power cables for the RCFC fans routed inside containment are 1VP004, 1VP026, 1VP048, and 1VP070.

A5.8.13.8 Description of Deviation

All four RCFC power cables (Division 11 - 1VP004 and 1VP048, Division 12 - 1VP026 and 1VP070) have a minimum separation of approximately 36 horizontal feet. This minimum separation occurs in the area bounded by elevations 393 feet 5 inches and 439 feet 3 inches, azimuth angles R/9 and R/12, at a radius of about 60 feet from the centerline of containment. There are intervening combustibles in this area in the form of cable insulation.

Section C.5.B(2) paragraph (a) is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 1C.8 in FPR Amendment 20.)

A5.8.13.8 Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown cables.

A5.8.14 Deviation No: 2A.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 2 main steam tunnel).

Fire Zone(s) or Elevations Involved

Unit 2 Main Steam and Feedwater Pipe Tunnels at various elevations between 357 feet 0 inch and 377 feet 0 inch (Fire Zone 18.3-2). The two valve enclosures that extend up to grade elevation are also a part of this fire zone.

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 18.3-2 are listed in Table 2.4-4. The redundant components and cables consist of valves and instruments in the main steam and auxiliary feedwater systems.

Description of Deviation

This fire zone encompasses two pipe tunnels and two physically separated valve houses. The two valve houses are located approximately 120 degrees apart at the southeast and southwest sides of the exterior containment wall. The below grade main steam and feedwater pipe tunnels connect the two valve houses. The southeast valve house contains safe components and piping associated with the "B" and "C" steam generators. The southwest valve house contains safe shutdown components and piping associated with the "A" and "D" steam generators. Safe shutdown components located in (or near to) the valve houses include the main steam safety valves, the steam generator PORVs, the MSIVs, MSIV bypass valves, steam generator pressure instruments and auxiliary feedwater system containment isolation valves. Cables associated with these components are present in the valve houses, and are also routed through the main steam and/or feedwater pipe tunnels to the auxiliary building. In the area of the pipe tunnels bounded by column-rows 26 to 31 and P to Q, cables for all of the redundant components may be present.

The combustible material present in this zone consists of hydraulic fluid that is located in the two valve houses. All cables routed through the pipe tunnels are located in conduit, and thus do not count as exposed combustibles. The main steam and feedwater pipe tunnels themselves have no combustible materials and no fire loading. Ionization detection is available in the two valve houses. The pipe tunnels themselves have no detection. Manual extinguishing capability consisting of portable extinguishers and a hose station is available to the area.

Separation between redundant components located in the two valve houses: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant components involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by

20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. The separation through the pipe tunnels between the two valve houses is in excess of 200 linear feet with no intervening combustibles. However, this requirement is not met because neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed. Therefore, the separation between redundant components in the two valve houses deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Separation between redundant cables within the pipe tunnels: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. Although the pipe tunnels have no fire loading (i.e., no combustible materials), this requirement is not met because existing separation is less than 20 horizontal feet. In addition, neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed in the pipe tunnels. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2A.23 in FPR Amendment 20.)

Justification for Deviation

Separation between redundant component located in the two valve houses: Other than the oil associated with the valve hydraulic systems in both valve enclosures, there are no combustible materials in the main steam and feedwater tunnels, which then have no fire load. Detection and manual suppression capability are provided in the valve enclosures. The separation between the two valve houses, coupled with the absence of combustible materials in the connecting pipe tunnels, is sufficient to ensure that no single fire could affect both valve enclosures at once.

Separation between redundant cables within the pipe tunnels: All safe shutdown cables located in this fire zone are routed in conduit. This fact, in conjunction with the absence of combustible materials within the pipe tunnels, is sufficient to ensure a single fire (involving transient combustible materials) will not affect redundant safe shutdown cables.

In summary, because the cables are routed in conduit, and considering the configuration of combustible materials, and detection and manual suppression capability, a level of protection equivalent to Section C.5.B(2) of BTP CMEB 9.5-1 is achieved. The existing separation is judged to be adequate to preclude a single fire in the pipe tunnels or within one of the valve houses from affecting redundant safe shutdown components or cables.

A5.8.15 Deviation No: 2A.2

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) between fire zones (2A RHR pump room and 2B RHR pump room).

Fire Zone(s) or Elevations Involved

346 feet 0 inch (Fire Zone 11.2A-2)

346 feet 0 inch (Fire Zone 11.2D-2)

Description of Equipment/Cables Involved

RHR pump 2A and its cubicle cooler are located in Fire Zone 11.2A-2. RHR pump 2B and its cubicle cooler are located in Fire Zone 11.2D-2. Refer to Table 2.4-4 for a specific list of redundant equipment and cables in these zones.

Description of Deviation(s)

The RHR pumps and cubicle coolers located in Fire Zone 11.2A-2 are separated from the redundant RHR pump and cubicle cooler, located in Fire Zone 11.2D-2, by a 2-hour-rated fire barrier. Also, area-wide automatic fire suppression is not provided in either zone; nor is it provided in Fire Zones 11.2B-2 and 11.2C-2 (containment spray pump rooms), which are located between the RHR pump rooms. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2A.8 in FPR Amendment 20.)

Justification for Deviation(s)

Due to the presence of the containment spray pump rooms between the RHR pump rooms, the separation between the two trains of RHR components is greater than 75 feet. The 3 walls between the two trains of RHR components are all of 3-hour construction. Two of the walls contain unsealed penetrations or penetrations with non-fire-rated seals. The wall at column-row W between the two containment spray pump rooms is upgraded to a 2-hour-rated fire barrier. The RHR pump rooms and the containment spray pump rooms have low combustible loading. All of these rooms are provided with automatic fire detection. Fire Zone 11.2B-2 contains a manual hose station having hose of adequate length to reach Fire Zones 11.2A-2, 11.2C-2, and 11.2D-2. Also, portable extinguishers are provided in adjacent Fire Zone 11.2-0 (auxiliary building general area).

The residual heat removal system is not required for hot shutdown of the plant. Station repair procedures been written to ensure that the RHR system will be repaired and available to achieve cold shutdown conditions within 72 hours after a fire.

In summary, the large distance separating the two trains of RHR pumps and cubicle coolers, the 2 hour-rated fire barrier, fire detection and manual fire suppression provided, establish a level of fire protection commensurate with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.16 Deviation No: 2A.3

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 2 Auxiliary Electric Equipment Room), and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 5.5-2)

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 5.5-2 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables present in Fire Zone 5.5-2 are not separated by 20 feet with the intervening space free of combustible materials. Also the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2A.21 in FPR Amendment 20.)

Justification for Deviation(s)

Instrumentation for both trains of safe shutdown equipment is located in this zone. Although separation of this redundant equipment does not meet the requirements of Section III.G.2, alternative shutdown instrumentation independent of this zone is provided. Specifically, the Fire Hazards Panel, described in Subsection 2.4 of the Fire Protection Report, has sufficient instrumentation to bring the plant to the hot standby condition, and taking credit for local manual operation, cold shutdown can be achieved. This meets the requirements of Section C.5.B(3) and is therefore acceptable.

A5.8.17 Deviation No: 2C.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) for a single fire zone (the containment).

Fire Zone(s) or Elevations Involved

Unit 2 Containment (Fire Zone 1-2)

A5.8.17.1 Description of Equipment/Cables Involved

Pressurizer Power-Operated Relief Valves (PORV) and Block Valves
Pressurizer power-operated relief valves, block valves and associated power and control cables which are required for safe shutdown are located in containment. For the Division 21 PORV, the associated control cables are 2RY246, 2RY247, 2RY248, 2RY249 and 2RY388. Cable 2RY246 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 21 PORV block valve, the associated power and control cables are 2RY002 and 2RY004, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

For the Division 22 PORV, the associated control cables are 2RY252, 2RY253, 2RY254, 2RY255 and 2RY389. Cable 2RY252 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 22 PORV block valve, the associated power and control cables are 2RY007 and 2RY009, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

A5.8.17.1 Description of Deviation

Due to the proximity of both power-operated relief valves and block valves within the pressurizer cubicle, Division 21 cables (2RY002, 2RY004, 2RY246, 2RY247, 2RY248, 2RY49 and 2RY388) and Division 22 cables (2RY007, 2RY009, 2RY252, 2RY253, 2RY254, 2RY255, and 2RY389) are separated by as little as 1 foot. The pressurizer cubicle is separated from the rest of containment by concrete walls that extend between Elevations 426 feet 0 inch and 471 feet 0 inch.

Outside of the pressurizer cubicle, all Division 21 and Division 22 cables are horizontally separated by approximately 15 feet on the vertical run along the shield wall between Elevations 440 feet 0 inch and 467 feet 0 inch, and azimuth angles R25 and R26. Also, between Elevations 421 feet 0 inch and 440 feet 0 inch, azimuth angles R24 and R25, all cables are separated by a vertical distance of approximately 14 feet with intervening combustibles in the form of cable trays.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.1 in FPR Amendment 20.)

A5.8.17.1 Justification for Deviation

Within the pressurizer cubicle, all cables are routed in rigid or flexible conduit. There are no exposed combustible materials within the cubicle that represent a fire hazard. Thus, a fire within the pressurizer cubicle is considered to be extremely unlikely and the existing separation is considered to be adequate.

Immediately outside of the pressurizer cubicle, where the cables run vertically along the outside of the shield wall, both sets of cables are in conduit. The minimum horizontal separation is about 2 feet. The only combustible materials here are in cable trays and negligible amounts of free-air routed cable. In this area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of combustible materials present and the fact that the cables in question are routed in conduit.

Elsewhere outside of the pressurizer cubicle, Division 21 cables pass underneath Division 22 cables with a minimum vertical separation of 13 feet. This occurs near the penetration area between R24 and R25. In this area, the Division 21 and Division 22 PORV control cables (2RY246 and 2RY252, respectively) are routed individually in conduit from their respective penetrations to inside the pressurizer enclosure. Therefore, in the penetration area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of the combustible materials present and the fact that the PORV control cables are routed in conduit.

Furthermore, even if both pressurizer PORVs were inoperable, the ability to safely shut down the plant would not be lost. Hot standby could be maintained utilizing the pressurizer safety valves for overpressure protection. Cooldown and depressurization could be accomplished using the steam generators to remove decay heat, and if required, utilizing the letdown system. This mode of operation will take the primary system to a low enough temperature and pressure to initiate RHR system operation.

In summary, because of the low combustible loading coupled with the large size of the area, and the routing of the affected PORV cables within conduit from the electrical penetrations to the valves, a level of fire protection equivalent to that specified in paragraphs (a), (b) or (c) of BTP CMEB 9.5-1 is provided. The existing separation between the redundant safe shutdown cables for these components is judged to be adequate to prevent a single fire from simultaneously damaging both pressurizer PORVs.

A5.8.17.2 Description of Equipment/Cables Involved

Steam Generator Wide Range Level Instrumentation
Cables for all four channels of steam generator wide range level instrumentation are located in containment. Only one steam generator is required to achieve and maintain hot standby. Each of the steam generators has one instrumentation cable which provides wide range level indication; steam generator (SG) 2A - instrumentation cable 2FW018, SG 2B - 2FW020, SG 2C - 2FW022, and SG 2D - 2FW024.

A5.8.17.2 Description of Deviation

All four water level instrumentation cables (Division 21 - 2FW018 and 2FW024, Division 22 - 2FW020 and 2FW022) have a minimum separation of approximately 15 feet vertically and 60 feet horizontally in the area bounded by elevations 400 feet 0 inch and 440 feet 0 inch, azimuth angles R25 and R42, at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.2 in FPR Amendment 20.)

A5.8.17.2 Justification for Deviation

A single fire large enough to damage all four cables would have to span more than 60 feet in the horizontal direction between azimuth angles R25 and R42. Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.17.3 Description of Equipment/Cables Involved

Source Range Neutron Monitoring Instruments

Two channels of source range neutron monitoring instruments are provided. Two channels of post-accident nuclear instrumentation are also provided. A single channel of nuclear indication (of either system) is required to achieve and maintain hot standby. Cables for the two available channels of source range neutron monitoring instruments are 2NR009 (Division 21) and 2NR130 (Division 22). Cables for the two available channels of post-accident nuclear instrumentation are 2NR251 and 2NR252 (Division 21) and 2NR267 and 2NR 268 (Division 22). All of these cables are routed in containment.

The detectors for the Division 21 and division 22 channels of the source range nuclear instrument system are located 180 degrees apart to the east and west of the reactor vessel. The Division 21 detector is located on the west side of the reactor vessel. Its cable (2NR009) is routed directly north toward the missile barrier. It passes through the missile barrier and is routed to an electrical penetration between azimuth R25 and R26. The Division 22 detector is located on the east side of the reactor vessel. Its cable (2NR130) is routed around the south side of the primary shield wall and over to the missile barrier. It follows along the interior side of the missile barrier to near azimuth angle R42. There it passes through the missile barrier and is routed over to an electrical penetration near R42.

The detectors for the Division 21 and Division 22 post-accident nuclear instrument system are located 180 degrees apart to the north and south of the reactor vessel. The Division 21 detector is located on the south side of the reactor vessel. Cable 2NR252 is routed around the outside of the primary shield wall to a box on the southwest side of the primary shield wall. Cable 2NR251 is routed from this box directly southwest to the missile barrier, along the inside wall of the missile barrier, through the missile barrier near R22, and to an electrical penetration near azimuth R22. The Division 22 detector is located on the north side of the reactor vessel. Cable 2NR267 is routed in a northeast direction from the detector to a box in the northeast quadrant of the containment building. Cable 2NR268 is routed from the box directly north to the missile barrier. After passing through the missile barrier, the cable follows along the exterior containment wall to an electrical penetration between azimuth R24 and R25.

A5.8.17.3 Description of Deviation

Inside of the missile barrier, the separation between cables 2NR009 (Division 21) and 2NR130 (Division 12) is approximately between 23 feet to 30 feet in the area bounded by Elevations 399 feet and 408 feet, azimuth angles R39 and R42. The cables for the Division 21 post-accident channel are also located in this same area. Intervening combustibles are also present in the form of cable trays and lubricating oil in the reactor coolant pump 2A. The cables for the Division 22 post-accident channel are located a substantial distance away in the northeast quadrant, and are separated from this area by the primary shield wall and other internal containment structures.

Outside of the missile barrier, both source range nuclear instrument channels are separated by approximately 65 feet in the area bounded by Elevations 408 feet 0 inch and 435 feet 0 inch, azimuth angles R26 and R42. Cables for the two post-accident channels are present between these two cables. Intervening combustibles are present in the form of cable trays. In addition, area-wide fire detection or suppression is not provided in these zones.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.3 in FPR Amendment 20.)

A5.8.17.3 Justification for Deviation

The cables are routed in conduit inside the missile barrier, in the area where cables for three of the four instruments are present. The reactor coolant pump is not considered to represent a major fire hazard since it is provided with an oil collection system. Furthermore, heat detectors are provided over the pump. Only two cable trays are located in the area. They are located near radii R41 and R42, where the separation is 30 feet, and not in the area where the separation is 23 feet. In addition, the cable trays are oriented parallel to the conduits carrying the neutron source range monitoring cables. Thus, they are not likely to serve as a means to transmit a fire between these cables. A negligible amount of free-air cable is routed along the primary shield wall at approximate EL. 409 feet 0 inch. In the area of the deviation (azimuth angles R39 to R42) it will not come in contact with either conduit for cable 2NR009 (Division 21) or 2NR130 (Division 22). The cables utilized at Braidwood are constructed per IEEE 383 and will not propagate a fire without the presence of an external flame. Therefore, these free-air cables are not likely to serve as a means to transmit a fire between these cables. In addition, the cables for the other post-accident instrument are located on the opposite side of the primary shield wall, and are not subject to the same fire hazards. Outside of the missile barrier, the minimum separation between the two source range instrument cables (the pair which are farthest apart) is approximately 65 feet. In view of the fact that the neutron monitoring cables are in conduit for the majority of their routings, and in consideration of the nature and orientation of intervening combustibles, the existing separation is considered to be adequate to preclude a single fire from disabling all of the instruments.

A5.8.17.4 Description of Equipment/Cables Involved

Pressurizer Pressure Instrumentation
Four channels of pressurizer pressure instrumentation are provided. Only one of the four available pressurizer pressure instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the four channels. The four instrumentation cables are 2RY199 and 2RY207 in Division 21, and 2RY203 and 2RY211 in Division 22.

A5.8.17.4 Description of Deviation

All four pressurizer pressure instrumentation cables have a minimum separation of approximately 15 feet vertically and 60 feet horizontally in the area bounded by Elevation 400 feet and 440 feet, azimuth angles R25 and R42, at a radius at about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.4 in FPR Amendment 20.)

A5.8.17.4 Justification for Deviation

A single fire large enough to damage both Division 21 and Division 22 cables would have to span more than 60 feet in the horizontal direction between azimuth angles R25 and R42. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials and negligible amounts of free-air routed cable are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.17.5 Description of Equipment/Cables Involved

Pressurizer Level Instrumentation
Three channels of pressurizer level instrumentation are provided. One of the three pressurizer level instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the three channels. The three instrumentation cables are 2RY20l and 2RY209 in Division 21, and 2RY205 in Division 22.

A5.8.17.5 Description of Deviation

All three pressurizer level instrumentation cables have a minimum separation of approximately 15 feet vertically and 22 feet horizontally in the area bounded by Elevations 408 feet and 423 feet 6 inches, azimuth angles R23 and R42, at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of

BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.5 in FPR Amendment 20.)

A5.8.17.5 Justification for Deviation

The pressurizer level instrumentation cables are routed in conduit. Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all three of these safe shutdown instruments.

A5.8.17.6 Description of Equipment/Cables Involved

Reactor Coolant Hot Leg Temperature Or Core Exit Temperature
Indication for reactor coolant hot leg temperature for one RCS loop or indication of core exit temperature from one division of the incore thermocouples is required to achieve and maintain hot standby.

Each reactor coolant system hot leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the east side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 2RC351, 2RC356, 2RC361 and 2RC366. All four of these cables are Division 21 cables. These four cables are routed in a generally northerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 21 electrical penetration located near R25.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 2RC743, 2RC745, 2RC747 and 2RC749. All four of these cables are Division 22 cables. Starting at their respective RTDs, the two cables for the loop "B" and

"C" RTDs are routed in a generally southerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 22 electrical penetration located near R22. The two loop "A" and "D" cables are routed west through the secondary shield wall and then along over their Division 22 electrical penetration located near R24.

The Division 21 incore thermocouple cables are 2IT308 through 2IT340, 2IT343, 2IT344, 2IT425 and the 33 incore thermocouple circuits combined into five multiconductor mineral insulated cables 2IT428, 2IT429, 2IT432, 2IT433, 2IT436, 2IT437, 2IT440, 2IT441, 2IT444, and 2IT445 (two cable numbers assigned per multiconductor cable) from junction box 2JB697R to the reactor vessel head. The Division 22 incore thermocouple cables are 2IT351 through 2IT382, 2IT347, 2IT348, 2IT427, and the 32 incore thermocouple circuits combined into five multiconductor mineral insulated cables 2IT430, 2IT431, 2IT434, 2IT435, 2IT438, 2IT439, 2IT442, 2IT443, 2IT446, and 2IT447 (two cable numbers assigned per multiconductor cable) from junction box 2JB698R to the reactor vessel head.

The Division 21 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 417 feet 6 inches between R24 and R25 to junction box 2JB697R outside the missile barrier at Elevation 435 feet 9 inches between R22 and R42. The Division 22 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 439 feet 3 inches between R25 and R26 to junction box 2JB698R outside the missile barrier at Elevation 456 feet 0 inches between R22 and R42. The mineral insulated cables for both divisions are routed in conduit from junction boxes

2JB697R and 2JB698R, between steam generators 2A and 2D, to the primary shield wall. These same cables are then routed in cable trays (Elevation 430 feet) from the primary shield wall to a connector plate above the reactor vessel, and from there routed vertically down to the reactor vessel head.

A5.8.17.6 Description of Deviation

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. The Divisions 21 and 22 reactor coolant hot leg temperature and incore thermocouple cables are routed in the closest proximity to each other outside of the secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet in the sector bounded by R22 and R25. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.6 in FPR Amendment 20.)

A5.8.17.6 Justification for Deviation

Between the primary and secondary shield walls, the RCS loop "B" and "C" RTDs and their cables are separated from the RCS loop "A" and "D" RTDs and their cables and the incore thermocouple cables by the primary shield wall and/or the refueling pool structure. The primary shield wall is a concrete structure approximately 34 feet in diameter that encloses the reactor cavity and reactor vessel. These structures serve the purpose of a noncombustible radiant energy shield that separates the loop "B" and "C" RTDs and cables from the redundant loop "A" and "D" RTDs and cables and incore thermocouple cables. Away from the penetration, the divisional routings of the RTD cables provide good spatial separation, ensuring that indication for at least one loop of reactor coolant hot leg temperature will be available. As previously stated, the minimum separation of cables occurs between the containment penetrations and secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet at the containment penetrations in the sector bounded by R22 and R25. Therefore, a fire would have to span a horizontal distance of approximately 52 feet to damage all of the reactor coolant hot leg and incore thermocouple cables. Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments.

A5.8.17.7 Description of Equipment/Cables Involved

Reactor Coolant Cold Leg Temperature
Indication for reactor coolant cold leg temperature for one RCS loop is credited to achieve and maintain hot standby. Each reactor coolant system cold leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the east side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 2RC373, 2RC392, 2RC397 and 2RC402. All four of these cables are Division 22 cables. Some of these four cables are routed in a generally southerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 22 electrical penetration located near R42. The other cables remain inside the secondary shield wall until they pass through it in the immediate vicinity of the electrical penetration located by R42.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 2RC751, 2RC753, 2RC755 and 2RC757. All four of these cables are also Division 22 cables. Starting at their respective RTDs, these four cables are routed in a generally northerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 22 electrical penetration located near R24.

A5.8.17.7 Description of Deviation

Three of the four FHP cold leg RTD cables have a minimum separation of approximately 1 foot vertically from the four MCR/RSP cold leg RTD cables near R42. The remaining FHP cold leg RTD cable is separated from the four MCR/RSP cold

leg RDT cables by approximately 35 feet.

Section C.5.B(2) paragraph (a) is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.7 in FPR Amendment 20.)

A5.8.17.7 Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments. Additionally, the loss of all cold leg RTDs is acceptable for the following reasons. The cold leg RTDs would normally be used in conjunction with the hot leg RTDs to verify adequate core cooling, i.e., that natural circulation is present. This condition can also be verified by trending the temperatures indicated by the core exit thermocouples. As noted in Section A5.8.6.6, the thermocouple cables are routed in conduit in the area of concern. Furthermore, cold leg temperature can be inferred from steam generator pressure. As indicated in Section 2.4, steam generator pressure instrumentation and cabling are independent of this zone. Plant emergency procedures are written to refer to these alternate methods of verifying primary system conditions. In fact, the core exit thermocouples are the preferred method. The Byron and Braidwood plant procedures are written using guidance from the Westinghouse Owners Group. Therefore, this deviation from BTP CMEB 9.5-1 requirements is considered to be acceptable.

A5.8.17.8 Description of Equipment/Cables Involved

Reactor Containment Fan Cooler (RCFC) Fans
Two of the four RCFC fans are required to operate in the high-speed mode to achieve and maintain hot standby. The four RCFCs themselves are located outside of the secondary shield wall at widely spaced intervals around the containment. The high speed power cables for the RCFC fans routed inside containment are 2VP004, 2VP026, 2VP048, and 2VP070.

A5.8.17.8 Description of Deviation

All four RCFC power cables (Division 21 - 2VP004 and 2VP048, Division 22 - 2VP026 and 2VP070) have a minimum separation of approximately 36 horizontal feet. This minimum separation occurs in the area bounded by elevations 393 feet 5 inches and 439 feet 3 inches, azimuth angles R26 and R42, at a radius of about 60 feet from the centerline of containment. There are intervening combustibles in this area in the form of cable insulation.

Section C.5.B(2) paragraph (a) is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1. (This deviation was previously identified as deviations 2C.8 in FPR Amendment 20.)

A5.8.17.8 Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays and negligible amounts of free-air routed cable are present in the affected area, the cables utilized at Braidwood are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown cables.

APPENDIX 5.8

DEVIATIONS FROM
BRANCH TECHNICAL POSITION
CMEB 9.5-1 SECTION C.5.b

TABLE OF CONTENTS

A5.8 DEVIATIONS FROM SECTION C.5.b OF BTP CMEB 9.5-1

INTRODUCTION

This appendix addresses deviations from Section C.5.b "Safe Shutdown Capability" of BTP CMEB 9.5-1 that exist because of redundant safe shutdown equipment located in a fire zone. Deviations common to both Unit 1 and Unit 2 begin with the number "0". Unit 1 deviations begin with the number "1" and Unit 2 deviations begin with the number "2".

A5.8.1 Deviation No: 0A.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the auxiliary building general area at elevation 364 feet).

Fire Zone(s) or Elevations Involved

364 feet 0 inch (Fire Zone 11.3-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.3-0 are listed in Table 2.4-4. However, not all of these cables and components are the subject of this deviation.

Description of Deviation

The five component cooling pumps for both units ("0", 1A, 1B, 2A and 2B) and pump power cables are present in Fire Zone 11.3-0, and are located in a small area. For either of the two units, the separation between the redundant pumps and their associated power cables is less than 20 horizontal feet.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant pumps and their power cables are located within the same fire zone, and only a 1-hour fire barrier is present to protect the power cable (1CC020) for the common component cooling water pump. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This requirement is not met because the redundant pumps and their associated power cables are less than 20 feet apart, and intervening combustibles are present. Although detection is available in this fire zone, this requirement is also not met because an area-wide automatic fire suppression system is not provided in the fire zone (note that a partial coverage automatic suppression system is installed in the immediate area of the component cooling water pumps). Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, a 1-hour rated fire barrier is present in the zone to protect the power cable (1CC020) for the common component cooling water pump, however, an area-wide automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

In order to ensure that a single fire cannot damage all of the component cooling water pumps and cables in the zone, the following fire protection measures are employed:

Partial height masonry walls separate the redundant component cooling water pumps. One partial height wall separates the 1A and 1B pumps from the common pump and the two Unit 2 pumps. A second partial height wall separates the 2A and 2B pumps from the common pump and the two Unit 1 pumps.

A 1-hour fire rated barrier is provided around the conduit for the Division 12 common component cooling pump power cable (1CC020) (Note: Although cable 1CC020 carries a Division 12 designation, power will be provided to the "0" pump from Division 11 switchgear bus 141. This is consistent with the protection of Division 11 cables in Fire Zone 11.3-0, as described in Byron Section 2.4.)

An automatic fixed water suppression system is installed over the component cooling water pumps. This sprinkler system provides adequate coverage for an area out to at least 20 feet past the pumps in all directions. The pump motors have spray shields to prevent water damage.

The component cooling water heat exchangers separate the pumps from the rest of the area and will act as radiant energy shields should a fire break out elsewhere in the room.

This is a large open area with a low combustible loading. Area wide detection is provided.

Because of the partial height masonry walls, 1-hour rated fire barrier protecting the common pump power cable, the area wide detection and the automatic water suppression system over the component cooling water pumps, and the large area and low combustible loading of this zone, the damage from a single fire will be limited such that at most two of the pumps could be affected. For each single fire in the area of the pumps, at least three of the pumps will remain available to serve the demand for both units. Thus, a level of protection equivalent to that of Section C.5.B(2) is achieved.

A5.8.2 Deviation No: 0A.2

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the auxiliary building HVAC exhaust complex).

Fire Zone(s) or Elevations Involved

Auxiliary Building HVAC Exhaust Complex (Fire Zone 11.7-0). This fire zone encompasses multiple elevations of the auxiliary building, including portions of 451 feet – 0 inch, 459 feet – 0 inch, 467 feet – 4 inch and 475 feet – 6 inch.

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.7-0 are listed in Table 2.4-4. However, not all of these cables and components are the subject of this deviation. The equipment and cables that are the subject of this deviation include the four auxiliary building HVAC supply fans, their respective power cables, the four auxiliary building HVAC exhaust fans and their respective power cables.

The four VA system exhaust fans are located on the 475 feet – 6 inch level. The A and B fans are located close together on the Unit 1 side. The C and D fans are located close together on the Unit 2 side. The A and B fans and their cables are separated from the C and D fans and their cables by approximately 40 feet with no significant quantities of intervening combustibles. The four VA system supply fans are located on the 451 feet –0 inch level. The A and B fans are located close together on the Unit 1 side. The C and D fans are located close together on the Unit 2 side. The A and B fans and their cables are separated from the C and D fans and their cables by a minimum of 40 feet with no significant quantities of intervening combustibles (although the charcoal filter units are located to the west side of this room on this elevation).

Description of Deviation

The four VA system supply fans and their power cables, and the four VA system exhaust fans and their power cables are present in the same zone.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant fans and their power cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. Although detection is available in this fire zone (except on elevation 475 feet 6 inch), this requirement is not met because an automatic fire suppression system is not provided in the fire zone. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

The primary justification for this deviation consists of the judgement that a single fire in this zone will not affect all four trains of the auxiliary building ventilation system. This conclusion is based on the following information. The two Unit 1 (A and B) exhaust fans and their power feed cables are separated from the two Unit 2 (C and D) exhaust fans and their power feed cables by approximately 40 feet with no significant quantities of intervening combustible materials. The two Unit 1 (A and B) supply fans and their power feed cables are separated from the two Unit 2 (C and D) supply fans and their power feed cables by approximately 40 feet with no significant quantities of intervening combustible materials. The charcoal filters are present in this area. The filter units are housed in substantial steel enclosures that separate the combustible charcoal from the rest of the area. The charcoal filter units are provided with an independent detection system, and a manual deluge suppression system. This area is provided with ionization detection (except for El. 475 feet - 6 inch) that annunciates and alarms in the main control room. Manual hose stations and portable extinguishers are provided. Because of the type and configuration of combustible materials, the detection and suppression capabilities provided, and the existing physical separation between the Unit 1 / Unit 2 supply and exhaust fans and their cables, a single fire will not affect all four trains of the system.

Additional justification for the deviation is provided by an evaluation of the safe shutdown function of these components. The supply and exhaust fans together provide airflow to the auxiliary building general areas and the various cubicles and rooms containing plant equipment. This airflow serves the dual purpose of providing temperature control for the auxiliary building general areas, and establishing pressure balances to ensure air flows from general areas towards potentially contaminated areas (i.e., for radiological control). For major safe shutdown components located in their own rooms or cubicles, the primary cooling function is provided by cubicle coolers. Although the auxiliary building supply and exhaust fans are relied upon for cooling of some safe shutdown components in some fire zones, that is not the case for this particular fire zone. The safe shutdown cubicle coolers for the affected components are independent of the auxiliary building supply and exhaust fans and this fire zone. Therefore, a fire in this zone would not result in loss of the cooling function for major safe shutdown components, even should all four trains of the auxiliary building ventilation system be disabled. Loss of the radiological control function could not prevent safe shutdown of the plant, although it would present operation difficulties to the operating staff.

In consideration of the conditions and features discussed above, the separation between the A/B and C/D trains of the VA system supply and exhaust fans is judged to be adequate to prevent a fire from disabling all four trains. In addition, redundant cooling capability independent of this zone and the VA system supply and exhaust fans is provided for major safe shutdown components. Thus, a level of protection equivalent to that of Section C.5.B(2) is achieved.

A5.8.3 Deviation No: 1A.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 main steam tunnel).

Fire Zone(s) or Elevations Involved

Unit 1 Main Steam and Feedwater Pipe Tunnels at various elevations between 357 feet 0 inch and 377 feet 0 inch (Fire Zone 18.3-1). The two valve enclosures that extend up to grade elevation are also a part of this fire zone.

Description of Equipment/Cables Involved

The cables and equipment, required for safe shutdown and located in Fire Zone 18.3-1, are listed in Table 2.4-4. The redundant components and cables consist of valves and instruments in the main steam and auxiliary feedwater systems.

Description of Deviation

This fire zone encompasses two pipe tunnels and two physically separated valve houses. The two valve houses are located approximately 120 degrees apart at the southwest and southeast sides of the exterior containment wall. The below grade main steam and feedwater pipe tunnels connect the two valve houses. The southwest valve house contains safe shutdown components and piping associated with the "B" and "C" steam generators. The southeast valve house contains safe shutdown components and piping associated with the "A" and "D" steam generators. Safe shutdown components located in (or near to) the valve houses include the main steam safety valves, the steam generator PORVs, the MSIVs, MSIV bypass valves, steam generator pressure instruments and auxiliary feedwater system containment isolation valves. Cables associated with these components are present in the valve houses, and are also routed through the main steam and/or feedwater pipe tunnels to the auxiliary building. In the area of the pipe tunnels bounded by column-rows 5 to 10 and P to Q, cables for all of the redundant components may be present.

The combustible material present in this zone consists of hydraulic fluid that is located in the two valve houses. All cables routed through the pipe tunnels are located in conduit, and thus do not count as exposed combustibles. The main steam and feedwater pipe tunnels themselves have no combustible materials and no fire loading. Ionization detection is available in the two valve houses. The pipe tunnels themselves have no detection. Manual extinguishing capability consisting of portable extinguishers and a hose station is available to the area.

Separation between redundant component located in the two valve houses: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant components involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. The separation through the pipe tunnels between the two valve houses is in excess of 200 linear feet with no intervening combustibles. However, this requirement is not met because neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed. Therefore, the separation between redundant components in the two valve houses deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Separation between redundant cables within the pipe tunnels: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. Although the pipe tunnels have no fire loading (i.e., no combustible materials), this requirement is not met because existing separation is less than 20 horizontal feet. In addition, neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed in the pipe tunnels. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Separation between redundant component located in the two valve houses: Other than the oil associated with the valve hydraulic systems in both valve enclosures, there are no combustible materials in the main steam and feedwater tunnels, which then have no fire load. Detection and manual suppression capability are provided in the valve enclosures. The separation between the two valve houses, coupled with the absence of combustible materials in the connecting pipe tunnels, is sufficient to ensure that no single fire could affect both valve enclosures at once.

Separation between redundant cables within the pipe tunnels: All safe shutdown cables located in this fire zone are routed in conduit. This fact, in conjunction with the absence of combustible materials within the pipe tunnels, is sufficient to ensure a single fire (involving transient combustible materials) will not affect redundant safe shutdown cables.

In summary, because the cables are routed in conduit, and considering the configuration of combustible materials, and detection and manual suppression capability, a level of protection equivalent to Section C.5.B(2) of BTP CMEB 9.5-1 is achieved. The existing separation is judged to be adequate to preclude a single fire in the pipe tunnels or within one of the valve houses from affecting redundant safe shutdown components or cables.

A5.8.4 Deviation No.: 1A.2

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) between fire zones (1A RHR pump room and 1B RHR pump room).

Fire Zone(s) or Elevations Involved

346 feet 0 inch (Fire Zone 11.2A-1)

346 feet 0 inch (Fire Zone 11.2D-1)

Description of Equipment/Cables Involved

The cables and equipment, required for safe shutdown and located in Fire Zones 11.2A-1 and 11.2D-1, are listed in Table 2.4-4. The redundant components and cables consist of RHR pump 1A and its cubicle cooler located in Fire Zone 11.2A-1 and RHR pump 1B and its cubicle cooler located in Fire Zone 11.2D-1.

Description of Deviation(s)

The RHR pumps and cubicle coolers located in Fire Zone 11.2A-1 are separated from the redundant RHR pump and cubicle cooler, located in Fire Zone 11.2D-1, by a 2-hour-rated fire barrier. Also, area-wide automatic fire suppression is not provided in either zone; nor is it provided in Fire Zones 11.2B-1and 11.2C-1 (containment spray pump rooms), which are located between the RHR pump rooms. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Due to the presence of the containment spray pump rooms between the RHR pump rooms, the separation between the two trains of RHR components is greater than 75 feet. The 3 walls between the two trains of RHR components are all of 3-hour construction. Two of the walls contain unsealed penetrations or penetrations with non-fire-rated seals. The wall at column-row W between the two containment spray pump rooms is upgraded to a 2-hour-rated fire barrier. The RHR pump rooms and the containment spray pump rooms have low combustible loadings. All of these rooms are provided with automatic fire detection. Fire Zone 11.2B-1 contains a manual hose station allowing the fire brigade to reach Fire Zones 11.2A-1, 11.2C-1, and 11.2D-1. Also, portable extinguishers are provided in adjacent Fire Zone 11.2-0 (auxiliary building general area).

The residual heat removal system is not required for hot shutdown of the plant. Station repair procedures have been written to ensure that the RHR system will be repaired and available to achieve cold shutdown conditions within 72 hours after a fire.

In summary, the large distance separating the two trains of RHR pumps and cubicle coolers, the 2 hour-rated fire barrier, fire detection and manual fire suppression provided, establish a level of fire protection commensurate with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.5 Deviation No.: 1A.3

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 main control room), and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 2.1-0)

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 2.1-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables located in Fire Zone 2.1-0 are not separated by a 20-foot space free of combustible materials and the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Controls and instrumentation for all plant systems are located in the control room. Although separation of redundant trains does not meet the requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1, alternative shutdown systems and equipment independent of this zone are provided. Specifically, the remote Shutdown Panel and Fire Hazards Panel have sufficient controls and instrumentation to bring the plant to hot standby, and taking credit for local manual operations, cold shutdown can be achieved. This meets the requirements of Section C.5.B(3),and is therefore acceptable.

A5.8.6 Deviation No: 1A.4

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 Auxiliary Electric Equipment Room), and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 5.5-1)

Description of of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 5.5-1 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables present in Fire Zone 5.5-1 are not separated by 20 feet with the intervening space free of combustible materials. Also the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Instrumentation for both trains of safe shutdown equipment is located in this zone. Although separation of this redundant equipment does not meet the requirements of guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1, alternative shutdown instrumentation independent of this zone is provided. Specifically, the Fire Hazards Panel, described in Subsection 2.4 of the Fire Protection Report, has sufficient instrumentation to bring the plant to the hot standby condition, and taking credit for local manual operation, cold shutdown can be achieved. This meets the requirements of Section C.5.B(3) and is therefore acceptable.

A5.8.7 Deviation No: 1A5

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 Remote Shutdown Panel Room).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4C-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4C-0 are listed in Table 2.4-4.

Description of Deviation(s)

The remote shutdown panels for both units are located in this zone. A fire in this zone could render inoperable the remote shutdown panels and the corresponding controls in the control room. As a result, redundant systems required for safe shutdown could be adversely affected. In addition, no area-wide automatic fire suppression is provided. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Fire Zone 11.4C-0 is separated from the rest of the plant by 3-hour-rated fire barriers and is a controlled access area. The remote shutdown control panels for Unit 1 are separated from those for Unit 2 by approximately 90 feet. One manual hose station and several portable fire extinguishers are available in this zone. Ionization detectors are provided throughout the fire zone, including the room with the remote shutdown panel, which annunciate and alarm in the control room. The fire load is moderately low and the bulk of combustible materials consists of cable insulation. In the event of a fire in this zone, safe shutdown of the plant can be achieved by local operation of equipment. Also, instruments located at the remote shutdown panel are isolated so that a fire in this room will not affect the instruments in the control room.

In summary, the low combustible loading, automatic fire detection and manual suppression capabilities, controlled access, and local operation of safe shutdown equipment provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.8 Deviation No: 1A.6

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 383 feet).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown equipment and/or cables in Fire Zone 11.4-0 are located throughout this area. This area lacks fixed suppression and contains combustible material and has separation distances which are less than 20 feet all of which are not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The applicant originally committed to install a 3-hour fire-rated barrier around Division 11 cable trays, risers and conduits in this area as follows: The risers near 13-15/Q will be wrapped from floor to ceiling. The conduit and tray with cable 1SX001 will be wrapped from Q/13 to L/13. The risers and trays from L/11 to L/13 will be completely wrapped. In addition, the centrifugal charging pump cubicle cooler fan fed from MCC 131X3 will be moved to another MCC completely independent of this zone. With these modifications complete, the loss of both MCCs 131X3 and 132X3 will be acceptable since the essential service water cubicle coolers will function properly with only two out of four fans in service. This room is a large open area with a low combustible loading. Area-wide detection is provided, and manual suppression capability is also present.

Subsequent to the above modifications, the component cooling pump 1A power cable and the essential service water pump 1A power cable are rerouted out of Fire Zone 11.4-0, where redundant cables are present. An evaluation has shown that the charging pumps and the essential service water pumps can perform their design function for the 72 hours needed to take the plant to cold shutdown without the support of the room cubicle coolers. In addition, the remaining safe shutdown cables in this fire zone have been determined not to require protection based on an evaluation which demonstrated that alternate equipment and cabling would be available or local manual actions could be performed as described in station procedures in the event of a fire in this zone. Therefore, the 3-hour fire-rated barrier described previously as installed around the

Division 11 trays, risers, and conduits on Elevation 383 feet 0 inch is no longer required and will not be replaced.

In summary, the low combustible loading, automatic fire detection and manual suppression capabilities, controlled access, and local operation of safe shutdown equipment provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.9 Deviation No: 1A.7

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 383 feet, Auxiliary Feedwater pumps).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables located in Fire Zone 11.4-0 are less than 20 feet apart and the intervening space contains combustible materials and the area is not covered by a total suppression system which is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The diesel-driven auxiliary feedwater pump is located within its own room, which has 3-hour fire-rated barriers separating it from the general area outside. This pump can be manually started from a local control panel in this room, and it will operate completely independent of the associated cables located outside of the room in the general area on Elevation 383 feet 0 inch (Fire Zone 11.4-0). Thus, the fact that cables for both AFW pumps are present in the same area in Fire Zone 11.4-0 and could be damaged by a single fire is acceptable, since the Division 12 diesel-driven AFW pump can still be manually started and operated.

In order to provide an adequate supply of water to the secondary heat sink in a timely manner following a fire in this zone, remote start capability for the diesel-driven auxiliary feedwater pump is required. Therefore, a remote switch has been installed at the elevation below in Fire Zone 11.3-0 to ensure that the diesel-driven auxiliary feedwater pump can be manually started in the case of a fire in Fire Zone 11.4-0.

Cables 1AF346 and 1AF338 routed through Fire Zone 11.4-0 supply a low-low suction pressure signal that could trip the 1B auxiliary feedwater pump. If this happens, the 1B pump can be manually started even if cables 1AF346 and 1AF338 are damaged by a fire. Several other cables associated with both AFW pumps are routed through Fire Zone 11.4-0; however, an evaluation has shown that the 1B AFW pump can be started locally if a fire destroyed these cables. Although cables for both AFW pumps are present in the same area in Fire Zone 11.4-0 and could be damaged by a single fire, the Division 12 diesel-driven AFW can still be manually started and operated.

A5.8.10 Deviation No: 1A.8

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 401 feet).

Fire Zone(s) or Elevations Involved

401 feet 0 inch (Fire Zone 11.5-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.5-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown equipment and/or cables in Fire Zone 11.5-0 are located throughout this area. This area lacks fixed suppression and contains combustible material and has separation distances which are less than 20 feet all of which are not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

the applicant originally committed to provide a 3-hour fire-rated barrier around Division 11 cable trays containing redundant safe shutdown cables in three locations. The risers at 13-15/Q, the trays and risers along Row L between 11 and 12, and the trays and risers by 11/P-Q will all be protected.

The component cooling pump 1A power cable and the essential service water pump 1A power cable are rerouted out of Fire Zone 11.5-0 where redundant cables are present. An evaluation also shows that the charging pumps and the essential service water pumps can perform their design function for the 72 hours needed to take the plant to cold shutdown without the support of the room cubicle coolers. In addition, the remaining safe shutdown cables in this fire zone have been determined not to require protection based on an evaluation which demonstrates that alternate equipment and cabling would be available for a fire in this fire zone or that local manual actions could be performed as described in the station procedures. Therefore, the 3-hour fire-rated barrier installed around the Division 11 trays and risers on Elevation 401 feet 0 inch is no longer required and will not be replaced.

In summary, the low combustible loading, automatic fire detection and manual suppression capabilities, controlled access, and local operation of safe shutdown equipment provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.11 Deviation No: 1A.9

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 426 feet).

Fire Zone(s) or Elevations Involved

426 feet 0 inch (Fire Zone 11.6-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.6-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown equipment and/or cables in Fire Zone 11.6-0 are located throughout this area. This area lacks fixed suppression and contains combustible material and has separation distances which are less than 20 feet all of which are not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The applicant has initiated a design change to move the Division 12 ESF switchgear supply fan to another MCC, independent of this zone. Also, the control cable for the Division 12 MEER supply fan will be re-routed to avoid this zone. Upon completion of this modification, MCC 132X5 will not serve any equipment which is redundant to the Division 11 MCC and cables in the room. Control cable 1VE028, which is routed in the risers near column-row 16/P, originally was protected with a 3-hour-rated barrier to ensure that the supply fan for the miscellaneous electric equipment room remains operational after a fire. Loss of the Division 12 AFW control cables will still leave the diesel-driven AFW pump manually operable from a local panel. Only one oil transfer pump is required to provide sufficient flow of diesel fuel oil for continuous operation of an emergency diesel generator. Thus, safe shutdown would not be prevented by a fire in this zone. This zone is a large open area with a low combustible load. Area-wide detection and manual suppression capability are provided. Because of this, and the modification being implemented, a level of protection equivalent to Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Subsequent to the above modifications, the switchgear room/cable tunnel vent fan 1VX01C control cable is rerouted out of Fire Zone 11.6-0. Control cable 1VE042 (which replaced 1VE028) was to be protected with a 3-hour barrier. Reanalysis shows that this cable is not required for safe shutdown. As a result, the barrier will not be replaced and the cable will not be rerouted.

In addition, the remaining safe shutdown cables in this fire zone have been determined not to require protection based on an evaluation which demonstrates that alternate equipment or cabling is available or local manual actions can be performed as described in the station procedures in the event of a fire.

A5.8.12 Deviation No: 1A10

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone.

Fire Zone(s) or Elevations Involved

439 feet 0 inch (Fire Zone 3.2B-1)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 3.2B-1 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The fire zone is provided with fire detection and an area-wide automatic suppression system.

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system.

In summary, the low combustible loading, automatic fire detection and suppression capabilities, controlled access, and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.13 Deviation No: 1C.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) for a single fire zone (the containment).

Fire Zone(s) or Elevations Involved

Unit 1 Containment (Fire Zone 1-1)

A5.8.13.1 Description of Equipment/Cables Involved

Pressurizer Power-Operated Relief Valves (PORV) and Block Valves
Pressurizer power-operated relief valves, block valves and associated power and control cables which are required for safe shutdown are located in containment. For the Division 11 PORV, the associated control cables are 1RY246, 1RY247, 1RY248, 1RY249 and 1RY388. Cable 1RY246 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 11 PORV block valve, the associated power and control cables are 1RY002 and 1RY004, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

For the Division 12 PORV, the associated control cables are 1RY252, 1RY253, 1RY254, 1RY255 and 1RY389. Cable 1RY252 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 12 PORV block valve, the associated power and control cables are 1RY007 and 1RY009, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

Description of Deviation

Due to the proximity of both power-operated relief valves and block valves within the pressurizer cubicle, Division 11 cables (1RY002, 1RY004, 1RY246, 1RY247, 1RY248, 1RY249 and 1RY388) and Division 12 cables (1RY007, 1RY009, 1RY252, 1RY253, 1RY254, 1RY255 and 1RY389) are separated by as little as 5 or 6 feet. The pressurizer cubicle is separated from the rest of containment by concrete walls that extend between Elevations 426 feet 0 inch and 471 feet 0 inch.

Outside of the pressurizer cubicle, all Division 11 and Division 12 cables are horizontally separated by approximately 13 feet on the vertical run along the shield wall between Elevations 448 feet 0 inch and 467 feet 0 inch, and azimuth angles R7 and R8. Also, between Elevations 421 feet 0 inch and 448 feet 0 inch, azimuth angles R8 and R9, all cables are separated by a vertical distance of approximately 27 feet with intervening combustibles in the form of cable trays.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Within the pressurizer cubicle, all cables are routed in rigid or flexible conduit. There are no exposed combustible materials within the cubicle that represent a fire hazard. Thus, a fire within the pressurizer cubicle is considered to be extremely unlikely and the existing separation is considered to be adequate.

Immediately outside of the pressurizer cubicle, where the cables run vertically along the outside of the shield wall, both sets of cables are in conduit. The minimum horizontal separation is about 13 feet. The only combustible materials here are cables in cable trays. In this area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of combustible materials present and the fact that the cables in question are routed in conduit.

Elsewhere outside of the pressurizer cubicle, Division 11 cables pass underneath Division 12 cables with a minimum vertical separation of 27 feet. This occurs near the penetration area between R8 and R9. In this area, the Division 11 and Division 12 PORV control cables (1RY246 and 1RY252, respectively) are routed individually in conduit from their respective penetrations to inside the pressurizer enclosure. Therefore, in the penetration area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of the combustible materials present and the fact that the PORV control cables are routed in conduit.

Furthermore, even if both pressurizer PORVs were inoperable, the ability to safely shut down the plant would not be lost. Hot standby could be maintained utilizing the pressurizer safety valves for overpressure protection. Cooldown and depressurization could be accomplished using the steam generators to remove decay heat, and if required, utilizing the letdown system. This mode of operation will take the primary system to a low enough temperature and pressure to initiate RHR system operation.

In summary, because of the low combustible loading coupled with the large size of the area, and the routing of the affected PORV cables within conduit from the electrical penetrations to the valves, a level of fire protection equivalent to that specified in paragraphs (a), (b) or (c) of BTP CMEB 9.5-1 Section III. G. 2 is provided. The existing separation between the redundant safe shutdown cables for these components is judged to be adequate to prevent a single fire from simultaneously damaging both pressurizer PORVs.

A5.8.13.2 Description of Equipment/Cables Involved

Steam Generator Wide Range Level Instrumentation

Cables for all four channels of steam generator wide range level instrumentation are located in containment. Only one steam generator is required to achieve and maintain hot standby. Each of the steam generators has one instrumentation cable which provides wide range level indication; steam generator (SG) 1A - instrumentation cable 1FW018, SG 1B - 1FW020, SG 1C - 1FW022, and SG 1D - 1FW024.

Description of Deviation

All four water level instrumentation cables (Division 11 - 1FW018 and 1FW024, Division 12 - 1FW020 and 1FW022) have a minimum separation of approximately 17 feet vertically and 65 feet horizontally in the area bounded by elevations 421 feet 0 inch and 438 feet 0 inch, azimuth angles 141 -15' and 197 -30', at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.13.3 Description of Equipment/Cables Involved

Source Range Neutron Monitoring Instruments

Two channels of source range neutron monitoring instruments are provided. Two channels of post-accident nuclear instrumentation are also provided. A single channel of nuclear indication (of either system) is required to achieve and maintain hot standby. Cables for the two available channels of source range neutron monitoring and post-accident nuclear instrumentation are 1NR251 and 1NR252 (Division 11) and 1NR267 and 1NR 268 (Division 12). All of these cables are routed in containment.

The detectors for the Division 11 and Division 12 source range neutron monitoring and post-accident nuclear instrument system are located 180 degrees apart to the south and north of the reactor vessel. The Division 11 detector is located on the south side of the reactor vessel. Cable 1NR252 is routed around the outside of the primary shield wall to a box on the east side of the primary shield wall. Cable 1NR251 is routed from this box directly east to the missile barrier, through the missile barrier, and to an electrical penetration near azimuth R11. The Division 12 detector is located on the north side of the reactor vessel. Cable 1NR268 is routed in a northwest direction from the detector to a box in the northwest quadrant of the containment building. Cable 1NR267 is routed from the box directly north to the missile barrier. After passing through the missile barrier, the cable follows along the exterior containment wall to an electrical penetration between azimuth R8 and R9.

Description of Deviation

Inside the missile barrier, the separation between cables 1NR251 (Division 11) and 1NR267 (Division 12) is approximately 50 feet in the area bounded by Elevations 401 feet and 424 feet, azimuth angles R11 and R7. Intervening combustibles are present in the form of lubricating oil in the reactor coolant pump 1D and cable tray.

Outside of the missile barrier, the instrument channels are separated by approximately 36 feet in the area bounded by Elevations 412 feet and 420 feet, azimuth angles R9 and

R11. Intervening combustibles are present in the form of cable trays. In addition, area-wide fire detection or suppression is not provided in these zones.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

The cables are routed in conduit inside the missile barrier. The minimum separation between the two instrument cables is approximately 50 feet. The reactor coolant pump is not considered to represent a major fire hazard since it is provided with an oil collection system. Furthermore, heat detectors are provided over the pump. Only one 12 inch wide cable tray is located in this area of Fire Zone 1.1-1. The cable tray is located near radii R7 to R11 where the separation between redundant cables is 50 feet. The tray is filled to less than one quarter of its total cross sectional area. The cables are primarily located on the opposite sides of the primary shield wall, and are not subject to the same fire hazards. Outside of the missile barrier, the minimum separation between the two instrument cables is approximately 36 feet. Only two 12 inch wide cable trays are located in this area of Fire Zone 1.2-1. The cable trays are located near radii R11 to R9. One tray is filled to less than half its total cross sectional area and the other tray is filled to less than one quarter of its total cross sectional area. In view of the fact that the neutron monitoring cables are in conduit for the majority of their routings, and in consideration of the nature and orientation of intervening combustibles, the existing separation is considered to be adequate to preclude a single fire from disabling all of the instruments.

A5.8.13.4 Description of Equipment/Cables Involved

Pressurizer Pressure Instrumentation

Four channels of pressurizer pressure instrumentation are provided. Only one of the four available pressurizer pressure instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the four channels. The four instrumentation cables are 1RY199 and 1RY207 in Division 11, and 1RY203 and 1RY211 in Division 12.

Description of Deviation

All four pressurizer pressure instrumentation cables have a minimum separation of approximately 17 feet vertically and 65 feet horizontally in the area bounded by Elevation 421 feet 0 inch and 438 feet 0 inch, azimuth angles 141 -15' and 197 -30', at a radius at about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

A single fire large enough to damage both Division 11 and Division 12 cables would have to span more than 60 feet in the horizontal direction between azimuth angles R9 and R12. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.13.5 Description of Equipment/Cables Involved

Pressurizer Level Instrumentation

Three channels of pressurizer level instrumentation are provided. One of the three pressurizer level instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the three channels. The three instrumentation cables are 1RY20l and 1RY209 in Division 11, and 1RY205 in Division 12.

Description of Deviation

All three pressurizer level instrumentation cables have a minimum separation of approximately 13 feet vertically and 22 feet horizontally in the area bounded by Elevations 410 feet 6 inches and 423 feet 6 inches, azimuth angles 178 -15' and 197 - 30', at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

The pressurizer level instrumentation cables are routed in conduit. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all three of these safe shutdown instruments.

A5.8.13.6 Description of Equipment/Cables Involved

<u>Reactor Coolant Hot Leg Temperature Or Core Exit Temperature</u>

Indication for reactor coolant hot leg temperature for one RCS loop or indication of core exit temperature from one division of the incore thermocouples is required to achieve and maintain hot standby.

Each reactor coolant system hot leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the eastside of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 1RC351, 1RC356, 1RC361 and 1RC366. All four of these cables are Division 11 cables. These four cables are routed in a generally northern direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 11 electrical penetration located near R8.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 1RC743, 1RC745, 1RC747 and 1RC749. All four of these cables are Division 12 cables. Starting at their respective RTDs, these four cables are routed in a generally southerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 12 electrical penetration located near R11.

The Division 11 incore thermocouple cables are 1IT308 through 1IT340, 1IT343, 1IT344, 1IT425 and the 33 incore thermocouple circuits combined into five multiconductor mineral insulated cables 1IT428, 1IT429, 1IT432, 1IT433, 1IT436, 1IT437, 1IT440, 1IT441, 1IT444, and 1IT445 (two cable numbers assigned per multiconductor cable) from junction box 1JB656R to the reactor vessel head. The Division 12 incore thermocouple cables are 1IT351 through 1IT382, 1IT347, 1IT348, 1IT427, and the 32 incore thermocouple circuits combined into five multiconductor mineral insulated cables 1IT430, 1IT431, 1IT434, 1IT435, 1IT438, 1IT439, 1IT442, 1IT443, 1IT446, and 1IT447 (two cable numbers assigned per multiconductor cable) from junction box 1JB657R to the reactor vessel head.

The Division 11 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 417 feet 6 inches between R8 and R9 to junction box 1JB656R outside the missile barrier at Elevation 431 feet 9 inches between R11 and R12. The Division 12 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 439 feet 3 inches near R8 to junction box 1JB657R outside the missile barrier at Elevation 435 feet 9 inches between R11 and R12. The mineral insulated cables for both divisions are routed in conduit from junction boxes 1JB656R and 1JB657R, between steam generators 1A and 1D, to the primary shield wall. These same cables are then routed in cable trays (Elevation 430 feet) from the primary shield wall to a connector plate above the reactor vessel, and from there routed vertically down to the reactor vessel head.

Description of Deviation

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. The Divisions 11 and 12 reactor coolant hot leg temperature and incore thermocouple cables are routed in the closest proximity to each other outside of the secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet in the sector bounded by R8 and R11. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Between the primary and secondary shield walls, the RCS loop "B" and "C" RTDs and their cables are separated from the RCS loop "A" and "D" RTDs and their cables and the incore thermocouple cables by the primary shield wall and/or the refueling pool structure. The primary shield wall is a concrete structure approximately 34 feet in diameter that encloses the reactor cavity and reactor vessel. These structures serve the purpose of a noncombustible radiant energy shield that separates the loop "B" and "C" RTDs and cables from the redundant loop "A" and "D" RTDs and cables and incore thermocouple cables. Away from the penetration, the divisional routings of the RTD cables provide good spatial separation, ensuring that indication for at least one loop of reactor coolant hot leg temperature will be available. As previously stated, the minimum separation of cables occurs between the containment penetrations and secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet at the containment penetrations in the sector bounded by R8 and R11. Therefore, a fire would have to span a horizontal distance of approximately 52 feet to damage all of the reactor coolant hot leg and incore thermocouple cables. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments.

A5.8.13.7 Description of Equipment/Cables Involved

Reactor Coolant Cold Leg Temperature

Indication for reactor coolant cold leg temperature for one RCS loop is credited to achieve and maintain hot standby. Each reactor coolant system cold leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the eastside of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 1RC373, 1RC392, 1RC397 and 1RC402. All four of these cables are Division 12 cables. Some of these four cables are routed in a generally southerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 12 electrical penetration located near R12. The other cables remain inside the secondary shield wall until they pass through it in the immediate vicinity of the electrical penetration located by R12.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 1RC751, 1RC753, 1RC755 and 1RC757. All four of these cables are also Division 12 cables. Starting at their respective RTDs, these four cables are routed in a generally southerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 12 electrical penetration located near R9.

Description of Deviation

The eight cold leg RTD cables have a minimum separation of approximately 1 foot vertically near R12. Combustibles are present in the immediate area in the form of cable trays.

Section C.5.B(2) paragraph (a) is not met because the separation between these cables is less than the specified 20 horizontal feet, and because combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments. Additionally, the loss of all cold leg RTDs is acceptable for the following reasons. The cold leg RTDs would normally be used in conjunction with the hot leg RTDs to verify adequate core cooling, i.e., that natural circulation is present. This condition can also be verified by trending the temperatures indicated by the core exit thermocouples. As noted in Section A5.8.13.6, the thermocouple cables are routed in conduit in the area of concern. Furthermore, cold leg temperature can be inferred from steam generator pressure. As indicated in Section 2.4, steam generator pressure instrumentation and cabling are independent of this zone. Plant emergency procedures are written to refer to these alternate methods of verifying primary system conditions. In fact, the core exit thermocouples are the preferred method. The Byron and Braidwood plant procedures are written using guidance from the Westinghouse Owners Group. Therefore, this deviation from BTP CMEB 9.5-1 requirements is considered to be acceptable.

A5.8.13.8 Description of Equipment/Cables Involved

Reactor Containment Fan Cooler (RCFC) Fans

Two of the four RCFC fans are required to operate in the high-speed mode to achieve and maintain hot standby. The four RCFCs themselves are located outside of the secondary shield wall at widely spaced intervals around the containment. The high speed power cables for the RCFC fans routed inside containment are 1VP004, 1VP026, 1VP048, and 1VP070.

Description of Deviation

All four RCFC power cables (Division 11 - 1VP004 and 1VP048, Division 12 - 1VP026 and 1VP070) have a minimum separation of approximately 36 horizontal feet. This minimum separation occurs in the area bounded by elevations 393 feet 5 inches and 439 feet 3 inches, R/8 and R/12, at a radius of about 60 feet from the centerline of containment. There are intervening combustibles in this area in the form of cable insulation.

Section C.5.B(2) paragraph (a) is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown cables.

A5.8.14 Deviation No: 2A.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 2 main steam tunnel).

Fire Zone(s) or Elevations Involved

Unit 2 Main Steam and Feedwater Pipe Tunnels at various elevations between 357 feet 0 inch and 377 feet 0 inch (Fire Zone 18.3-2). The two valve enclosures that extend up to grade elevation are also a part of this fire zone.

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 18.3-2 are listed in Table 2.4-4. The redundant components and cables consist of valves and instruments in the main steam and auxiliary feedwater systems.

Description of Deviation

This fire zone encompasses two pipe tunnels and two physically separated valve houses. The two valve houses are located approximately 120 degrees apart at the northwest and northeast sides of the exterior containment wall. The below grade main steam and feedwater pipe tunnels connect the two valve houses. The northwest valve house contains safe components and piping associated with the "B" and "C" steam generators. The northeast valve house contains safe shutdown components and piping associated with the "A" and "D" steam generators. Safe shutdown components located in (or near to) the valve houses include the main steam safety valves, the steam generator PORVs, the MSIVs, MSIV bypass valves, steam generator pressure instruments and auxiliary feedwater system containment isolation valves. Cables associated with these components are present in the valve houses, and are also routed through the main steam and/or feedwater pipe tunnels to the auxiliary building. In the area of the pipe tunnels bounded by column-rows 26 to 31 and P to Q, cables for all of the redundant components may be present.

The combustible material present in this zone consists of hydraulic fluid that is located in the two valve houses. All cables routed through the pipe tunnels are located in conduit, and thus do not count as exposed combustibles. The main steam and feedwater pipe tunnels themselves have no combustible materials and no fire loading. Ionization detection is available in the two valve houses. The pipe tunnels themselves have no detection. Manual extinguishing capability consisting of portable extinguishers and a hose station is available to the area.

Separation between redundant components located in the two valve houses: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant components involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. The separation through the pipe tunnels between the two valve houses is in excess of 200 linear feet with no intervening combustibles. However, this requirement is not met because neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed. Therefore, the separation between redundant components in the two valve houses deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Separation between redundant cables within the pipe tunnels: Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables involved are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. Although the pipe tunnels have no fire loading (i.e., no combustible materials), this requirement is not met because existing separation is less than 20 horizontal feet. In addition, neither detection nor an automatic fire suppression system are provided in the pipe tunnels. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and neither detection nor an automatic suppression system are installed in the pipe tunnels. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Separation between redundant component located in the two valve houses: Other than the oil associated with the valve hydraulic systems in both valve enclosures, there are no combustible materials in the main steam and feedwater tunnels, which then have no fire load. Detection and manual suppression capability are provided in the valve enclosures. The separation between the two valve houses, coupled with the absence of combustible materials in the connecting pipe tunnels, is sufficient to ensure that no single fire could affect both valve enclosures at once.

Separation between redundant cables within the pipe tunnels: All safe shutdown cables located in this fire zone are routed in conduit. This fact, in conjunction with the absence of combustible materials within the pipe tunnels, is sufficient to ensure a single fire (involving transient combustible materials) will not affect redundant safe shutdown cables.

In summary, because the cables are routed in conduit, and considering the configuration of combustible materials, and detection and manual suppression capability, a level of protection equivalent to Section C.5.B(2) of BTP CMEB 9.5-1 is achieved. The existing separation is judged to be adequate to preclude a single fire in the pipe tunnels or within one of the valve houses from affecting redundant safe shutdown components or cables.

A5.8.15 Deviation No: 2A.2

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) between fire zones (2A RHR pump room and 2B RHR pump room).

Fire Zone(s) or Elevations Involved

346 feet 0 inch (Fire Zone 11.2A-2)

346 feet 0 inch (Fire Zone 11.2D-2)

Description of Equipment/Cables Involved

RHR pump 2A and its cubicle cooler are located in Fire Zone 11.2A-2. RHR pump 2B and its cubicle cooler are located in Fire Zone 11.2D-2. Refer to Table 2.4-4 for a specific list of redundant equipment and cables in these zones. Figure 2.3-15 shows the location of the equipment involved.

Description of Deviation(s)

The RHR pumps and cubicle coolers located in Fire Zone 11.2A-2 are separated from the redundant RHR pump and cubicle cooler, located in Fire Zone 11.2D-2, by a 2-hour-rated fire barrier. Also, area-wide automatic fire suppression is not provided in either zone; nor is it provided in Fire Zones 11.2B-2 and 11.2C-2 (containment spray pump rooms), which are located between the RHR pump rooms. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Due to the presence of the containment spray pump rooms between the RHR pump rooms, the separation between the two trains of RHR components is greater than 75 feet. The 3 walls between the two trains of RHR components are all of 3-hour construction. Two of the walls contain unsealed penetrations or penetrations with non-fire-rated seals. The wall at column-row W between the two containment spray pump rooms is upgraded to all 2-hour-rated fire barrier. The RHR pump rooms and the containment spray pump rooms have low combustible loadings. All of these rooms are provided with automatic fire detection. Fire Zone 11.2B-2 contains a manual hose station allowing the fire brigade to reach Fire Zones 11.2A-2, 11.2C-2, and 11.2D-2. Also, portable extinguishers are provided in adjacent Fire Zone 11.2-0 (auxiliary building general area).

The residual heat removal system is not required for hot shutdown of the plant. Station repair procedures been written to ensure that the RHR system will be repaired and available to achieve cold shutdown conditions within 72 hours after a fire.

In summary, the large distance separating the two trains of RHR pumps and cubicle coolers, the 2 hour-rated fire barrier, fire detection and manual fire suppression provided, establish a level of fire protection commensurate with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.16 Deviation No: 2A.3

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 1 main control room), and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 2.1-0)

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 2.1-0 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables located in Fire Zone 2.1-0 are not separated by a 20-foot space free of combustible materials and the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Controls and instrumentation for all plant systems are located in the control room. Although separation of redundant trains does not meet the requirements of Section III.G.2, alternative shutdown systems and equipment independent of this zone are provided. Specifically, the remote Shutdown Panel and Fire Hazards Panel have sufficient controls and instrumentation to bring the plant to hot standby, and taking credit for limited local manual operations, cold shutdown can be achieved. This meets the requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1and is therefore acceptable.

A5.8.17 Deviation No: 2A.4

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 2 Auxiliary Electric Equipment Room), and for which alternate or dedicated shutdown capability is provided.

Fire Zone(s) or Elevations Involved

451 feet 0 inch (Fire Zone 5.5-2)

Description of Equipment/Cables Involved

The cables and equipment required for safe shutdown and located in Fire Zone 5.5-2 are listed in Table 2.4-4.

Description of Deviation(s)

The redundant safe shutdown cables present in Fire Zone 5.5-2 are not separated by 20 feet with the intervening space free of combustible materials. Also the area is not covered by a total suppression system. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Instrumentation for both trains of safe shutdown equipment is located in this zone. Although separation of this redundant equipment does not meet the requirements of Section III.G.2, alternative shutdown instrumentation independent of this zone is provided. Specifically, the Fire Hazards Panel, described in Subsection 2.4 of the Fire Protection Report, has sufficient instrumentation to bring the plant to the hot standby condition, and taking credit for local manual operation, cold shutdown can be achieved. This meets the requirements of Section C.5.B(3) and is therefore acceptable.

A5.8.18 Deviation No: 2A.5

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (the Unit 2 Remote Shutdown Panel Room).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4C-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4C-0 are listed in Table 2.4-4.

Description of Deviation(s)

The remote shutdown panels for both units are located in this zone. A fire in this zone could render inoperable the remote shutdown panels and the corresponding controls in the control room. As a result, redundant systems required for safe shutdown could be adversely affected. In addition, no area-wide automatic fire suppression is provided. This is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

Fire Zone 11.4C-0 is separated from the rest of the plant by 3-hour-rated fire barriers and is a controlled access area. The remote shutdown control panels for Unit 1 are separated from those for Unit 2 by approximately 90 feet. One manual hose station and portable fire extinguishers are available in this zone. Ionization detectors are provided throughout the fire zone, including the room with the remote shutdown panel, which annunciate and alarm in the control room. The fire load is moderately low and the bulk of combustible materials consists of cable insulation. In the event of a fire in this zone, safe shutdown of the plant can be achieved by local operation of equipment. Also, instruments located at the remote shutdown panel are isolated so that a fire in this room will not affect the instruments in the control room.

In summary, the low combustible loading, automatic fire detection and manual suppression capabilities, controlled access, and local operation of safe shutdown equipment provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.19 Deviation No: 2A.6

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone (general area, Auxiliary Building Elevation 383 feet).

Fire Zone(s) or Elevations Involved

383 feet 0 inch (Fire Zone 11.4-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.4-0 are listed in Table 2.4-4.

Description of Deviation(s)

Redundant power and/or control cables serving auxiliary feedwater pumps 2A and 2B routed in Fire Zone 11.4-0 are less than 20 feet apart and the intervening space contains combustible materials and the area is not covered by a total suppression system which is not in accordance with the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The diesel-driven auxiliary feedwater pump is located within its own room, which has 3-hour fire-rated barriers separating it from the general area outside. This pump can be manually started from a local control panel in this room, and it will operate completely independent of the associated cables located outside of the room in the general area on Elevation 383 feet 0 inch (Fire Zone 11.4-0). Thus, the fact that cables for both AFW pumps are present in the same area in Fire Zone 11.4-0 and could be damaged by a single fire is acceptable, since the Division 22 diesel-driven AFW pump can still be manually started and operated.

In order to provide an adequate supply of water to the secondary heat sink in a timely manner following a fire in this zone, remote start capability for the diesel-driven auxiliary feedwater pump is required. Therefore, a remote switch has been installed at the elevation below in Fire Zone 11.3-0 to ensure that the diesel-driven auxiliary feedwater pump can be manually started in the case of a fire in Fire Zone 11.4-0.

Cables 2AF346 and 2AF338 (which are routed in Fire Zone 11.4-0 in a modification subsequent to this deviation) supply a lo-lo suction pressure signal that could trip the 2B auxiliary feedwater (AFW) pump. To preclude this from happening, a modification is implemented to allow the 2B pump to be manually started even if these cables, 2AF346 and 2AF338, are damaged by fire. Besides these cables, several other cables associated with both AFW pumps are routed through Fire Zone 11.4-0; however, an evaluation has shown that the 2B AFW pump can be started locally if a fire destroyed these cables.

A5.8.20 Deviation No: 2A.7

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone.

Fire Zone(s) or Elevations Involved

439 feet 0 inch (Fire Zone 3.2B-1)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 3.2B-1 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The fire zone is provided with fire detection and an area-wide automatic suppression system.

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system.

In summary, the low combustible loading, automatic fire detection and suppression capabilities, controlled access, and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A.5.8.21 Deviation No: 2A.8

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone.

Fire Zone(s) or Elevations Involved

401 feet 0 inch (Fire Zone 11.5-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.5-0 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The fire zone is provided with an area-wide automatic fire detection system.

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system.

In summary, the low combustible loading, automatic fire detection capability, and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A.5.8.22 Deviation No: 2A.9

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) within a single fire zone.

Fire Zone(s) or Elevations Involved

426 feet 0 inch (Fire Zone 11.6-0)

Description of Equipment/Cables Involved

The redundant cables and equipment required for safe shutdown and located in Fire Zone 11.6-0 are listed in Table 2.4-4.

Description of Deviation(s)

Cables for both trains of the control room ventilation system are present in this zone. The separation of these cables does not meet the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation(s)

The fire zone is provided with an area-wide automatic fire detection system.

In the event of the total loss of the VC system, portable fans will be staged and flow paths established to ventilate the AEERs and main control room from the Turbine Building. Station evaluations (reference EC#333738 and Calculation #BRW-97-0339-M/BYR97-210), assuming Turbine Building ambient temperatures associated with peak summer temperatures, have demonstrated that temporary ventilation can maintain the AEER and main control room temperatures within conditions to assure the control room remains habitable and control room instrumentation would not be adversely affected. Additionally, safe shutdown instrumentation at the unit 1 and unit 2 fire hazards panels would not be affected by the loss of the VC system.

In summary, the low combustible loading, automatic fire detection capability, and manual provisions to provide ventilation for loss of the VC system, provide a level of fire protection equivalent to that specified by Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

A5.8.23 Deviation No: 2C.1

This item represents a deviation from the separation requirements of Section C.5.B(2), paragraphs (a), (b) and (c) for a single fire zone (the containment).

Fire Zone(s) or Elevations Involved

Unit 2 Containment (Fire Zone 1-2)

A5.8.23.1 Description of Equipment/Cables Involved

Pressurizer Power-Operated Relief Valves (PORV) and Block Valves

Pressurizer power-operated relief valves, block valves and associated power and control cables which are required for safe shutdown are located in containment. For the Division 21 PORV, the associated control cables are 2RY247, 2RY248, 2RY249, 2RY388 and 2RY490. Cable 2RY490 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 21 PORV block valve, the associated power and control cables are 2RY002 and 2RY004, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

For the Division 22 PORV, the associated control cables are 2RY253, 2RY254, 2RY255, 2RY389 and 2RY491. Cable 2RY491 is routed between the containment electrical penetration and a junction box located within the pressurizer cubicle. The remaining four cables are located entirely within the pressurizer cubicle. For the Division 22 PORV block valve, the associated power and control cables are 2RY007 and 2RY009, which are routed between the containment electrical penetrations and the block valve itself, which is located within the pressurizer cubicle.

Description of Deviation

Due to the proximity of both power-operated relief valves and block valves within the pressurizer cubicle, Division 21 cables (2RY002, 2RY004, 2RY247, 2RY248, 2RY249, 2RY388 and 2RY490) and Division 22 cables (2RY007, 2RY009, 2RY253, 2RY254, 2RY255, 2RY389 and 2RY491) are separated by as little as 1 foot. The pressurizer cubicle is separated from the rest of containment by concrete walls that extend between Elevations 426 feet 0 inch and 471 feet 0 inch.

Outside of the pressurizer cubicle, all Division 21 and Division 22 cables are horizontally separated by approximately 15 feet on the vertical run along the shield wall between Elevations 440 feet 0 inch and 467 feet 0 inch, and azimuth angles R25 and R26. Also, between Elevations 421 feet 0 inch and 440 feet 0 inch, azimuth angles R24 and R25, all cables are separated by a vertical distance of approximately 5 feet at the closest point with intervening combustibles in the form of cable trays.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Within the pressurizer cubicle, all cables are routed in rigid or flexible conduit. There are no exposed combustible materials within the cubicle that represent a fire hazard. Thus, a fire within the pressurizer cubicle is considered to be extremely unlikely and the existing separation is considered to be adequate.

Immediately outside of the pressurizer cubicle, where the cables run vertically along the outside of the shield wall, both sets of cables are in conduit. The minimum horizontal separation is about 15 feet. The only combustible materials here are cables in cable trays. In this area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of combustible materials present and the fact that the cables in question are routed in conduit.

Elsewhere outside of the pressurizer cubicle, Division 21 cables pass underneath Division 22 cables with a minimum vertical separation of 5 feet. This occurs near the penetration area between R24 and R25. In this area, the Division 21 and Division 22 PORV control cables (2RY490 and 2RY491, respectively) are routed individually in conduit from their respective penetrations to inside the pressurizer enclosure. Therefore, in the penetration area, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging both trains due to the nature of the combustible materials present and the fact that the PORV control cables are routed in conduit.

Furthermore, even if both pressurizer PORVs were inoperable, the ability to safely shut down the plant would not be lost. Hot standby could be maintained utilizing the pressurizer safety valves for overpressure protection. Cooldown and depressurization could be accomplished using the steam generators to remove decay heat, and if required, utilizing the letdown system. This mode of operation will take the primary system to a low enough temperature and pressure to initiate RHR system operation.

In summary, because of the low combustible loading coupled with the large size of the area, and the routing of the affected PORV cables within conduit from the electrical penetrations to the valves, a level of fire protection equivalent to that specified in paragraphs (a), (b) or (c) of BTP CMEB 9.5-1 is provided. The existing separation between the redundant safe shutdown cables for these components is judged to be adequate to prevent a single fire from simultaneously damaging both pressurizer PORVs.

A5.8.23.2 Description of Equipment/Cables Involved

Steam Generator Wide Range Level Instrumentation

Cables for all four channels of steam generator wide range level instrumentation are located in containment. Only one steam generator is required to achieve and maintain hot standby. Each of the steam generators has one instrumentation cable which provides wide range level indication; steam generator (SG) 2A - instrumentation cable 2FW018, SG 2B - 2FW020, SG 2C - 2FW022, and SG 2D - 2FW024.

Description of Deviation

All four water level instrumentation cables (Division 21 - 2FW018 and 2FW024, Division 22 - 2FW020 and 2FW022) have a minimum separation of approximately 15 feet vertically and 60 feet horizontally in the area bounded by elevations 400 feet 0 inch and 440 feet 0 inch, azimuth angles R25 and R42, at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

A single fire large enough to damage all four cables would have to span more than 60 feet in the horizontal direction between azimuth angles R25 and R42. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.23.3 Description of Equipment/Cables Involved

Source Range Neutron Monitoring Instruments

Two channels of source range neutron monitoring instruments are provided. Two channels of post-accident nuclear instrumentation are also provided. A single channel of nuclear indication (of either system) is required to achieve and maintain hot standby. Cables for the two available channels of source range neutron monitoring and post-accident nuclear instrumentation are 2NR251 and 2NR252 (Division 21) and 2NR267 and 2NR 268 (Division 22). All of these cables are routed in containment.

The detectors for the Division 21 and Division 22 source range neutron monitoring and post-accident nuclear instrument system are located 180 degrees apart to the north and south of the reactor vessel. The Division 21 detector is located on the north side of the reactor vessel. Cable 2NR252 is routed around the outside of the primary shield wall to a box on the northeast side of the primary shield wall. Cable 2NR251 is routed from this box east to and through the missile barrier near R22, and to an electrical penetration near azimuth R22. The Division 22 detector is located on the south side of the reactor vessel. Cable 2NR268 is routed in a southwest direction from the detector to a box in the southwest quadrant of the containment building. Cable 2NR267 is routed from the box directly south to the missile barrier. After passing through the missile barrier, the cable follows along the exterior containment wall to an electrical penetration between azimuth R24 and R25.

Description of Deviation

Outside of the missile barrier, the separation between cables 2NR251 (Division 21) and 2NR267 (Division 22) is approximately 32 feet in the area bounded by Elevations 412 feet and 420 feet, azimuth angles R22 and R24. Intervening combustibles are also present in the form of cable trays.

Inside of the missile barrier, the instrument channels are separated by approximately 50 feet in the area bounded by Elevations 380 feet and 421 feet, azimuth angles R27 and R22. Intervening combustibles are present in the form of cable trays. In addition, area-wide fire detection or suppression is not provided in these zones.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

The cables are routed in conduit inside the missile barrier. The minimum separation between the two instrument cables is approximately 50 feet. The reactor coolant pump is not considered to represent a major fire hazard since it is provided with an oil collection system. Furthermore, heat detectors are provided over the pump. Only one cable tray is located in the area. It is located near radii R22 and R25, where the separation between redundant cables is 50 feet. The tray is 12 inches wide and is filled to less than one quarter of its total cross sectional area. In addition, the cables are primarily located on the opposite sides of the primary shield wall, and are not subject to the same fire hazards. Outside of the missile barrier, the minimum separation between the two instrument cables is approximately 32 feet. Only two 12 inch wide cable trays are located in the area. They are located near radii R22 and R24. One tray is filled to less than half its total cross sectional area. The other tray is filled to less than one quarter of its cross sectional area. In view of the fact that the neutron monitoring cables are in conduit for the majority of their routings, and in consideration of the nature and orientation of intervening combustibles, the existing separation is considered to be adequate to preclude a single fire from disabling all of the instruments.

A5.8.23.4 Description of Equipment/Cables Involved

Pressurizer Pressure Instrumentation

Four channels of pressurizer pressure instrumentation are provided. Only one of the four available pressurizer pressure instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the four channels. The four instrumentation cables are 2RY199 and 2RY207 in Division 21, and 2RY203 and 2RY211 in Division 22.

Description of Deviation

All four pressurizer pressure instrumentation cables have a minimum separation of approximately 15 feet vertically and 60 feet horizontally in the area bounded by Elevation 400 feet and 440 feet, azimuth angles R25 and R42, at a radius at about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

A single fire large enough to damage both Division 21 and Division 22 cables would have to span more than 60 feet in the horizontal direction between azimuth angles R25 and R42. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all four of these safe shutdown instruments.

A5.8.23.5 Description of Equipment/Cables Involved

Pressurizer Level Instrumentation

Three channels of pressurizer level instrumentation are provided. One of the three pressurizer level instrumentation channels is required to achieve and maintain hot standby. Inside containment, a single cable is associated with each of the three channels. The three instrumentation cables are 2RY20l and 2RY209 in Division 21, and 2RY205 in Division 22.

Description of Deviation

All three pressurizer level instrumentation cables have a minimum separation of approximately 15 feet vertically and 22 feet horizontally in the area bounded by Elevations 408 feet and 423 feet 6 inches, azimuth angles R23 and R42, at a radius of about 67 feet from the centerline of containment.

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment of 20 horizontal feet with no intervening combustibles. This is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) specifies installation of fire detectors and an automatic suppression system in the area. Although detection is available in the affected area, this is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) specifies separation of redundant cables by a non-combustible radiant energy shields. Non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

The pressurizer level instrumentation cables are routed in conduit. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all three of these safe shutdown instruments.

A5.8.23.6 Description of Equipment/Cables Involved

Reactor Coolant Hot Leg Temperature Or Core Exit Temperature

Indication for reactor coolant hot leg temperature for one RCS loop or indication of core exit temperature from one division of the incore thermocouples is required to achieve and maintain hot standby.

Each reactor coolant system hot leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the eastside of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room and at the remote shutdown panel. The four cables associated with the MCR/RSP indication are 2RC351, 2RC356, 2RC361 and 2RC366. All four of these cables are Division 21 cables. These four cables are routed in a generally southerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 21 electrical penetration located near R25.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel. The four cables associated with the FHP indication are 2RC743, 2RC745, 2RC747 and 2RC749. All four of these cables are Division 22 cables. These four cables are routed in a generally northerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 22 electrical penetration located near R22.

The Division 21 incore thermocouple cables are 2IT308 through 2IT340, 2IT343, 2IT344, 2IT425 and the 33 incore thermocouple circuits combined into five multiconductor mineral insulated cables 2IT428, 2IT429, 2IT432, 2IT433, 2IT436, 2IT437, 2IT440, 2IT441, 2IT444, and 2IT445 (two cable numbers assigned per multiconductor cable) from junction box 2JB697R to the reactor vessel head. The Division 22 incore thermocouple cables are 2IT351 through 2IT382, 2IT347, 2IT348, 2IT427, and the 32 incore thermocouple circuits combined into five multiconductor mineral insulated cables 2IT430, 2IT431, 2IT434, 2IT435, 2IT438, 2IT439, 2IT442, 2IT443, 2IT446, and 2IT447 (two cable numbers assigned per multiconductor cable) from junction box 2JB698R to the reactor vessel head.

The Division 21 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 417 feet 6 inches between R24 and R25 to junction box 2JB697R outside the missile barrier at Elevation 435 feet 9 inches between R22 and R42. The Division 22 incore thermocouple cables are routed in conduit from a containment penetration at Elevation 439 feet 3 inches between R25 and R26 to junction box 2JB698R outside the missile barrier at Elevation 456 feet 0 inches between R22 and R42. The mineral insulated cables for both divisions are routed in conduit from junction boxes 2JB697R and 2JB698R, between steam generators 2A and 2D, to the primary shield wall. These same cables are then routed in cable trays (Elevation 430 feet) from the primary shield wall to a connector plate above the reactor vessel, and from there routed vertically down to the reactor vessel head.

Description of Deviation

Section C.5.B(2) paragraph (a) specifies separation between redundant cables and equipment by a fire barrier having a 3-hour rating. This is not met because the redundant cables are located within the same fire zone, and no fire barrier is present. Section C.5.B(2) paragraph (b) specifies separation between redundant cables and equipment by 20 feet of horizontal distance with no intervening combustibles and installation of fire detectors and an automatic suppression system in the area. This is not met because the separation between the redundant cables is less than that specified, and intervening combustibles in the form of cable insulation in cable trays are present in the area and although detection is available in the affected area, an automatic fire suppression system is not provided. The Divisions 21 and 22 reactor coolant hot leg temperature and incore thermocouple cables are routed in the closest proximity to each other outside of the secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet in the sector bounded by R22 and R25. Section C.5.B(2) paragraph (c) specifies enclosure of redundant cables and equipment of one train by a 1-hour rated fire barrier and installation of fire detectors and an automatic suppression system in the area. As previously stated, no fire barriers are present in the zone, and an automatic suppression system is not installed. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Between the primary and secondary shield walls, the RCS loop "B" and "C" RTDs and their cables are separated from the RCS loop "A" and "D" RTDs and their cables and the incore thermocouple cables by the primary shield wall and/or the refueling pool structure. The primary shield wall is a concrete structure approximately 34 feet in diameter that encloses the reactor cavity and reactor vessel. These structures serve the purpose of a noncombustible radiant energy shield that separates the loop "B" and "C" RTDs and cables from the redundant loop "A" and "D" RTDs and cables and incore thermocouple cables. Away from the penetration, the divisional routings of the RTD cables provide good spatial separation, ensuring that indication for at least one loop of reactor coolant hot leg temperature will be available. As previously stated, the minimum separation of cables occurs between the containment penetrations and secondary shield wall. The minimum horizontal separation between a single division of either the hot leg cables or the incore thermocouple cables is approximately 52 feet at the containment penetrations in the sector bounded by R22 and R25. Therefore, a fire would have to span a horizontal distance of approximately 52 feet to damage all of the reactor coolant hot leg and incore thermocouple cables. Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments.

A5.8.23.7 Description of Equipment/Cables Involved

Reactor Coolant Cold Leg Temperature

Indication for reactor coolant cold leg temperature for one RCS loop is credited to achieve and maintain hot standby.

Each reactor coolant system cold leg has a dual element RTD. The loop "A" and "D" RTDs are located between the primary and secondary shield walls on the eastside of the reactor cavity. The loop "B" and "C" RTDs are located between the primary and secondary shield walls on the west side of the reactor cavity.

One of the two elements for each RTD provides a signal to indication in the main control room (MCR) and at the remote shutdown panel (RSP). The four cables associated with the MCR/RSP indication are 2RC373, 2RC392, 2RC397 and 2RC402. All four of these cables are Division 22 cables. Some of these four cables are routed in a generally northerly direction from their respective RTDs to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 22 electrical penetration located near R42. The other cables remain inside the secondary shield wall until they pass through it in the immediate vicinity of the electrical penetration located by R42.

The remaining element for each RTD provides a signal to electrically independent indication located on the Fire Hazards Panel (FHP). The four cables associated with the FHP indication are 2RC751, 2RC753, 2RC755 and 2RC757. All four of these cables are also Division 22 cables. Starting at their respective RTDs, these four cables are routed in a generally southerly direction to outside of the secondary shield wall, and from there they follow along the exterior containment wall over to their Division 22 electrical penetration located near R24.

Description of Deviation

The four FHP cold leg RTD cables have a minimum separation of approximately 1 foot vertically from the four MCR/RSP cold leg RTD cables near R42.

Section C.5.B(2) paragraph (a) is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown instruments.

Additionally, the loss of all cold leg RTDs is acceptable for the following reasons. The cold leg RTDs would normally be used in conjunction with the hot leg RTDs to verify adequate core cooling, i.e., that natural circulation is present. This condition can also be verified by trending the temperatures indicated by the core exit thermocouples. As noted in Section A5.8.6.6, the thermocouple cables are routed in conduit in the area of concern. Furthermore, cold leg temperature can be inferred from steam generator pressure. As indicated in Section 2.4, steam generator pressure instrumentation and cabling are independent of this zone. Plant emergency procedures are written to refer to these alternate methods of verifying primary system conditions. In fact, the core exit thermocouples are the preferred method. The Byron and Braidwood plant procedures are written using guidance from the Westinghouse Owners Group. Therefore, this deviation from BTP CMEB 9.5-1 requirements is considered to be acceptable.

A5.8.23.8 Description of Equipment/Cables Involved

Reactor Containment Fan Cooler (RCFC) Fans

Two of the four RCFC fans are required to operate in the high-speed mode to achieve and maintain hot standby. The four RCFCs themselves are located outside of the secondary shield wall at widely spaced intervals around the containment. The high speed power cables for the RCFC fans routed inside containment are 2VP004, 2VP026, 2VP048, and 2VP070.

Description of Deviation

All four RCFC power cables (Division 21 - 2VP004 and 2VP048, Division 22 - 2VP026 and 2VP070) have a minimum separation of approximately 36 horizontal feet. This minimum separation occurs in the area bounded by elevations 393 feet 5 inches and 439 feet 3 inches, azimuth angles R26 and R42, at a radius of about 60 feet from the centerline of containment. There are intervening combustibles in this area in the form of cable insulation.

Section C.5.B(2) paragraph (a) is not met because intervening combustibles in the form of cable insulation in cable trays are present in the area. Section C.5.B(2) paragraph (b) is not met because an automatic fire suppression system is not provided. Section C.5.B(2) paragraph (c) is not met because non-combustible shields are not provided. Therefore, the separation between redundant cables deviates from the guidelines of Section C.5.B(2), paragraphs (a), (b) and (c) of BTP CMEB 9.5-1.

Justification for Deviation

Although intervening combustibles in the form of cable insulation in cable trays are present in the affected area, the cables utilized at Byron are constructed per IEEE 383. These cables will not propagate a fire without the presence of an external flame. No other combustible materials (i.e., an external flame source for the cables) are present in this area in significant quantities. The fire loading in this area is low. The containment is a large open area. The heat and products of combustion of any fire which may be postulated to start will be dissipated in the upper levels of the containment building, and will not be concentrated in the immediate area of the fire near potential targets (i.e., other cable trays). In addition, fire detection is provided in this area. For these reasons, the existing separation between redundant cables is considered to be adequate to preclude a single fire from damaging all of these safe shutdown cables.