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Dominion®

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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 16-335
NSS&L/TFO R0
Docket No. 50-336
License No. DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
PROPOSED EXEMPTION REQUEST FROM 10 CFR 50, APPENDIX R, SECTION III.G., "FIRE PROTECTION OF SAFE SHUTDOWN CAPABILITY"

In accordance with 10 CFR 50.12, "Specific exemptions," Dominion Nuclear Connecticut, Inc. (DNC) hereby requests an exemption from the provisions of 10 CFR 50, Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability," for Millstone Power Station Unit 2 (MPS2). The proposed exemption request would allow the use of operator manual actions (OMAs) in lieu of the requirements of paragraph III.G.2. This exemption is being requested in accordance with the requirements of 10 CFR 50.12(a)(2)(ii) since the application of Appendix R, III.G.2 in this particular circumstance would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The OMAs addressed in this exemption request are contained in the MPS2 Appendix R Compliance Report. The MPS2 Appendix R Compliance Report was submitted to the NRC for review on May 29, 1987 and found acceptable in an NRC safety evaluation report (SER) dated July 17, 1990. However, the SER did not specifically address the OMAs addressed in this exemption request. By letter dated June 30, 2011, DNC submitted an exemption request for OMAs contained in the MPS2 Appendix R Compliance Report. DNC subsequently removed four OMAs from the requested exemption for four specific fire areas by letter dated February 29, 2012 because loss of instrument air was not a postulated event. However, the four OMAs remained in the exemption request for other fire areas. The NRC approved the requested exemption by letter dated July 12, 2012. By letter dated October 29, 2012, DNC requested a revision to the approved exemption to add OMAs back in to certain fire areas due to postulated cable damage and loss of power. The NRC approved the revision to the exemption by letter December 18, 2012.

During the 2016 Triennial Fire Inspection it was identified that a loss of offsite power will result in a loss of instrument air prior to the emergency diesel generators starting and that instrument air does not automatically restart and cannot be manually started from the control room. As a result, a request for exemption is being submitted for OMAs related to loss of instrument air.

A006
NRR

In accordance with Regulatory Issue Summary (RIS) 2006-10, "Regulatory Expectations with Appendix R paragraph III.G.2 Operator Manual Actions," an approved 10 CFR 50.12 exemption is required for all operator manual actions, even those that were accepted in a previously issued NRC SER. This exemption request is limited to those OMAs related to a loss of instrument air that were previously submitted to the NRC in MPS2 Appendix R Compliance Report but were not reviewed and approved by the NRC per 10 CFR 50.12. Attachment 1, Table 1 contains a list of the specific manual actions for which an exemption is being requested.

Information supporting the exemption request is contained in Attachments 1 through 3 to this letter. DNC requests approval of this exemption request by October 31, 2017.

The exemption request has been reviewed and approved by the Facility Safety Review Committee. This exemption request will not result in undue risk to the public health and safety because DNC has determined that the subject manual actions are feasible for use in achieving post-fire safe shutdown. This exemption request includes no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Jeffry A. Langan at (860) 444-5544.

Sincerely,

Mark D. Sartain
Vice President – Nuclear Engineering

Commitments made in this letter: None

Attachments:

1. Request for Exemption from 10 CFR 50, Appendix R, Section III.G., "Fire Protection of Safe Shutdown Capability" for OMAs Related to Loss of Instrument Air
2. Simplified Sketches of System Configurations and Facility Alignment
3. Appendix R Fire Area Boundaries, Emergency Lights, and Access/Egress Routes

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Serial No. 16-335
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ATTACHMENT 1

Request for Exemption from 10 CFR 50, Appendix R, Section III.G., "Fire Protection of Safe Shutdown Capability" for OMAs Related to Loss of Instrument Air

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2

Introduction

In accordance with 10 CFR 50.12, "Specific exemptions," Dominion Nuclear Connecticut, Inc. (DNC) hereby requests an exemption from the provisions of 10 CFR 50, Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability," for Millstone Power Station Unit 2 (MPS2). The proposed exemption would allow the use of operator manual actions (OMAs) in lieu of the requirements of Section III.G.2. This exemption is being requested in accordance with the requirements of 10 CFR 50.12(a)(2)(ii) since the application of Appendix R, III.G.2 in this particular circumstance would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The OMAs addressed in this exemption request are contained in the MPS2 Appendix R Compliance Report. The MPS2 Appendix R Compliance Report was submitted to the NRC for review on May 29, 1987 (Reference 6) and found acceptable in an NRC safety evaluation report (SER) dated July 17, 1990 (Reference 8). However, the SER did not specifically address the OMAs addressed in this exemption request. By letter dated June 30, 2011 (Reference 14), DNC submitted an exemption request for OMAs contained in the MPS2 Appendix R Compliance Report. DNC subsequently removed four OMAs from the requested exemption related to specific fire areas by letter dated February 29, 2012 (Reference 15) because loss of instrument air was not a postulated event. However, the four OMAs remained in the exemption request for other fire areas. The NRC approved the requested exemption by letter dated July 12, 2012 (Reference 16). By letter dated October 29, 2012, DNC requested a revision to the approved exemption to add OMAs back in to certain fire areas due to postulated cable damage and loss of power (Reference 17). The NRC approved the revision to the exemption by letter December 18, 2012 (Reference 18).

During the 2016 Triennial Fire Inspection at MPS it was identified that a loss of offsite power will result in a loss of instrument air prior to the emergency diesel generators starting and that instrument air does not automatically restart and cannot be manually started from the control room. As a result, a request for exemption is being submitted for OMAs related to loss of instrument air.

In accordance with Regulatory Issue Summary (RIS) 2006-10, "Regulatory Expectations with Appendix R paragraph III.G.2 Operator Manual Actions," an approved 10 CFR 50.12 exemption is required for all operator manual actions, even those that were accepted in a previously issued NRC SER. This exemption request is limited to those OMAs related to a loss of instrument air that were previously submitted to the NRC in MPS2 Appendix R Compliance Report but were not reviewed and approved by the NRC per 10 CFR 50.12. Table 1 contains a list of the specific manual actions for which an exemption is being requested.

This exemption is being requested in accordance with the requirements of 10 CFR 50.12(a)(2)(ii) since the application of the regulation in this particular circumstance

would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

Background

The fire protection features in effect during the design and construction of MPS2 were those specified by the AEC-proposed 10 CFR Part 50, Appendix A, General Design Criterion 3 - "Fire Protection." MPS2 fire protection systems are consistent with 10 CFR Part 50 Appendix A criteria, and recognized guidelines of the Nuclear Energy Property Insurance Association (NEPIA) and the National Fire Protection Association (NFPA). The MPS2 Appendix R Compliance Report documents that MPS2 can be placed in a cold shutdown condition following a design basis fire as required by the rules of 10 CFR Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979" (hereafter referred to as Appendix R). Based on the Fire Protection Safety Evaluation Report (SER) for MPS2 dated September 19, 1978 (Reference 1), MPS2 committed to implement and maintain a quality assurance program for fire protection features that meets the guidelines of Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1 and Appendix A thereto, and "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Control and Quality Assurance," dated June 14, 1977.

MPS2 implements and maintains in effect, all provisions of the approved fire protection program as described in the MPS2 Final Safety Analysis Report and as approved in the NRC SER dated September 19, 1978, and supplements dated October 21, 1980, November 11, 1981, April 15, 1986, January 15, 1987, April 29, 1988, July 17, 1990, November 3, 1995 and March 16, 1999 (References 1-5 and References 7-10) subject to the following provision: The licensee may make changes to the approved Fire Protection Program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

The requested exemption is for manual actions that were previously identified in the MPS2 Appendix R Compliance Report submitted and determined to be acceptable in an SER dated July 17, 1990 (Reference 8). The current MPS2 Appendix R Compliance Report indicates operator access is assured either by an alternate path or access is not required until after the fire has been suppressed. The abnormal operating procedures (AOPs) were validated and performance of the actions was verified as reasonable within the timeframes required. While the four OMAs in this exemption request had previously been approved for exemption in some fire areas (reference Table 2), per SER dated December 18, 2012, the approval did not consider the impacts related to a loss of instrument air. This proposed exemption request is seeking approval of OMAs related to loss of instrument air for certain affected fire areas. In accordance with RIS 2006-10, an exemption request is required for these OMAs. Table 1 shows the four OMAs (OMA 1, OMA 9, OMA 10, and OMA 11) related to a loss of instrument air which are proposed for exemption for the affected initiating fire area (R-9, R-10, R-13, and R-14). OMAs that have not been previously approved for an affected fire area are noted

as being new. OMAs that were previously approved for an affected fire area without consideration of a loss of instrument air are noted as being updated. For example, OMA 11 has been previously approved for Fire Areas R-4, R-7, R-13, and R-15, and R-17 for cable damage and loss of power. For this exemption request, OMA 11 is being updated for the loss of instrument air. OMA 11 is being requested for Fire Areas R-9 and R-14 since it was not previously approved for those fire areas. In addition, the area where the associated OMA is required to be performed is also listed in Table 1. For example, a fire in Fire Area R-10, R-9, R-13, or R-14 would require entry into Fire Area R-4 to perform OMA 1.

Table 1: Requested Additional OMAs for Exemption Request for Affected Initiating Fire Areas

OMA No.	Equipment	OMA	Time to Accomplish OMA	Affected Initiating Fire Area	Action Location Fire Area/FHA Zone or Area*
1	2-CH-192, RWST Isolation valve	Manually open valve to establish Charging Pump suction from RWST	Within 72 minutes after restoring Charging	New for R-10 Previously approved for R-9, R-13, and R-14, but being updated for loss of instrument air considerations	R-4/A-6A (AppR-2)
9	2-FW-43B, AFW Flow Control valve	Control at Fire Shutdown Panel C-10 panel until loss of backup air or local manual operation	Within 45 minutes after loss of Main Feedwater	Previously approved for R-13 and R-14, but being updated for loss of instrument air considerations	R-2/T-10 (AppR-9) R-3/T-1A (AppR-7)
10	2-MS-190A, Atmospheric Dump valve	Manually operate valve to transition from MSSVs	After establishing AFW	New for R-10	R-17/A-10C (AppR-6)
11	2-MS-190B, Atmospheric Dump valve	Control at Fire Shutdown Panel C-10 (R-13 fire) until loss of air, manually operate valve to transition from MSSVs	After establishing AFW	New for R-9, R-14 Previously approved for R-13, but being updated for loss of instrument air considerations	R-2/T-10 (C-10) (AppR-9) R-2/A-8E (Manual operation) (AppR-6)

* Refer to Attachment 2 for all drawings

Technical Discussion

1.0 Overview

Following a reactor shutdown using the Control Element Assemblies (CEAs), the Reactor Coolant System (RCS) is placed into a hot shutdown condition by isolating potential paths for loss of reactor coolant and establishing natural circulation cooldown by transferring heat to the Steam Generators (SGs). The RCS is borated through the charging system prior to achieving cold shutdown conditions. System pressure is decreased as part of the cooldown phase and charging pump flow provides a source for auxiliary pressurizer spray, as needed.

1.1 Reactivity Control Function

Reactivity control is accomplished by insertion of the control rods and results from an automatic Reactor Protection System (RPS) trip or from operator initiation of a manual trip.

Only control rods are necessary to achieve and initially maintain hot shutdown reactivity control. If MPS2 is to remain in hot shutdown for an extended period of time, then boron would be added to maintain shutdown margin once Xenon has burned out. The addition of boron is used to counter the effects of positive reactivity addition during cooldown to cold shutdown conditions.

1.2 RCS Pressure and Inventory Control Function

Maintaining the RCS pressure boundary integrity is necessary to achieve inventory and pressure control. The RCS and the Chemical and Volume Control System (CVCS) are used to achieve, or to assist in the achievement of the reactivity control function, the RCS inventory/pressure control function, and the decay heat removal function.

The RCS is isolated to maintain inventory control by minimizing system losses. This is achieved by de-energizing system components that could spuriously operate. The RCS letdown line will be isolated to conserve RCS inventory. The Reactor Coolant Pump (RCP) controlled bleedoff lines are isolated to avoid overfilling the Volume Control Tank (VCT). It is assumed the RCS leak rate during this time will be less than 13 gpm. Assuming these activities, plant calculations show that the pressurizer will remain on scale with the Charging System shutdown for up to 3 hours following a reactor trip. MPS2's AOPs for hot standby due to an Appendix R Fire requires operators to restore charging within 3 hours to provide makeup to the RCS and to begin borating.

Under normal conditions, makeup to the RCS is provided from the VCT and boric acid is provided from the Boric Acid Storage Tanks (BASTs) using the Boric Acid Pumps. The Appendix R analysis assumes the VCT and Boric Acid Pumps are unavailable. Makeup is initially provided from the BASTs to quickly increase the RCS boration concentration. Boric acid is provided to the charging pump suction by gravity feed (open 'B' Gravity

Feed valve 2-CH-508 or 'A' Gravity Feed valve 2-CH-509). The remainder of the lineup is accomplished by isolating the VCT and Refueling Water Storage Tank (RWST) (close VCT Outlet Header to Charging Pump valve 2-CH-501 and RWST to Charging Suction valve 2-CH-504), and opening (or verifying open) the charging valves (Charging Header Isolation valve 2-CH-429, Charging Isolation valve 2-CH-518, and Charging Isolation valve 2-CH-519). For the purposes of re-establishing charging, either 2-CH-518 or 2-CH-519 is required. These air operated valves (2-CH-518 and 2-CH-519) are designed with independent backup air supplies to provide air if normal instrument air is lost. The safety-related backup air supplies are capable of opening their respective valve and maintaining the valve open for over 13 hours or providing air for two valve strokes with a 5-1/2 hour hold. Switchover to the RWST (the backup makeup water supply) is required when the BASTs approach depletion. The air operated valve utilized to align to the RWST also has a backup air supply. This safety-related system allows for a single stroke of RWST Isolation valve 2-CH-192 with a 3 hour hold. Level transmitters (LT-206 and LT-208) provide remote indication of BAST level, and local level indicators (LI-206A and LI-208A) are provided to monitor the status of the BASTs when the BASTs are being used to makeup and borate the RCS.

RCS inventory makeup and reactivity control are provided by the contents of the BASTs. The charging pump suction would be diverted from the VCT to both of the BASTs. Boric acid would then be provided through gravity feed lines to the charging pumps.

RCS makeup would also be available using the RWST, if the BASTs had less than the expected inventory or after the BASTs have been emptied. RCS makeup would be accomplished through the normal charging lines. To achieve cold shutdown, the RCS must be depressurized. The charging pumps provide borated water to the pressurizer via the auxiliary spray line and Auxiliary Spray Isolation valve 2-CH-517. This water cools the steam bubble in the pressurizer, causing the RCS pressure to decrease. RCS shrinkage due to cooling can be offset by charging water flowing directly into RCS loops 1A and 2A.

1.3 Decay Heat Removal Function

Removal of reactor decay heat starts immediately after reactor shutdown and continues through stabilization of the plant at cold shutdown conditions. Multiple systems are credited as part of this function. The approach ensures that the water inventory in at least one SG is maintained while in hot standby conditions while the other SG may be allowed to initially steam itself dry and be refilled prior to entering cold shutdown.

(a) Main Steam (MS) System

Reactor decay heat removal is accomplished either by dumping steam to the atmosphere using the Atmospheric Dump Valves (ADVs) (2-MS-190A or 2-MS-190B) or the main steam safety valves. Once AFW is established from the control room, operation of the Main Steam Safety Valves (MSSVs) along with an ADV (2-MS-190B) is

the required method of removing decay heat for maintaining the plant in hot standby and an ADV is needed for initiating the transition to cold shutdown. Therefore, there is no required timeframe to operate the valves. Cold shutdown may be achieved by remote or handwheel-operation of the ADVs in conjunction with operation of other systems (e.g., shutdown cooling, Reactor Building Closed Cooling Water system (RBCCW), and service water). The Main Steam System also supplies steam to the turbine driven auxiliary feedwater (TDAFW) pump. To prevent excessive cooldown and to protect the inventory in the SGs, the various boundary paths must be isolated.

Following a fire, the portion of the Main Steam System from the SGs to the Main Steam Isolation Valves (MSIVs) is needed to isolate the SGs from the main condenser, provide steam to drive the TDAFW pump, and provide a vent to dump steam to atmosphere to initiate plant cooldown from hot to cold shutdown conditions. Steam is provided to the TDAFW pump, via #1 SG Supply to Auxiliary Feedwater Turbine 2-MS-201 or via #2 SG Supply to Auxiliary Feedwater Turbine 2-MS-202. NS6202 is a disconnect switch for the power cables of motor operated valve 2-MS-202. This disconnect switch is procedurally maintained "open" during normal plant power operation (Modes 1, 2, and 3). The valve is normally open; as such, this pre-fire action eliminates the possibility for spurious closing of 2-MS-202, and also addresses the NRC Information Notice (IN) 92-18 issue (to verify post-fire manual operation capability) for this valve. During plant cooldown, the ADVs (2-MS-190A or 2-MS-190B) are opened to vent steam to atmosphere after auxiliary feedwater flow has been established. Normally, these valves can be modulated from the control room. Following a fire, it may be necessary to manually modulate these valves to cool down the RCS. The instrumentation loop for ADV 2-MS-190B has been routed to Fire Shutdown Panel C-10 so that the valve can also be modulated from that location. If instrument air is lost, the atmospheric dump valves will be manually opened locally at the valve.

(b) Auxiliary Feedwater (AFW) System

The AFW system is required to remove decay heat from the RCS to maintain hot shutdown conditions and to remove decay and latent heat to cool the RCS to conditions allowing initiation of shutdown cooling (300°F). The AFW system supplies water from the Condensate Storage Tank (CST) or the fire water system to the secondary side of the SGs for RCS decay heat removal.

The AFW system supplies water to the secondary side of the SGs, thus maintaining a secondary heat sink for decay heat removal. Two motor driven (MDAFW) pumps and one steam TDAFW pump are available to supply water to the SGs. Each pump is capable of supplying the required feedwater flow to both SGs. The AFW pumps are normally aligned to take suction from the CST, and can be aligned to the fire water system if additional makeup is required. Each MDAFW pump supplies 300 gpm while the TDAFW pump supplies 600 gpm. Level transmitter LT-5282 monitors the water level in the CST, and local level indication (LIS-5489) is available in the event CST Level Transmitter LT-5282 is disabled as a result of a plant fire.

Either MDAFW pump or the TDAFW pump can be used to cooldown the plant. The adequacy of flow from one MDAFW pump has been verified to be adequate to support post-fire shutdown for a fire in R-2 with minimum impact on RCS conditions.

AFW Flow Control valves 2-FW-43A and 2-FW-43B control flow to each SG. An alternate set of controls has been provided for the TDAFW pump at Fire Shutdown Panel C-10. A cross-connect valve (2-FW-44) allows flow from any AFW pump to any SG. Operation of each flow control valve is controlled by two circuits: a solenoid that supplies/dumps positioner air; and a circuit that provides a position signal. The solenoid for each flow control valve can be de-energized by tripping the appropriate 125 VDC breaker or by energizing 120 VAC relays in each train of the AFW automatic initiation circuit (two out of two). This action will dump positioner air and cause both valves to open. The relays can be energized by hand switches in the control room. When air is supplied to the flow control valve, a positioner can be used to regulate feedwater flow. The positioner is controlled from the control room. Upon loss of signal, the flow control valves fail open. The valves can be closed or throttled using hand wheels. Additionally, each AFW flow control valve has a safety-related back-up air supply which requires no operator alignment for operation. This backup air supply provides for 20 cycles, fully closed to open and then to closed for each valve, with a final 3 hour hold in the last position. Once the backup air supply is depleted, the valves go to their failed open position.

An alternate set of controls has been provided at Fire Shutdown Panel C-10 for AFW Flow Control valve 2-FW-43B. These controls will allow the valve to be fully opened by disconnecting the 125 VDC solenoid circuit, or position controlled using the positioner circuit if instrument air is available. The cables associated with the disconnect switch are protected with a 3-hour, fire rated material in the Facility Z1 4.16 kV switchgear room, and 1-hour fire rated material in the R-14 cable vault.

A plant calculation shows that AFW is required to be established within 45 minutes of reactor trip and loss of main feedwater. The 45 minute requirement assumes one MDAFW pump is used to provide flow to both SGs. The preferred method of supplying AFW to the SGs is to utilize the TDAFW pump which allows for flow to be regulated through the failed open AFW flow control valves to the SGs by utilizing speed control of the turbine. As a defense-in-depth approach, at least one MDAFW pump is available during a fire in fire areas R-9, R-10, or R-14, but not for a fire in the west 480 VAC switchgear room (R-13).

The instrument air system has not been analyzed in the Appendix R program. Therefore, availability of the instrument air system to operate components is not credited, even if the actuated component and its control circuit are undamaged by the fire. If required, air operated valves (AOVs) are repositioned manually, or by using backup air sources. Additionally, for defense-in-depth, MPS2 can crosstie to the Millstone Power Station Unit 3 (MPS3) air system to provide MPS2 with sufficient instrument air to manipulate Appendix R valves.

1.4 Simplified Sketches

The following simplified sketches are contained in Attachment 2 to aid with the understanding of system configurations and facility alignment:

1. Sketch 25203-26131, SH. 5, "Auxiliary Feedwater System"
2. Sketch 25203-26131, SH. 7, "Main Steam System"
3. Sketch 25203-26131, SH. 8, "Chemical and Volume Control System" and
4. Sketch SKE-3.1-Elect Dist., "One Line Diagram for Appendix R".

2.0 Fire Hazards Analysis for Fire Areas Requiring Additional OMAs

The following section describes the Fire Hazards Analysis (FHA) for the applicable FHA areas of Fire Areas R-9, R-10, R-13, and R-14. An Appendix R fire area contains FHA areas/FHA zones. An FHA area is designated with a letter and number, such as A-8 or T-9. An FHA zone is designated with a letter followed by a number and letter, such as A-10B and A-10C.

This section also includes a discussion of ignition sources and combustible fuel load.

At MPS2, the storage of combustibles is administratively controlled by the site's fire protection program procedures (References 12 and 13) to limit the effects of transient fire exposures on the plant. Additionally, hot work (i.e., welding, cutting, grinding) is administratively controlled by the site fire protection program procedure (Reference 13).

With the exception of Fire Area R-14/FHA Area T-9, fire areas/zones discussed in this exemption request have low combustible loading with an equivalent fire severity of 75 minutes or less (Reference 11). Fire Area R-14/FHA Area T-9 has moderate combustible loading with an equivalent fire severity between 75 and 150 minutes (Reference 11), but is protected by an automatic wet-pipe sprinkler system.

Institute of Electrical and Electronics Engineers (IEEE) 383, "Standard for Qualifying Electric Cables and Splices for Nuclear Facilities" provides requirements for the qualification of cables. The predominant combustible in the affected fire areas is IEEE 383 qualified cable insulation or cables that have been tested and found to have similar fire resistive characteristics. IEEE 383 qualified cables are not self-igniting, nor will the cables propagate flame once a pilot ignition source is removed. Based on the minor quantities of combustibles that could serve as an ignition source for cabling in these fire areas/zones and administrative controls in place for transient combustibles and hot work evolutions, it is improbable that the transient combustibles or hot work could serve as a pilot ignition source for the cables. While high energy arcing faults resulting from a switchgear failure are a potential pilot ignition source for the cable insulation in some areas, a switchgear failure normally results in a high intensity fire that lasts for a short duration, making it unlikely to cause a sustained combustion of IEEE 383 qualified cables.

The original Bechtel cable specifications and orders indicate that cabling at MPS2 is of the thermoset type. MPS2 uses thermoset Kerite FR cable, which has a lower failure temperature than typical thermoset insulation materials. Cabling installed after the unit's original construction was installed to the applicable MPS2 specifications which utilize cable of the thermosetting type. Installation of cabling in the plant is reviewed by the Fire Protection and Appendix R engineers as required by the MPS design change process. In rare instances, where thermoplastic cable is requested to be used (Security modifications, non-power block applications, etc); the cable is required to be installed in conduit. Such requests are considered only for non safe-shutdown applications and are reviewed to ensure that safe shutdown equipment and cable is not impacted.

Fire Area R-9/FHA Area A-20

The "A" (east) Direct Current (DC) equipment room, which is located on the 14'-6" elevation of the auxiliary building, is part of Appendix R Fire Area R-9, and is designated as Fire Area A-20 in the FHA.

FHA Area A-20 measures approximately 43' x 39' and has a ceiling height of approximately 10'. There is an approximate 15'x 5' jog into the southeast corner of the room associated with Stair Number 10 and an approximate 20' x 9' jog into the northwest corner of the room. FHA Area A-20 has a floor area of 1,417 ft^2 and has low combustible loading. Combustibles in this fire area consist predominantly of cable insulation. Potential ignition sources include electrical faults. This fire area is provided with a cross-zoned ionization and photoelectric smoke detection system that activates a total flooding Halon 1301 fire suppression system. The Halon 1301 suppression system, which was installed in lieu of fireproof coating of structural steel, has manual release stations at each doorway and an abort switch is located at the doorway to the east control room/cable vault stairway. This system alarms locally on the Halon control panel and at the main fire alarm panel in the control room. Duct smoke detection is provided between this fire area, the "B" (west) DC equipment room (FHA Area A-21), and the auxiliary building cable vault (FHA Area A-24). This system alarms at a local panel and at the main fire alarm panel in the control room. A portable fire extinguisher is available in this fire area, while additional portable fire extinguishers and hose stations are available in adjacent fire areas/zones for use in this area.

A fire in FHA Area A-20 that could potentially impact any cables of concern would likely involve cable insulation resulting from an electrical fault or failure of a bus or electrical panel located in the room. Combustibles in this fire area consist predominantly of IEEE 383 qualified cable insulation or cables that have been tested and found to have similar fire resistive characteristics. IEEE 383 qualified cables are not self-igniting, nor will the cables propagate flame once a pilot ignition source is removed. Since there is a minimal amount of Class A combustibles in this area, there is little chance of a fire occurring, outside of a bus/electrical panel failure, which could act as a pilot ignition source for the cable insulation. A bus/electrical panel failure normally results in a high intensity fire that lasts for a short duration, which makes it unlikely to cause a sustained combustion of IEEE 383 qualified cables. In the event of a fire in this area, the fire would be detected at an early stage by the cross-zoned ionization and photoelectric

smoke detection system and subsequently extinguished by the total flooding Halon 1301 suppression system installed in this area. The smoke detection system would also aid in providing prompt fire brigade response were a fire to occur in this area.

Fire Area R-10/FHA Area A-21

The "B" (west) DC equipment room, which is located on the 14'-6" elevation of the auxiliary building, is part of Appendix R Fire Area R-10, and is designated as Fire Area A-21 in the FHA.

FHA Area A-21 measures approximately 33' x 28' along the west and north walls, respectively, with an additional area in the southeast corner of the room that measures approximately 12' x 5'. The ceiling height of this room is approximately 10'. FHA Area A-21 has a floor area of 983 ft^2 and has low combustible loading. Major combustibles in this fire area consist predominantly of cable insulation. Potential ignition sources include electrical faults. This fire area is provided with a cross-zoned ionization and photoelectric smoke detection system that activates a total flooding Halon 1301 fire suppression system. This Halon 1301 suppression system, which was installed in lieu of fireproof coating of structural steel, has manual release stations at each doorway and an abort switch is located at the doorway to the "A" (east) DC equipment room (FHA Area A-20). This system alarms locally on the halon control panel and at the main fire alarm panel in the control room. Duct smoke detection is provided between this fire area, the "A" (east) DC equipment room (FHA Area A-20), and the auxiliary building cable vault (FHA Area A-24). This system alarms at a local panel and at the main fire alarm panel in the control room. Portable fire extinguishers and hose stations are available in adjacent fire areas/zones for use in this area.

A fire in FHA Area A-21 that could potentially impact any cables of concern would likely involve cable insulation resulting from an electrical fault or failure of a bus or electrical panel located in the room. Combustibles in this fire area consist predominantly of IEEE 383 qualified cable insulation or cables that have been tested and found to have similar fire resistive characteristics. IEEE 383 qualified cables are not self-igniting, nor will the cables propagate flame once a pilot ignition source is removed. Since there is a minimal amount of Class A combustibles in this area, there is little chance of a fire occurring, outside of a bus/electrical panel failure, which could act as a pilot ignition source for the cable insulation. A bus/electrical panel failure normally results in a high intensity fire that lasts for a short duration, which makes it unlikely to cause a sustained combustion of IEEE 383 qualified cables. In the event of a fire in this area, the fire would be promptly detected at an early stage by the cross-zoned ionization and photoelectric smoke detection system and subsequently extinguished by the total flooding Halon 1301 suppression system installed in this area. The smoke detection system would also aid in providing prompt fire brigade response were a fire to occur in this area.

Fire Area R-13/FHA Area T-6

The west 480 VAC switchgear room, which is located on the 36'-6" elevation of the MPS2 Turbine Building, makes up Appendix R Fire Area R-13, and is designated as Fire Area T-6 in the FHA.

FHA Area T-6 measures approximately 23' x 83' along the west and south walls, respectively, with a ceiling height of approximately 17'. There are two approximately 10' x 10' jogs into the northeast corner of the room. FHA Area T-6 has a floor area of 1,609 ft^2 and has low combustible loading. Major combustibles in this fire area consist predominantly of cable insulation. Potential ignition sources include electrical faults. This fire area contains portable fire extinguishers for suppression purposes as well as ionization smoke detection that alarms at the main fire alarm panel in the control room. Hose stations and additional fire extinguishers are located in adjacent fire areas/zones for use in this area. The portion of this fire area east of column line 'E' has been designated as a transient combustible free zone.

A fire in FHA Area T-6 that could potentially impact any cables of concern would likely involve cable insulation resulting from an electrical fault or a bus failure. Combustibles in this fire area consist predominantly of IEEE 383 qualified cable insulation or cables that have been tested and found to have similar fire resistive characteristics. IEEE 383 qualified cables are not self-igniting, nor will the cables propagate flame once a pilot ignition source is removed. Since there is a minimal amount of Class A combustibles in this area, there is little chance of a fire occurring, outside of a bus failure, which could act as a pilot ignition source for the cable insulation. A bus failure normally results in a high intensity fire that lasts for a short duration, which makes it unlikely to cause a sustained combustion of IEEE 383 qualified cables. In the event of a fire in this area, the fire would be promptly detected at an early stage by the ionization smoke detection system installed in the area. The smoke detection system will aid in providing prompt fire brigade response and rapid extinguishment of a fire.

Fire Area R-14/FHA Area T-7

The lower 6.9 kV and 4.16 kV switchgear room, which is located on the 36'-6" elevation of the MPS2 Turbine Building, is part of Appendix R Fire Area R-14, and is designated as Fire Area T-7 in the FHA.

FHA Area T-7 measures approximately 126' x 20' and has a ceiling height of approximately 13'. FHA Area T-7 has a floor area of 2,520 ft^2 and has low combustible loading. Major combustibles in this fire area consist predominantly of cable insulation and Thermo-Lag fire resistant wrap. Potential ignition sources include electrical faults. Thermo-Lag wrap, while considered combustible, has been fire tested and qualifies as a 3-hour fire-rated protective covering for cabling in this area.

FHA Area T-7 contains portable fire extinguishers for suppression purposes as well as ionization smoke detection that alarms at the main fire alarm panel in the control room. Hose stations and additional fire extinguishers are located in adjacent fire areas/zones for use in this area.

A fire in FHA Area T-7 that could potentially impact cables of concern would likely involve cable insulation resulting from an electrical fault in one of the cable trays routed over bus 24E or failure of bus 24E itself. Combustibles in this fire area consist predominantly of IEEE 383 qualified cable insulation or cables that have been tested and found to have similar fire resistive characteristics. IEEE 383 qualified cables are not self-igniting, nor will the cables propagate flame once a pilot ignition source is removed. Since there is a minimal amount of Class A combustibles in this area, there is little chance of a fire occurring, outside of a switchgear failure, which could act as a pilot ignition source for the cable insulation. A switchgear failure normally results in a high intensity fire that lasts for a short duration, which makes it unlikely to cause a sustained combustion of IEEE 383 qualified cables. In the event of a fire in this area, the fire would be promptly detected at an early stage by the ionization smoke detection system installed in the area. The smoke detection system, which consists of an ionization smoke detector located directly over each switchgear cabinet in the area, will aid in providing prompt fire brigade response and rapid extinguishment of a fire.

Fire Area R-14/FHA Area T-9

The east cable vault, which is located on the 45'-0" elevation of the MPS2 turbine building, is part of Appendix R Fire Area R-14, and is designated as Fire Area T-9 in the FHA.

FHA Area T-9 measures approximately 152' x 10' with a ceiling height of approximately 10'. FHA Area T-9 has a floor area of 1,520 ft^2 and has moderate combustible loading. Major combustibles in this fire area consist predominantly of cable insulation, with smaller amounts of Thermo-Lag fire resistant wrap also in the area. Potential ignition sources include electrical faults. Thermo-Lag wrap, while considered combustible, has been fire tested and qualifies as a 1-hour fire rated protective covering for cabling in this area. Based on its fire resistive properties and its minimal BTU contribution in relation to that of cable insulation in this fire area, its overall fire impact is considered negligible and is bounded by the analysis of cable insulation fires provided below.

FHA Area T-9 is provided with an automatic wet-pipe sprinkler system designed to protect structural steel in this area from the adverse affects of a fire. This area is also protected by an ionization smoke detection system that alarms at the main fire alarm panel in the control room. The vertical cable chase that leads down the auxiliary building cable vault is protected by an automatic deluge spray system which is actuated by a cross-zoned smoke detection system. This system alarms at a local panel and at the main fire alarm panel in the control room. Hose stations and portable fire extinguishers are located in adjacent fire areas/zones for use in this area.

A fire in FHA Area T-9 that could potentially impact any cables of concern would likely involve cable insulation resulting from an electrical fault. Combustibles in this fire area consist predominantly of IEEE 383 qualified cable insulation or cable that has been tested and found to have similar fire resistive characteristics. IEEE 383 qualified cables are not self-igniting, nor will the cables propagate flame once a pilot ignition source is removed. Since there is a minimal amount of Class A combustibles in this area, there is little chance of a fire occurring which could act as a pilot ignition source for the cable insulation. Thermo-Lag, while considered combustible, is one-hour fire rated in this area. Based on its fire resistive qualities and lack of ignition sources, a fire involving the Thermo-Lag wrap is not credible.

In the event of a fire in this area, the fire would be promptly detected at an early stage by the installed smoke detection system, which will aid in providing rapid response by the fire brigade. In the unlikely event the fire advanced beyond its early stage (unlikely based on type of cable insulation and fire brigade suppression activities), the fire would actuate the installed automatic wet-pipe suppression system provided in this area. This system consists of upright sprinklers located in each beam pocket, and was originally installed for the protection of structural steel. This system will, at a minimum, provide reasonable assurance that a cable tray fire in this area will be controlled and confined to the immediate area of origin.

3.0 Fire Protection Features associated with Affected Fire Areas

This section will discuss the fire protection features such as detection and suppression systems and fire rated assemblies. Discussion will include a technical basis for such installations including the applicable codes, standards and listings. This section will also discuss self-contained breathing apparatus and a summary of the nature and ratings of fire boundaries and openings.

Fire Detection

The smoke detection systems in Fire Area R-14/FHA Area T-7, Fire Area R-14/FHA Area T-9, and Fire Area R-13/FHA Area T-6 were designed and installed in accordance with the guidance in the 1967 edition of NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems for Watchman, Fire Alarm and Supervisory Service." The cross-zoned smoke detection systems in Fire Area R-9/FHA Area A-20 and Fire Area R-10/FHA Area A-21, which actuates the respective area's total-flooding Halon 1301 gaseous suppression systems, were designed in general compliance with, and to meet the intent of the 1986 edition of NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems" and the 1984 edition of NFPA 72E, "Standard on Automatic Fire Detectors." The cross-zoned smoke detection system that actuates the deluge system separating Fire Area R-2/FHA Area T-8 and Fire Area R-14/FHA Area T-9 from the auxiliary building cable vault (FHA Area A-24) were also designed and installed to these NFPA standards.

The ventilation system is not used to perform smoke removal activities for the fire areas/zones. Smoke evacuation for these areas would be accomplished by the site fire brigade utilizing portable mechanical ventilation.

Fire Suppression

In general, fire extinguishers and hose stations at MPS2 have been installed in accordance with the requirements of the 1968 edition of NPFA 10, "Standard for the Installation of Portable Fire Extinguishers" and the 1978 edition of NFPA 14, "Standard for the Installation of Standpipe and Hose Systems," respectively. The total-flooding Halon 1301 systems in Fire Area R-9/FHA Area A-20 and Fire Area R-10/FHA Area A-21 were designed and installed in accordance with the guidance in the 1987 edition of NFPA 12A, "Standard on Halon 1301 Fire Extinguishing Systems."

The automatic wet-pipe sprinkler systems in Fire Area R-14/FHA Area T-9 were designed in general compliance with, and to meet the intent of the 1985 edition of NFPA 13, "Standard for the Installation of Sprinkler Systems."

The automatic deluge system that separates Fire Areas R-2/FHA Area T-8 and R-14/FHA Area T-9 from the auxiliary building cable vault (FHA Area A-24), was designed in general compliance with, and to meet the intent of the 1985 edition of NFPA 13 and the 1985 edition of NFPA 15, "Standard for Water Spray Fixed Systems For Fire Protection."

Fire Rated Assemblies

In general, fire rated assemblies separating Appendix R fire areas meet Underwriters Laboratories/Factory Mutual (UL/FM) design criteria and the requirements of ASTM E-119, "Fire Test of Building Construction and Materials" for 3-hour rated fire assemblies. Openings created in fire rated assemblies are sealed utilizing penetration seal details that have been tested in accordance with ASTM E-119 and are qualified for a 3-hour fire rating. Fireproof coating of structural steel conforms to UL-recognized details and is qualified for a 3-hour fire rating. Fire dampers are UL-Listed and have been installed in accordance with the requirements of NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilation Systems." In general, the code of record for fire dampers at MPS2 is either the NFPA 90A code in effect at the time of original plant construction (late 1960s) or the 1985 edition of NFPA 90A. Fire doors are UL-Listed and have been installed in accordance with the edition of NFPA 80, "Standard for Fire Doors and Windows" in effect at the time of plant construction (late 1960s).

Nature and Rating of Fire Boundaries and Openings

The types of barrier deviations, including the use of water curtains in lieu of rated fire barriers, insufficient barrier/seal depth to meet a full 3-hour fire rating, fire damper installations that do not conform to manufacturer's instructions, exposed steel in fire barriers, use of non-rated doors in fire barriers and use of partial height walls as fire barriers, is discussed in section 9.0. Consistent with the requirements for evaluation in GL 86-10, deviations to fire barrier assemblies, penetration seals, fire doors and fire dampers have been evaluated and concluded to sufficiently bound an area to withstand

the hazards associated with the area and, as necessary, to protect equipment within the area from a fire outside the area. Barrier deviations that could allow the spread of fire combustion products to an adjacent area that either serves as a travel path for OMAs or is an action location for an OMA are also discussed in section 9.0 and have been found to not adversely impact OMA travel paths or action areas.

Self-contained Breathing Apparatus
None of the fire areas discussed in this exemption request require the use of a self-contained breathing apparatus.

4.0 Defense-in-Depth

10 CFR 50 Appendix R establishes the concept of defense-in-depth and requires operators to be able to safely and reliably achieve and maintain hot shutdown capability from the control room. This section will discuss how the proposed OMAs will result in a level of protection that is commensurate with that intended by 10 CFR 50, Appendix R, paragraph III.G.2.

The fire protection program enforces the concept of defense-in-depth, both procedurally and physically, to meet the following objectives:

- Prevent fires from starting
- Rapidly detect, control, and extinguish promptly, those fires that do occur
- Provide protection for structures, systems, and components (SSCs) 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

The integration of the program, personnel, and procedures, which are then collectively applied to the facility, reinforce this defense in-depth aspect of the fire protection program. Strict enforcement of ignition source and transient combustible control activities (through permitting), and periodic fire prevention inspections by the site fire marshal, ensure that this work is actively monitored to prevent fires. The design of MPS2 has been reviewed by qualified fire protection engineers for the protection from fire, as documented in both the Fire Hazard Analysis and the Fire Fighting Strategies. Modifications to the plant are reviewed and documented for impact to the program through the use of the Detailed Fire Protection Review checklist. The means to safely shutdown MPS2 in the event of a fire that does occur and is not rapidly extinguished, as expected, has been documented in the Appendix R Compliance report.

There are a series of Appendix R AOPs corresponding to each Appendix R fire area which are entered when an Appendix R fire is declared. Operations personnel train to these AOPs which identify, among other things, the steps to perform each OMA. Time critical OMAs are also identified within operating procedures and Operations personnel are trained to perform these time critical activities.

Verification and validation of these AOPs identified that for a fire in Fire Area R-14 an additional operator might be necessary to place the plant into hot standby. To that end,

the staffing requirements for MPS2 include one licensed or non-licensed operator in addition to the minimum technical specification staffing requirement to be on duty each shift during Modes 1, 2, 3, or 4. This operator is designated as the Appendix R operator, and is not part of the credited five-member fire brigade crew.

Additionally, MPS has a Station Emergency Response Organization (SERO) and appropriate emergency response facilities (ERFs). The declaration of an ALERT (events which are in progress or have occurred and involve an actual or potential substantial degradation of the level of safety of the plant, with releases expected to be limited to small fractions of the Environmental Protection Agency, Protective Action Guideline exposure levels) at MPS activates the SERO organization, which is required to be immediately staffed by on-site personnel and fully established with on-call personnel within 60 minutes of the ALERT being declared. After 60 minutes, off-shift Operations staff (e.g. personnel in training, performing administrative functions, etc.) may be called in by the Shift Manager (SM). Many of the existing approved OMAs are not required prior to the establishment of SERO. Of the four additional OMAs from this exemption request, OMA 1 related to RWST Isolation valve 2-CH-192 is the only OMA not required prior to SERO being fully established. The responding Fire Brigade lead may request the SM augment the on-shift five-member Fire Brigade with outside resources from the Town of Waterford Fire Department. The Town of Waterford Fire Department, as established in a letter of agreement with MPS, will respond to the site (when requested) will attempt to control the situation with available resources.

In establishing the assumed times for operators to perform various tasks, a significant margin (i.e., a factor of two) was used with respect to the time required to perform the OMA for the fire area scenarios identified in this exemption request. For example, the time critical action (TCA) to establish AFW flow is validated as able to be completed within 22.5 minutes, which is one half of the 45 minute timeframe used in the fire scenario analysis. Similarly, the time to establish charging is validated as able to be completed within 90 minutes, whereas the fire scenario analysis is based on 180 minutes.

OMA 1: Manually Open RWST Isolation Valve 2-CH-192

OMA 1 has been previously approved for Fire Areas R-2, R-4, R-5, R-6, R-7, R-8, R-9, R-12, R-13, R-14, R-15, and R-17 for cable damage and loss of power per an SER dated December 18, 2012. For this exemption request, OMA 1 is being updated for the loss of instrument air. OMA 1 is being requested for Fire Area R-10 since it was not previously approved for that fire area.

The valve is located in Fire Area R-4/FHA Fire Zone A-6A (Reference Table 1 and Table 2). RWST Isolation valve 2-CH-192 is a normally closed AOV that fails closed with loss of instrument air or power. It is provided with a back-up air accumulator. The safety-related back-up air accumulator can be used for one full stroke with a 3 hour hold prior to depletion. After depletion of accumulator pressure, local operation of this valve is required. This OMA is required to be completed a minimum of 72 minutes after charging flow is reestablished. Charging flow is not required for up to 180 minutes after

a loss of all charging. The minimum time to establish flow from the RWST is based upon Technical Specification minimum level in the BASTs as well as continuous charging pump flow (44 gpm). With letdown isolated, continuous charging flow is unlikely to be needed to make up for minor RCS leakage.

The OMA required for this component is necessary in the following circumstances: (1) loss of instrument air only (Fire Area R-10), (2) a combination of both loss of instrument air and cable damage causing loss of DC power due to fire (R-9, R-13 and R-14).

Loss of Instrument Air
RWST Isolation valve 2-CH-192 is an AOV with a safety-related back-up air accumulator which has sufficient capacity to open the valve and hold the valve open for 3 hours from the control room after loss of instrument air. No operator action is required to align this back-up air accumulator. There are no cables for RWST Isolation valve 2-CH-192 located in Fire Area R-10. Therefore, control of the valve is maintained from the control room until loss of instrument air and/or loss of the accumulator pressure.

Loss of Instrument Air and Cable Damage
For a fire in Fire Area R-9, damaged power cables are postulated along with a loss of instrument air. Therefore, local operation of this valve is required after loss of accumulator pressure.

For a fire in Fire Area R-13, RWST Isolation valve 2-CH-192 can be controlled from the control room utilizing station batteries (for up to 8 hours) until loss of instrument air and/or loss of the accumulator inventory. The safety-related back-up air accumulator can be used for one full stroke with a 3 hour hold prior to depletion. After depletion of accumulator pressure, local operation of this valve is required.

For a fire in Fire Area R-14, RWST Isolation valve 2-CH-192 can be controlled from the control room utilizing station batteries until loss of instrument air and/or loss of the accumulator inventory. The safety-related back-up air accumulator can be used for one full stroke with a 3 hour hold. Therefore, after depletion of the accumulator, local operation of this valve is required.

Added defense-in-depth is achieved by meeting the safe shutdown performance goals without the need to perform OMA 1 for 252 minutes after an event that causes loss of charging. For fires in Fire Areas R-13 and R-14, the valve can be controlled from the control room until station battery depletion or loss of instrument/back-up air. A fire in Fire Area R-9 could cause a loss of control of the valve. However, Fire Area R-9/FHA Area A-20 is equipped with detection and automatic suppression. Only a fire directly impacting the 'C' charging pump cubicle could result in an immediate loss of control to RWST Isolation valve 2-CH-192. Additional defense-in-depth for this OMA is that the 72 minute requirement to switch over to the RWST (after charging is reestablished) is based on the Technical Requirements Manual (TRM) minimum BAST tank level for one

tank and full charging flow at 44 gpm. The BASTs have a low level alarm at 70% and typically Operations maintains levels above 90% for both BASTs. Furthermore, if charging is not lost during the event then it is utilized to make up for RCS leakage. This leakage is postulated to be a maximum of 13 gpm. Either of these factors can sustain charging on the BASTs for significantly longer than 72 minutes before switching to the RWST.

OMA 9: Control of AFW Flow Control Valve 2-FW-43B at Fire Shutdown Panel C-10 or Local Manual Operation

OMA 9 has been previously approved for Fire Areas R-13 and R-14 for cable damage and loss of power per an SER dated December 18, 2012. For this exemption request, OMA 9 is being updated for the loss of instrument air for Fire Areas R-13 and R-14.

AFW is not required to maintain the decay heat removal function until 45 minutes after a loss of main feedwater. The cables which may be affected by a fire are in Fire Area R-13/FHA Area T-6 and Fire Area R-14/FHA Areas T-7 and T-9. The cables are routed in conduit and are used to open, and modulate the valve. These cables are isolated at Fire Shutdown Panel C-10. A loss of instrument air or power causes the valve to fail open.

Added defense-in-depth is achieved by meeting the safe shutdown performance goals without the need to perform this OMA for the first 45 minutes of the event. FHA Areas T-6 and T-7 are equipped with detection but no automatic suppression while FHA Area T-9 is equipped with detection and automatic suppression. AFW Flow Control valve 2-FW-43B could spuriously operate (open or close) due to cable damage from a fire located in fire area R-13. However, the circuit can be isolated and controlled from Fire Shutdown Panel C-10 until loss of instrument air and/or loss of the back-up air inventory. The safety-related back-up air accumulator can be used to stroke the valve open up to 20 times and hold the valve open for 3.27 hours after a loss of instrument air. After depletion of the back-up air accumulator, the valve will fail open and local operation of this valve is required. If an AFW regulating valve failed open and there was a fire in Fire Area R-13, the TDAFW pump speed can be controlled from Fire Shutdown Panel C-10 to allow control of AFW flow rate. The cables for this equipment do not traverse Fire Area R-13/FHA Area T-6 but enter this area through the floor in a conduit, within 3 feet of Hot Shutdown Panel C-21 and access this panel near the floor from the cable vault (an Appendix R III.G.3 area). Therefore, only a fire which impacts Hot Shutdown Panel C-21 will require OMA 9. Fire Shutdown Panel C-10 isolates the controls for the TDAFW pump speed from a fire in Fire Area R-13.

For a fire in Fire Area R-14, cable damage to AFW Flow Control valve 2-FW-43B can be isolated at Fire Shutdown Panel C-10 and AFW Flow Control valve 2-FW-43B can be controlled until loss of instrument air and/or loss of the back-up air. The TDAFW pump speed can be controlled from the control room to allow control of AFW flows when AFW Flow Control valve 2-FW-43B is failed open.

OMA 10: Manually Operate Atmospheric Dump Valve 2-MS-190A

OMA 10 has been previously approved for Fire Areas R-2, R-5, R-6, R-8, R-12, and R-15, and R-17 for cable damage and loss of power per an SER dated December 18, 2012. For this exemption request, OMA 1 is being updated for the loss of instrument air. OMA 1 is being requested for Fire Area R-10 since it was not previously approved for that fire area.

Valve 2-MS-190A is an ADV which provides a steam path for cooling the RCS via SG Number 1. The OMA for this valve is the result of loss of instrument air. Loss of instrument air, which is a single train system, will result in the loss of both ADV 2-MS-190A and ADV 2-MS-190B. ADV 2-MS-190A and ADV 2-MS-190B are AOVs and have no back-up air supply. A loss of instrument air fails the valves closed and the initial secondary side steam release is from the MSSVs. The ADVs can be used after AFW is established to provide a decay heat path in addition to the MSSVs. Therefore, this OMA is performed after establishing AFW. AFW is not required until 45 minutes after loss of main feedwater. The action for this OMA takes place in Fire Area R-17/FHA Fire Zone A-10C (Reference Table 2).

Added defense-in-depth is achieved by meeting the safe shutdown performance goals without the need to perform this OMA. Prior to performing this OMA, decay heat removal will be maintained by the MSSVs. The MSSVs can be relied upon until the control of steam release is achieved by this OMA. The fire area for this OMA is Fire Area R-10/FHA Area A-21. FHA Area A-21 has both suppression and detection.

OMA 11: Control of Atmospheric Dump Valve 2-MS-190B at Fire Shutdown Panel C-10 or Local Manual Operation

OMA 11 has been previously approved for Fire Areas R-4, R-7, R-13, and R-15, and R-17 for cable damage and loss of power per an SER dated December 18, 2012. For this exemption request, OMA 11 is being updated for the loss of instrument air. OMA 11 is being requested for Fire Areas R-9 and R-14 since it was not previously approved for those fire areas.

Valve 2-MS-190B is an ADV which provides a steam path for cooling the RCS via SG Number 2. The OMA for this valve is the result of loss of instrument air. Loss of instrument air, which is a single train system, will result in the loss of both ADV2-MS-190A and ADV 2-MS-190B. Action for this OMA takes place in Fire Area R-2/FHA Area T-10 for control at Fire Shutdown Panel C-10 and in Fire Area R-2/FHA Fire Zone A-8E for manual operation (Reference Table 1 and Table 2). AFW is not required until 45 minutes after loss of main feedwater.

For a fire in Fire Area R-9, there is no cable damage to ADV 2-MS-190B. However, the valve will fail closed upon loss of instrument air. The failed closed design prevents excessive RCS cooldown prior to AFW start. The AFW system must be established within 45 minutes of a loss of Main Feedwater for a fire in Fire Area R-9. Therefore, in the event of a loss of instrument air, Operators will establish local manual control of ADV 2-MS-190B to maintain the plant in hot standby and to transition to cold shutdown.

A fire in Fire Area R-13 may impact ADV 2-MS-190B due to cable damage. ADV 2-MS-190B is an AOV and has no back-up air supply. A loss of air causes the valve to fail closed and initial secondary side steam release is from the MSSVs. The ADVs can be used after AFW is established to provide a decay heat path in addition to the MSSVs. Therefore, this OMA is performed after establishing AFW. The Fire Area R-13/FHA Area T-6 involved, is equipped with detection but no automatic suppression.

Added defense-in-depth is achieved by meeting the safe shutdown performance goals without the need to perform this OMA. Prior to performing this OMA, decay heat removal will be maintained by the MSSVs. The MSSVs can be relied upon until the control of steam release is achieved by this OMA. The cables for this equipment do not traverse Fire Area T-6 but enter Hot Shutdown Panel C-21 directly through the floor from the cable vault (Appendix R III.G.3 area). Therefore, only a fire originating in Hot Shutdown Panel C-21 will impact this component.

For a fire in fire area R-14, there is no cable damage to ADV 2-MS-190B. However, the valve will fail closed upon loss of instrument air. The failed closed design prevents excessive RCS cooldown prior to AFW start. The AFW system must be established within 45 minutes of a loss of Main Feedwater for a fire in fire area R-14. Therefore, in the event of a loss of instrument air, Operators will establish local manual control of ADV 2-MS-190B to maintain the plant in hot standby and to transition to cold shutdown.

Fire Area R-14/FHA Area T-7 is equipped with detection but not automatic suppression. Fire Area R-14/FHA Area T-9 is equipped with detection and automatic suppression.

5.0 Discussion on Credited Redundant Trains for Affected Fire Areas

Facility Z1 and Facility Z2

The following fire areas include a discussion in terms of Facility Z1 and Facility Z2. A description of the components that make up each Facility is provided to ensure greater understanding of which components are affected.

Facility Z1 would be synonymous with 'A' train while Facility Z2 would be synonymous with 'B' train.

The 4.16 kV subsystems are divided into two specific "Facilities". Facility Z1 begins with load center 24C which powers one train of Engineered Safety Features (ESFs) and is provided with emergency backup power by the 'A' EDG. Facility Z2 begins with load center 24D and powers a redundant second train of ESF and is provided with emergency backup power by the 'B' EDG.

Vital power and control cables fall mainly into two redundancy classifications; Channel Z1 and Channel Z2. In a few cases there is also a Channel Z5, which is a system that can be transferred from one source to another, and is run as described below.

Channel Z5 is associated with the spare units fed from 4.16 kV emergency bus A5; namely, service water pump P5B, Reactor Building Closed Cooling Water (RBCCW) pump P11B, and High Pressure Safety Injection (HPSI) pump P41B. The power circuits and the control circuits for this equipment are all transferred simultaneously to Channel Z1 or Z2 sources. Thus, their circuits are routed together as Channel Z5. The Z5 control circuit and power circuit for the spare 480 volt charging pump P18B are transferred to Z1 or Z2 sources, independent of the above circuits. Hence, the Z5 charging pump circuits are routed separately from those associated with bus A5. Non-vital Channel 5 circuits are those associated with instrument loops or metering circuits. Channel 5 and Z5 circuits are routed together only where it can be demonstrated that their transfer to Channel 1 (Z1) or 2 (Z2) sources does not impair the separation of redundant safety-related circuits.

The TDAFW pump, associated steam inlet valve, and speed adjuster motor have the capability of being transferred from their normal power supply Facility Z2 125 VDC (Panel DV-20) to Facility Z1 125 VDC (Panel DV-10). The transfer is accomplished by switching the position of two key-locked isolation switches on Main Control Board C-05 in the event of a loss of Facility Z2 125 VDC or a loss of DC panel DV-20. The associated wiring from Main Control Board C-05 is routed in dedicated Z5 conduit to Hot Shutdown Panel C-21, Fire Shutdown Panel C-10, and ultimately to the steam inlet valve and the speed adjuster motor.

Fire Area R-14/FHA Area T-7

Fire Area R-14/FHA Area T-7, lower 4.16 kV switchgear room, is located on the 31'-6" elevation of the turbine building. Located in this fire area are 6.9 kV bus 25A which houses breakers H101 through H107, 4.16 kV bus 24A which houses breakers A101 through A107, bus 24C which houses breakers A301 through A412 and the swing bus 24E which houses breakers A501 through A505. Cables of concern in this room are for AFW Flow Control valve 2-FW-43B and RWST Isolation valve 2-CH-192. There are no cables of concern for ADV 2-MS-190B in this room. Loss of control of ADV 2-MS-190B will only occur from a loss of instrument air.

The control and indication cabling for AFW Flow Control valve 2-FW-43B runs in a conduit from floor to ceiling located against the east wall and midway between buses 25A and 24C. The control and indication cabling for the other train AFW Flow Control valve 2-FW-43A, is located in a conduit next to the AFW Flow Control valve 2-FW-43B conduit, and enters the cable tray above bus 24C. The conduit for AFW Flow Control valve 2-FW-43B power traverses the room from floor to ceiling on the east wall, 6 feet or more horizontally from any ignition source. The closest fixed ignition source is switchgear bus 24C potential transformer (PT) in cubicle A301, which is six feet away. Thus, only a transient fire in the vicinity of the conduit can impact this conduit. The portion of the floor area in which a transient load can be placed in the zone of influence of the conduit is assumed to be approximately 5% of the total room area. Therefore, analysis indicates there is a very low likelihood that a fire can occur in Fire Area R-14/FHA Area T-7 which will impact 2-FW-43B.

Cables for RWST Isolation valve 2-CH-192 are not located in this room. RWST Isolation valve 2-CH-192 is impacted due to the potential loss of bus 22E which results in the loss of power to the battery charger and a resulting loss of DC power to the valve.

Fire Area R-9/FHA Area A-20

Fire Area R-9/FHA Area A-20, 'A' DC switchgear room, is bounded by the auxiliary building Fire Area R-1 along the east and north walls, the 'B' DC switchgear room along the west wall and the east battery room along the south wall. The OMAs associated with a fire in this area are related to loss of power to 'A' DC buses (such as DV-10). Cables for ADV 2-MS-190B do not pass through this room. The OMA to operate ADV 2-MS-190B is only for a loss of instrument air. The OMA to manually open RWST Isolation valve 2-CH-192 would be needed if DV-10 lost power. Based on walkdowns, the only ignition sources in the room that could have a direct impact on the targets are wall panels DV-30, VA-30, DV-10, VA-10, and VA-15, cabinet VR-11, cabinet UAC-3, and cabinets VS-3, VIP-3, VS-1, and VIP-1. This indicates that there is a moderate likelihood that a fire can occur in the 'A' (Z1) DC switchgear room (Fire Area R-9/FHA Area A-20) which could impact this valve.

Fire Area R-10/FHA Area A-21

Fire Area R-10/FHA Area A-21, 'B' DC switchgear room, is bounded by the auxiliary building Fire Area R-1 along the west and north walls, the 'A' DC switchgear room along the east wall, and the west battery room along the south wall. The OMAs associated with a fire in this area are related to loss of power to 'B' AC vital power panels (such as VA-20). Cables for ADV 2-MS-190A and RWST Isolation valve 2-CH-192 do not pass through this room. The OMAs to locally monitor and operate ADV 2-MS-190A and RWST Isolation valve 2-CH-192 are due to a loss of instrument air.

Fire Area R-13/FHA Area T-6

Fire Area R-13/FHA Area T-6, west 480V load center room, is bounded by the turbine building wall on the north, the east and west 45' cable vault connection to the 25' cable vault on the east wall, and the Millstone Power Station Unit 1 Technical Service area on the south and west walls. Components of concern in this room are RWST Isolation valve 2-CH-192, AFW Flow Control valve 2-FW-43B and ADV 2-MS-190B. Control and indication cables for ADV 2-MS-190B enter through the floor of Hot Shutdown Panel C-21 directly from the 25' cable vault located below. The control and indication cabling for AFW Flow Control valve 2-FW-43B enters this room in conduit through the floor near (within approximately two feet) Hot Shutdown Panel C-21, from the 25' cable vault located below, and enter Hot Shutdown Panel C-21 near the floor. Cables for RWST Isolation valve 2-CH-192 are not located in this room. RWST Isolation valve 2-CH-192 is impacted due to the potential loss of bus 22E which results in the loss of power to the battery charger and the resulting loss of DC power to the valve. Bus 22E feeder cables travel along a cable tray starting at the east wall exiting the west 45' cable vault and proceed west and then down into bus 22E. Damage is due to ignition sources in the vicinity of the tray, transient combustibles and bus 22E. Analysis indicates there is a medium likelihood that a fire in Fire Area R-13/FHA Area T-6 could impact power to bus

22E. The remaining components, which terminate in Hot Shutdown Panel C-21, have a low likelihood to result in a fire in Fire Area R-13/FHA Area T-6 which could impact AFW Flow Control valve 2-FW-43B and ADV 2-MS-190B.

Fire Area R-14/FHA Area T-9

Fire Area R-14/FHA Area T-9, east 45' cable vault, is bounded by the auxiliary building on the east wall, the turbine building on the north wall, the west 45' cable vault on the west wall and the west 480V load center switchgear room on the south wall. This zone is equipped with both detection and automatic suppression. The cables of concern in this area are the control and indication cabling for AFW Flow Control valve 2-FW-43B. These cables take two paths through this area. One path of the control and indication cables is routed in a cable tray, wrapped with 1-hour fire rated insulation, which enter this area in the northeast corner through the floor, turns horizontally and travels approximately 18 feet south, then turns vertically and exits this area through the ceiling. The other path the control and indication cables take is in a conduit which enters this area through the floor at a point midway along the horizontal run of the wrapped cable tray. The conduit travels upward and turns south near the ceiling for approximately 15 feet and then turns west and exits this area through the west wall. Cable routed in the conduit could only be fire impacted from a transient fire in the area. Analysis indicates that there is a very low likelihood that a fire can occur in Fire Area R-14/FHA Area T-9 which will impact AFW Flow Control valve 2-FW-43B.

Cables for RWST Isolation valve 2-CH-192 are not located in this room. RWST Isolation valve 2-CH-192 is impacted due to the potential loss of bus 22E which results in a loss of power to the battery charger and a resulting loss of DC power to the valve. The feed cables for the 480V load center bus 22E and the 'A' EDG's cables traverse Fire Area R-14/FHA Area T-9 in cable trays at the south end of the room and are only impacted by fire from transient loading. Therefore, analysis indicates there is a very low likelihood that a fire can occur in Fire Area R-14/FHA Area T-9 which could impact the cables of concern.

6.0 OMA List

Table 2 provides a list of all OMAs for the four affected initiating fire areas of R-9, R-10, R-13, and R-14. While the four OMAs in this exemption request (OMA 1, OMA 9, OMA 10, and OMA 11) had previously been approved for exemption in some fire areas, per SER dated December 18, 2012, the approval did not consider the impacts related to a loss of instrument air. The OMAs that have not been approved for an affected fire area are noted as being new. The OMAs that were previously approved for an affected fire area without consideration of a loss of instrument air are noted as being updated. The four OMAs and the four affected fire areas are bolded in the table below for review purposes. Also indicated in Table 2, for each OMA listed, are the other initiating fire areas where the OMA has previously been approved by SER dated December 18, 2012 (Reference 18).

To aid in reviewing the OMAs, applicable Appendix R drawings from MPS2 Compliance Report 25203-SP-M2-SU-1046, Revision 1 have been included in Attachment 3. These drawings identify the Appendix R fire areas throughout the plant and provide equipment locations for the OMAs in this exemption request. The drawings also depict locations for equipment which is not in the required flow path.

Table 2 List of OMAs for Affected Initiating Fire Areas

OMA No.	Equipment	OMA	Time to Accomplish OMA	Affected Initiating Fire Area	Other Approved Initiating Fire Areas	Action Location Fire Area/FHA Zone or Area*
1	2-CH-192. RWST Isolation valve	Manually open valve to establish Charging Pump suction from RWST	Within 72 minutes after restoring Charging	**New for R-10** **Previously approved for R-9, R-13, and R-14, but being updated for loss of instrument air**	R-2, R-4, R-5, R-6, R-7, R-8, R-12, R-15, R-17	R-4/A-6A (AppR-2)
4	2-CH-508, 'B' Gravity Feed valve	Manually open valve to obtain charging pump suction from BAST	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-9, R-13, and R-14	R-7, R-17	R-1/A-1G (AppR-3)
5	2-CH-509, 'A' Gravity Feed valve	Manually open valve to obtain charging pump suction from BAST	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-9, R-13, and R-14	R-7, R-17	R-1/A-1G (AppR-3)
9	2-FW-43B, AFW Flow Control valve	Control at Fire Shutdown Panel C-10 until loss of backup air or local manual operation	Within 45 minutes after loss of Main Feedwater	**Previously approved for R-13, and R-14, but being updated for loss of instrument air**	No additional areas approved	R-2/T-10 (AppR-9) R-3/T-1A (AppR-7)

OMA No.	Equipment	OMA	Time to Accomplish OMA	Affected Initiating Fire Area	Other Approved Initiating Fire Areas	Action Location Fire Area/FHA Zone or Area*
10	2-MS-190A, Atmospheric Dump valve	Manually operate valve to transition from MSSVs	After establishing AFW	**New for R-10**	R-2, R-5, R-6, R-8, R-12, R-15	R-17/A-10C (AppR-6)
11	2-MS-190B, Atmospheric Dump valve	Control at Fire Shutdown Panel C-10 (R-13 fire) until loss of air, manually operate valve to transition from MSSVs	After establishing AFW	**New for R-9 and R-14** **Previously approved for R-13, but being updated for loss of instrument air**	R-4, R-7, R-15, R-17	R-2/T-10 (C-10) (AppR-9) R-2/A-8E (Manual operation) (AppR-6)
13	A408, Bus 24D To Bus 24E Tie breaker	Pull control power fuses and ensure breaker is open to isolate required bus	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-14	No additional areas approved	R-2/T-10 (AppR-9)
14	A410, Bus 24B To Bus 24D Tie breaker	Pull control power fuses and ensure breaker is open to isolate required bus	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-14	No additional areas approved	R-2/T-10 (AppR-9)

OMA No.	Equipment	OMA	Time to Accomplish OMA	Affected Initiating Fire Area	Other Approved Initiating Fire Areas	Action Location Fire Area/FHA Zone or Area*
15	A411, Bus 24D Feeder breaker	Pull control power fuses and ensure breaker is open to isolate required bus	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-14	No additional areas approved	R-2/T-10 (AppR-9)
16	A406, Auxiliary Feed Pump 'B' breaker	Pull control power fuses and ensure breaker is open (A406)	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-13	No additional areas approved	R-2/T-10 (AppR-9)
17	H-21, TDAFW Turbine Speed Control	Operate from Fire Shutdown Panel C-10 to control TDAFW pump speed	Within 45 minutes after loss of Main Feedwater	Previously approved for R-13	No additional areas approved	R-2/T-10 (AppR-9)
18	LT-206, BAST Level Transmitter	Local BAST level indication (LI-206A)	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-10	R-2	R-1/A-1G (AppR-3)
19	LT-208, BAST Level Transmitter	Local BAST level indication (LI-208A)	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-10	R-2	R-1/A-1G (AppR-3)

OMA No.	Equipment	OMA	Time to Accomplish OMA	Affected Initiating Fire Area	Other Approved Initiating Fire Areas	Action Location Fire Area/FHA Zone or Area*
20	LT-5282, CST Level Transmitter	Local CST level Indication (LIS-5489)	Within 10 hours after establishing AFW	Previously approved for R-10 and R-13	R-2, R-8, Yard	Yard (Not shown)
21	P18C, Charging Pump 'C'	Operate pump from Fire Shutdown Panel C-10	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-13	No additional areas approved	R-2/T-10 (AppR-9)
22	SV-4188, Terry Turbine Auxiliary Feed Pump Steam Supply	Operate valve from Fire Shutdown Panel C-10	Within 45 minutes after loss of Main Feedwater	Previously approved for R-13	No additional areas approved	R-2/T-10 (AppR-9)
23	A401, 'B' Emergency Diesel Generator Feeder breaker	Pull control power fuses and ensure breaker is closed to power bus from the EGD (Bus A4)	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-14	No additional areas approved	R-2/T-10 (AppR-9)
24	DV2021, DC Control Power to Bus 24D breaker	Close breaker at panel DV20	To reestablish Charging within 3 hours after loss of Charging	Previously approved for R-13 and R-14	No additional areas approved	R-10/A-21 (AppR-4)

* Refer to Attachment 2 for all drawings

7.0 OMA Times for Affected Fire Areas

In addition to four OMAs which are the subject of this exemption request, this section includes a discussion for all the OMAs associated with the affected fire areas to provide

a complete overview. Tables for each affected fire area are provided to indicate which position is responsible to perform an OMA and associated times to complete that action.

The operations shift staffing requirements for MPS2 include one additional licensed or non-licensed operator over the minimum technical specification requirement to be on duty each shift during Modes 1, 2, 3, or 4. This operator is designated as the Appendix R operator and is specified in the TRM. Therefore the number of individuals available to respond to an OMA is: one reactor operator (RO), two plant equipment operators (PEOs), and one additional licensed or non-licensed individual (Appendix R operator). The exemption request allocates tasks to PEO-1, PEO-2, PEO-3 and RO-1. Per MPS2's staffing requirements, one of the three PEOs would be the TRM-required Appendix R operator. Furthermore, with the exception of Fire Shutdown Panel C-10 activities, the assignments are interchangeable between these four operators. Since these individuals are specified by technical specifications and TRM, the individuals are not members of the fire brigade and have no other collateral duties.

When an Operator is performing work in series to a previous action, this Operator's designation (PEO1, PEO2, etc.) will be repeated in the Operator column and the total time from the previous action will be added into the Walkdown column for the next action. Additionally, the time identified under Walkdown includes diagnostic time as well as time to don appropriate personal protective equipment (PPE) and obtain any required tools.

The operators are required and assumed to be within the protected area. The time lines account for the initial response by the field operator. Upon the announcement of a fire, the field operators are directed to report to the control room and await further directions. Initially, upon a report of a fire, the control room operators enter AOP 2559 "Fire." The flow path for MPS2 to get into an Appendix R fire scenario is that upon indication of a fire the fire brigade is dispatched and, based on their report or indications in the control room, an Appendix R fire may be declared. In the development of the time lines, the operators are allowed 5 minutes to respond and report to the control room.

During a series of events, the margin time is not calculated and thus is identified with an "N/A" in the Margin column. The margin time is only entered when the final result is accomplished. For example, the time for PEO3 to perform the multiple OMAs to restore Charging are identified up to the total time to accomplish each OMA. The time margin is not identified until Charging is restored, which is accomplished when 2-CH-429 is locally opened. The column "T=0" is the initiating event that necessitates the OMA.

There is no impact to the associated OMA when Operators need to pass in close proximity to a fire affected area. As noted in Section 3.0, in general, fire rated assemblies separating fire areas meet UL/FM design criteria and the requirements of ASTM E-119, "Fire Test of Building Construction and Materials" for 3-hour rated fire assemblies. Barrier deviations that could allow the spread of fire combustion products to an adjacent area that either serves as a travel path for an OMA or is an action location for an OMA have been discussed in Section 9.0 and have been found to not

adversely impact the applicable OMA travel paths or action areas. A review of ventilation systems for the fire areas/zones concluded that no credible paths exist that could allow the spread of fire combustion products from the fire area/zone of fire origin to an area that either serves as a travel path for an affected OMA or is an action location for an OMA.

Fire Area R-9

A fire in the Facility Z1 DC switchgear room and battery room will affect all Facility Z1 shutdown components. Facility Z2 is used to achieve and maintain hot standby. Plant shutdown to hot standby can be accomplished using Procedure AOP 2579E, "Fire Procedure for Hot Standby Appendix R Fire Area R-9".

For a fire in Fire Area R-9, OMAs are required to provide decay heat removal and restore charging system flow to the RCS.

Establishing AFW flow to the credited SG is required within 45 minutes. For a fire in Fire Area R-9, the required flow path utilizes the TDAFW pump which is not fire impacted. Once AFW is established from the control room, operation of the MSSVs along with an ADV (2-MS-190B) is the required method of removing decay heat for maintaining the plant in hot standby and an ADV is needed for initiating the transition to cold shutdown. Prior to AFW initiation, the plant is maintained in the hot standby condition by steaming through the MSSVs. There is no cable damage from a fire in Fire Area R-9 to the required ADV (2-MS-190B). However, the fire may cause a loss of instrument air. Instrument air is required to operate the ADVs to support decay heat removal. Upon a loss of instrument air, the ADV will fail closed. This "failed closed" design prevents excessive RCS cooldown prior to AFW start. Therefore, in the event of a loss of instrument air, Operators will establish local manual control of ADV 2-MS-190B after AFW is established (new OMA 11 for R-9 for loss of instrument air). PEO-1 will remain in the vicinity of the ADV to modulate steam flow per direction from the control room.

For a fire in fire Area R-9, the Charging system has OMAs identified. The BASTs gravity feed valves, 2-CH-508 and 2-CH-509, fail as is if a loss of power supply occurs. An OMA is in place to locally open the valves as part of restoring the Charging system. Once these valves are opened, the control room can establish charging flow within 2-3 minutes. Establishing charging pump suction from the BASTs and restoring charging is required within 3 hours of reactor shutdown/loss of charging. Charging is re-established within 24 minutes (21 minutes to open BASTs valves and 3 minutes to establish charging flow in the control room) which provides a 156 minute margin. Once the BASTs have reached the 10% level, Operators switch the charging pump suction over to the RWST to maintain charging flow. RWST Isolation valve 2-CH-192 is required to remain open after the BASTs supply to charging is exhausted (updated OMA 1 for R-9 related to loss of instrument air). Evaluations conclude that the BASTs will last a minimum of 72 minutes after charging is re-established. RWST Isolation valve 2-CH-192 fails closed in the event of a loss of power and will require local operation to open the valve. The OMA is not required prior to this time.

Table 3: Responsible Performer and Times to Complete OMAs for Fire Area R-9

Operator	Action	T=0	Walkdown Time (min.)	Time to Execute (min.)	Total Time (min.)	Time Required (min.)	Margin (min.)
PEO-1	2-MS-190B **(new OMA 11)**	Establishing AFW	10	7	17	N/A**	N/A
PEO-2	2-CH-508 (OMA 4)	Loss of Charging	10	5	15	180	N/A
PEO-2	2-CH-509 (OMA 5)	Loss of Charging	(15) + 1	5	21	180	159
Control Room	Restore Charging	Loss of Charging	*	3	24	180	156
PEO-2	2-CH-192 **(updated OMA 1)**	Restoration of Charging	10	22	32	72	40
Activity Complete	Establish Charging Suction from RWST	Restoration of Charging	N/A	N/A	32	72	40

() Carryover time from previous OMA
* allowed control room activity, no walkdown required.
** No specific time is required initially since decay heat is removed using MSSVs.

Fire Area R-10

A fire in the Facility Z2 DC Equipment Room and Battery Room will affect all Facility Z2 shutdown components. Facility Z1 is used to achieve and maintain hot standby. Plant shutdown to hot standby can be accomplished using Procedure AOP 2579F, "Fire Procedure for Hot Standby Appendix R Fire Area R-10".

The ADVs are utilized after AFW is established. For a fire in Fire Area R-10, the required flow path utilizes the TDAFW pump which is not fire impacted. Prior to AFW initiation, the plant is placed in the hot standby condition by steaming through the MSSVs. There is no cable damage to the credited ADV (2-MS-190A) from a fire in Fire Area R-10. However, the fire may cause a loss of instrument air. Instrument air is required to operate the ADVs to support decay heat removal. Upon a loss of instrument air, the ADV will fail closed. This is a required function to prohibit excessive cooldown prior to AFW start. The AFW system must be established within 45 minutes of a plant trip with loss of Main Feedwater. Therefore, in the event of a loss of instrument air, Operators will establish local manual control of ADV 2-MS-190A to maintain the plant in hot standby and to transition to cold shutdown (new OMA 10 for R-10 for loss of instrument air). A route to the ADVs has been established which does not traverse the Fire Area R-10 and is illuminated with emergency lighting units. PEO-1 will remain in the vicinity of the ADV to modulate steam flow per direction from the control room.

A fire in Fire Area R-10 may cause cable damage to level transmitter LT-5282 (Condensate Storage Tank Level) which will necessitate obtaining level readings locally at the tank using level indicator LIS-5489. The route to the CST is illuminated by emergency lighting units. Checking the level of the CST supports AFW system operation. Checking the level is not a short-term requirement as there is sufficient inventory in the CST to provide over 10 hours of water flow to the AFW system. If necessary, after the CST is depleted, Operators can switch over to the fire water system to continue flow to the AFW system.

For a fire in Fire Area R-10, the Charging system has OMAs identified. Fire damage to cables may render level transmitters LT-206 and LT-208 (Boric Acid Storage Tank Level) inoperable from the control room. This would necessitate BAST level indication being obtained locally via level indicators LI-206A and LI-206B. The TRM requires a minimum level be maintained in the BASTs. Maintaining this level provides a minimum of 72 minutes of charging flow to the RCS after charging is re-established. Calculations indicate that charging must be restored within 3 hours of a reactor trip. There is sufficient emergency lighting units and communication to allow Operators to locally monitor BAST level. Once the BASTs have reached the 10% level, Operators switch the charging pump suction over to the RWST. In order to establish RWST as the suction flow to the credited charging pump, Operators may be required to locally open RWST Isolation valve 2-CH-192 (new OMA 1 for R-10 for loss of instrument air). For a fire in Fire Area R-10, there is no cable damage to RWST Isolation valve 2-CH-192 as no cables transverse the fire area. RWST isolation Valve 2-CH-192 is an air operated valve which may have failed closed due to a loss of instrument air. RWST Isolation valve 2-CH-192 has a safety-related air accumulator which supplies sufficient air to stroke open the valve and maintain the valve open for 3 hours. After the air accumulator is exhausted, the valve will fail closed and the required OMA is to locally establish/maintain RWST flow to the charging system.

Table 4: Responsible Performer and Times to Complete OMAs for Fire Area R-10

Operator	**Action**	**T=0**	**Walkdown Time** (min.)	**Time to Execute** (min.)	**Total Time** (min.)	**Time Required** (min.)	**Margin** (min.)
PEO-1	2-MS-190A **(new OMA 10)**	Establishing AFW	10	7	17	N/A	N/A
PEO-2	LIS-5489 (OMA 20)	Establishing AFW	5	1	6	600	N/A
PEO-3	LI-206A (OMA 18)	Loss of Charging	10	1	11	180	N/A
PEO-3	LI-208A (OMA 19)	Loss of Charging	(11)	1	12	180	168
Activity Complete	Restore Charging	Loss of Charging	N/A	N/A	12	180	168

Operator	Action	T=0	Walkdown Time (min.)	Time to Execute (min.)	Total Time (min.)	Time Required (min.)	Margin (min.)
PEO-3	2-CH-192 **(new OMA 1)**	Restoration of Charging	2	22	24	72	48
Activity Complete	Establish Charging Suction from RWST	Restoration of Charging	N/A	N/A	24	72	48

() Carryover time from previous OMA

Fire Area R-13

A fire in the west (Facility Z1) 480 VAC switchgear room will affect Facility Z1 safe shutdown equipment. Diesel Generator A will be unavailable due to a loss of the Facility Z1 power supply for the diesel room ventilation fan, F38A. Facility Z2 is used to achieve and maintain hot standby. Plant shutdown to hot standby can be accomplished using Procedure AOP 2579L, "Fire Procedure for Hot Standby Appendix R Fire Area R-13". For a fire in Fire Area R-13, OMAs are required to provide decay heat removal and restore Charging system flow to the RCS.

Establishing AFW flow to the credited SG is required within 45 minutes. For a fire in Fire Area R-13, the required AFW flow path utilizes the TDAFW pump. Due to fire-induced cable damage, AFW Flow Control valve (2-FW-43B), AFW turbine steam supply valve (SV-4188), and TDAFW turbine speed control (H-21) may not be available from the control room. The cable damage can be isolated and the TDAFW pump can be operated from Fire Shutdown Panel C-10, located in Fire Area R-2.

Updated OMA 9, due to loss of instrument air, provides for control of AFW flow control valve 2-FW-43B at Fire Shutdown Panel C-10 until loss of backup air, then provides for local manual action. An OMA is necessary to isolate the damaged cables and operate the TDAFW turbine speed control to maintain level in the SG. In the case of AFW Flow Control valve 2-FW-43B, cable damage could result in spurious operation. Isolation of the affected cables and control of the valve can be accomplished at Fire Shutdown Panel C-10. Thereafter, a loss of instrument air will fail the valve open. However, the AFW regulating valve has a safety-related accumulator which provides sufficient air to cycle the valve 20 times (full open to full closed) and then hold the valve in a fixed position for 3.27 hours. Thereafter, control of SG water level will be maintained using the speed control function of the TDAFW pump with AFW Flow Control valve 2-FW-43B failed open. The timeframe to establish control of TDAFW pump at Fire Shutdown Panel C-10 is 45 minutes. After RO-1 has established control of TDAFW pump speed at Fire Shutdown Panel C-10 (8 minutes), it will take an additional 2 minutes to establish AFW flow. This results in a total time to establish AFW flow of 10 minutes, leaving a 35 minute margin.

After AFW flow is established, the steam release path from the SG may be switched from the MSSVs to ADV 2-MS-190B (updated OMA 11 for R-13 related to a loss of instrument air). Due to cable damage and loss of instrument air, this will require local manual operation of the valve. If instrument air is not lost, then ADV 2-MS-190B and AFW Flow Control valve 2-FW-43B can be operated from Fire Shutdown Panel C-10. The OMA for local or Fire Shutdown Panel C-10 operation of ADV 2-MS-190B is not required until after AFW flow is established. PEO-1 will remain in the vicinity of the ADV to modulate steam flow per direction from the control room.

The final decay heat removal function is to monitor CST level from either Fire Shutdown Panel C-10 (LT-5282) or locally at the CST (LIS-5489). Checking the level would not be a short-term requirement because there is sufficient inventory in the CST to provide over 10 hours of water flow to the AFW system.

A spurious start of the TDAFW pump coupled with AFW Flow Control valve 2-FW-43B failing open should not result in a SG overfill. Nominal water level in the SG is maintained between 60-75% as indicated on the narrow range level instruments (i.e. the normal operating band). From the top of the normal operating band, more than 8,000 gallons of water can be added before reaching 100% on the Narrow Range (NR) level instruments. Allotting 8 minutes to establish operations from Fire Shutdown Panel C-10 and assuming all the flow from the TDAFW pump is filling one SG, approximately 4,800 gallons can be added before regaining level control. There is also an additional 14,000 gallons of margin available before the SG would overfill (i.e. from 100% NR to the Main Steam nozzle).

For a fire in Fire Area R-13, the Charging system has OMAs identified. The BASTs gravity feed valves, 2-CH-508 and 2-CH-509, may fail as is, (closed) due to cable damage. An OMA is in place to locally open these valves as part of restoring the Charging system. Cable damage due to fire may also cause a spurious start of the P18C Charging Pump 'C'. The cable damage may be mitigated by isolating and operating Charging Pump P18C at Fire Shutdown Panel C-10. RO-1 is at Fire Shutdown Panel C-10 and must manipulate the controls for P18C. Establishing pump suction from the BASTs and operating Charging Pump P18C is required within 3 hours of reactor shutdown/loss of charging. Completing the OMAs to re-establish charging would take 23 minutes leaving a margin of 157 minutes. This includes the parallel actions of PEO-2 establishing control of bus 24D (by pulling control power fuses to Auxiliary Feed Pump 'B' breaker A406, ensuring Auxiliary Feed Pump 'B' breaker A406 is open and closing DC Control Power to Bus 24D breaker DV2021) and PEO-3 (by manually aligning BAST Gravity Feed Valves 2-CH-508 and 2-CH-509). Once the BASTs have reached the 10% level, Operators switch charging pump suction over to the RWST. RWST Isolation valve 2-CH-192 (updated OMA 1 for R-13 related to a loss of instrument air) may fail closed due to a loss of power supply but the valve can be controlled from the control room until either battery depletion or a loss of instrument air/backup air occurs. A backup air source allows for the opening of RWST Isolation valve 2-CH-192 and hence alignment of charging to the RWST from the control room.

The backup air source provides sufficient air to open the valve and maintain the valve open for 3 hours.

Table 5: Responsible Performer and Times to Complete OMAs for Fire Area R-13

Operator	**Action**	**T=0**	**Walkdown Time** (min.)	**Time to Execute** (min.)	**Total Time** (min.)	**Time Required** (min.)	**Margin** (min.)
RO-1	2-FW-43B **(updated OMA 9)**	Reactor Trip	3	1	4	45	N/A
RO-1	SV-4188 (OMA 22)	Reactor Trip	(4) + 1	1	6	45	N/A
RO-1	H-21 (OMA 17)	Reactor Trip	(6) + 1	1	8	45	37
Control Room	Establish AFW	Reactor Trip	*	2	10	45	35
PEO-1	2-MS-190B **(updated OMA 11)**	Establishing AFW	10	7	17	N/A**	N/A
PEO-2	LIS-5489 (OMA 20)	Establishing AFW	(17) + 2	1	20	600	N/A
PEO-2	A406 (OMA 16)	Loss of Charging	5	6	11	180	N/A
PEO-2	DV2021 (OMA 24)	Loss of Charging	(11) + 5	5	21	180	N/A
PEO-3	2-CH-508 (OMA 4)	Loss of Charging	10	5	15	180	N/A
PEO-3	2-CH-509 (OMA 5)	Loss of Charging	(15) + 1	5	21	180	N/A
RO-1	P18C (OMA 21)	Loss of Charging	1	1	2	180	157
Activity Complete	Restore Charging	Loss of Charging	N/A	N/A	23	180	157
PEO-3	2-CH-192 **(updated OMA 1)**	Restoration of Charging	10	22	32	72	40
Activity Complete	Establish Charging Suction from RWST	Restoration of Charging	N/A	N/A	32	72	40

() Carryover time from previous OMA
* Allowed control room activity, no walkdown required.
** No specific time is required initially since decay heat is removed using MSSVs.

Fire Area R-14

A fire in the Facility Z1 lower 4.16 kV switchgear room and cable vault will affect all Facility Z1 shutdown components. Facility Z2 is used to achieve and maintain hot standby. Plant shutdown to hot standby can be accomplished using Procedure AOP 2579M, "Fire Procedure for Hot Standby Appendix R Fire Area R-14".

For a fire in Fire Area R-14, OMAs are required to provide decay heat removal and restore charging system flow to the RCS.

Establishing AFW flow to the credited SG is required within 45 minutes. For a fire in Fire Area R-14, the required AFW flow path utilizes the TDAFW pump. Due to fire-induced cable damage, AFW Flow Control valve 2-FW-43B may not be operational from the control room. Damaged cables can be isolated at Fire Shutdown Panel C-10. AFW Flow Control valve 2-FW-43B may be operated from Fire Shutdown Panel C-10 if instrument air is available or until its backup air source is exhausted. The AFW regulating valve has a safety-related accumulator which provides sufficient air to cycle the valve 20 times (full open to full closed) and then hold the valve in a fixed position for 3.27 hours. Thereafter, the valve will fail open and local manual operation of AFW Flow Control valve 2-FW-43B will be required (updated OMA 9 for R-14 related to a loss of instrument air). Control of SG water level can also be maintained using the speed control function of the TDAFW pump. Once RO-1 has established control of AFW Flow Control valve 2-FW-43B at Fire Shutdown Panel C-10 (4 minutes), it will take an additional 2 minutes to establish AFW flow. This results in a total time to establish AFW flow as 6 minutes leaving a 39 minute margin.

New OMA 11 for R-14 is related to actions required for ADV 2-MS-190B for loss of instrument air. The ADVs are utilized after AFW flow is established. Prior to AFW initiation, the plant is placed in the hot standby condition by steaming through the MSSVs. A fire in Fire Area R-14 does not damage any cable associated with ADV 2-MS-190B. However, the fire may cause a loss of instrument air. Instrument air is required to operate the ADVs and support decay heat removal. Upon a loss of instrument air, the ADV will fail closed. This "fail to close" design prevents excessive RCS cooldown prior to AFW start. AFW system flow must be established within 45 minutes of a plant trip with loss of main feedwater. Therefore, in the event of a loss of instrument air, Operators will establish local manual control of ADV 2-MS-190B. PEO-2 will remain in the vicinity of the ADV to modulate steam flow per direction from the control room.

A spurious start of the TDAFW pump coupled with AFW Flow Control valve 2-FW-43B failing open should not result in a SG overfill. Nominal water level in the SG is maintained between 60-75% as indicated on the narrow range level instruments (i.e. the normal operating band). From the top of the normal operating band, more than 8000 gallons of water can be added before reaching 100% on the Narrow Range (NR) level instruments. Allotting 4 minutes to establish operations from Fire Shutdown Panel C-10 and assuming all the flow from the TDAFW pump is filling one SG, approximately 2400

gallons can be added before regaining level control. There is also an additional 14,000 gallon of margin available before the SG would overfill (i.e. 100% NR to the Main Steam nozzle).

For a fire in Fire Area R-14, the Charging system has OMAs identified. The BASTs Gravity Feed Valves, 2-CH-508 and 2-CH-509, may fail as is (closed) due to a loss of power supply. An OMA is in place to locally open these valves as part of restoring the Charging system. Establishing charging pump suction from the BASTs is required within 3 hours of reactor shutdown/loss of charging. RO-1 and PEO-3 will perform their OMAs in parallel to restore charging. Once RO-1 completes the OMAs, PEO-1 will then reset and close DC Control Power to Bus 24D breaker DV2021. It will then take approximately 3 minutes for the control room to re-establish charging flow. This provides a 153 minute margin. When the BASTs reach the 10% level, Operators switch over to the RWST as the source for charging. RWST Isolation valve 2-CH-192 may fail closed due to a loss of power supply but the valve can be controlled from the control room until either battery depletion or loss of instrument air/backup air occurs. A backup air source allows for the opening of RWST Isolation valve 2-CH-192 and hence alignment of charging to the RWST from the control room. The backup air source provides sufficient air to open the valve and maintain the valve opened for 3 hours. After loss of back-up air, local operation of RWST Isolation valve 2-CH-192 will be required (updated OMA 1 for R-14 related to loss of instrument air). As part of the restoration of Charging flow to the RCS, bus 24D must be isolated from cross-ties to bus 24B, bus 24E and the RSST. This is due to fire-induced cable damage which may result in spurious operation/loss of control from the control room of breakers A401, Bus 24B To Bus 24D Tie breaker A410, Bus 24D To Bus 24E Tie breaker A408 and Bus 24D Feeder breaker A411. The OMAs associated with these breakers are to pull the control power fuses and ensure that the breakers are open (A410, A408 and A411) or closed (A401).

Table 6: Responsible Performer and Times to Complete OMAs for Fire Area R-14

Operator	**Action**	**T=0**	**Walkdown Time** (min.)	**Time to Execute** (min.)	**Total Time** (min.)	**Time Required** (min.)	**Margin** (min.)
RO-1	2-FW-43B* **(Updated OMA 9)**	Reactor Trip	3	1	4	45	41
C-10 Panel	Establish AFW	Reactor Trip	**	2	6	45	39

Operator	Action	T=0	Walkdown Time (min.)	Time to Execute (min.)	Total Time (min.)	Time Required (min.)	Margin (min.)
PEO-2	2-MS-190B **(new OMA 11)**	Establishing AFW	10	7	17	N/A*****	N/A
PEO-3	2-CH-508 (OMA 4)	Loss of Charging	10	5	15	180	N/A
PEO-3	2-CH-509 (OMA 5)	Loss of Charging	(15) +1	5	21	180	N/A
RO-1	A410* (OMA 14)	Loss of Charging	(4) + 2	6 ***	12	180	N/A
RO-1	A408* (OMA 13)	Loss of Charging	(12) +1	1	14	180	N/A
RO-1	A401* (OMA 23)	Loss of Charging	(14) +1	1	16	180	N/A
RO-1	A411* (OMA 15)	Loss of Charging	(16) +1	1	18	180	N/A
PEO-1	DV2021 OMA 24	Loss of Charging	(18) +5	1	24	180	156
Control Room	Restore Charging	Loss of Charging	****	3	27	180	153
PEO-3	2-CH-192 **(Updated OMA 1)**	Restoration of Charging	10	22	32	72	40
Activity Complete	Establish Charging Suction from RWST	Restoration of Charging	N/A	N/A	32	72	40

() Carryover time from previous OMA
*C-10 panel and breakers in the same room.
**C-10 panel activity, no walkdown required
*** 5 minutes to put on proper PPE and 1 minute to perform task
**** Allowed control room activity, no walkdown required.
***** No specific time is required initially since decay heat is removed using MSSVs.

8.0 Support for OMA time feasibility

Entry into AOP 2559, "Fire" is at the first indication of a fire from a panel alarm or report from the field. If the fire is in an Appendix R area, the shift is directed to determine if a fire should be considered Appendix R (requiring use of the Appendix R AOPs) by:

- Actual or imminent damage to safe shutdown components, switchgear, MCCs, cable trays or conduit runs.
- Spurious operation of plant components needed for safe shutdown.
- Loss of indication, control, or function of safe shutdown plant systems or components.

- Conflicting instrument indication for safe shutdown systems or components.
- Parameters associated with safe shutdown systems or components not within expected limits for existing plant configuration.

Refer to the fire induced OMA timeline below for a graphical display showing various timelines associated with operator manual actions. The graphic shows the overall timeline along the top, followed by the worst case timelines for charging restoration, charging suction to RWST restoration, and auxiliary feed restoration. The timelines show the longest time for restoration to occur and the available margin compared to the time required for restoration. The timelines bound the restoration times for Fire Areas R-9, R-10, R-13, and R-14 discussed in this exemption request. The longest time to restore charging is 66 minutes for a fire in Fire Area R-2, resulting in a worst case margin of 114 minutes, when compared to the required time of 180 minutes for restoration. Similarly, the longest time to restore charging suction to the RWST is 40 minutes for a fire in Fire Area R-2, resulting in a worst case margin of 32 minutes, when compared to a required time of 72 minutes to complete the action. The longest time to restore auxiliary feed is 10 minutes for a fire in Fire Area R-13, resulting in a worst case margin of 35 minutes when compared to the required time of 45 minutes for restoration.

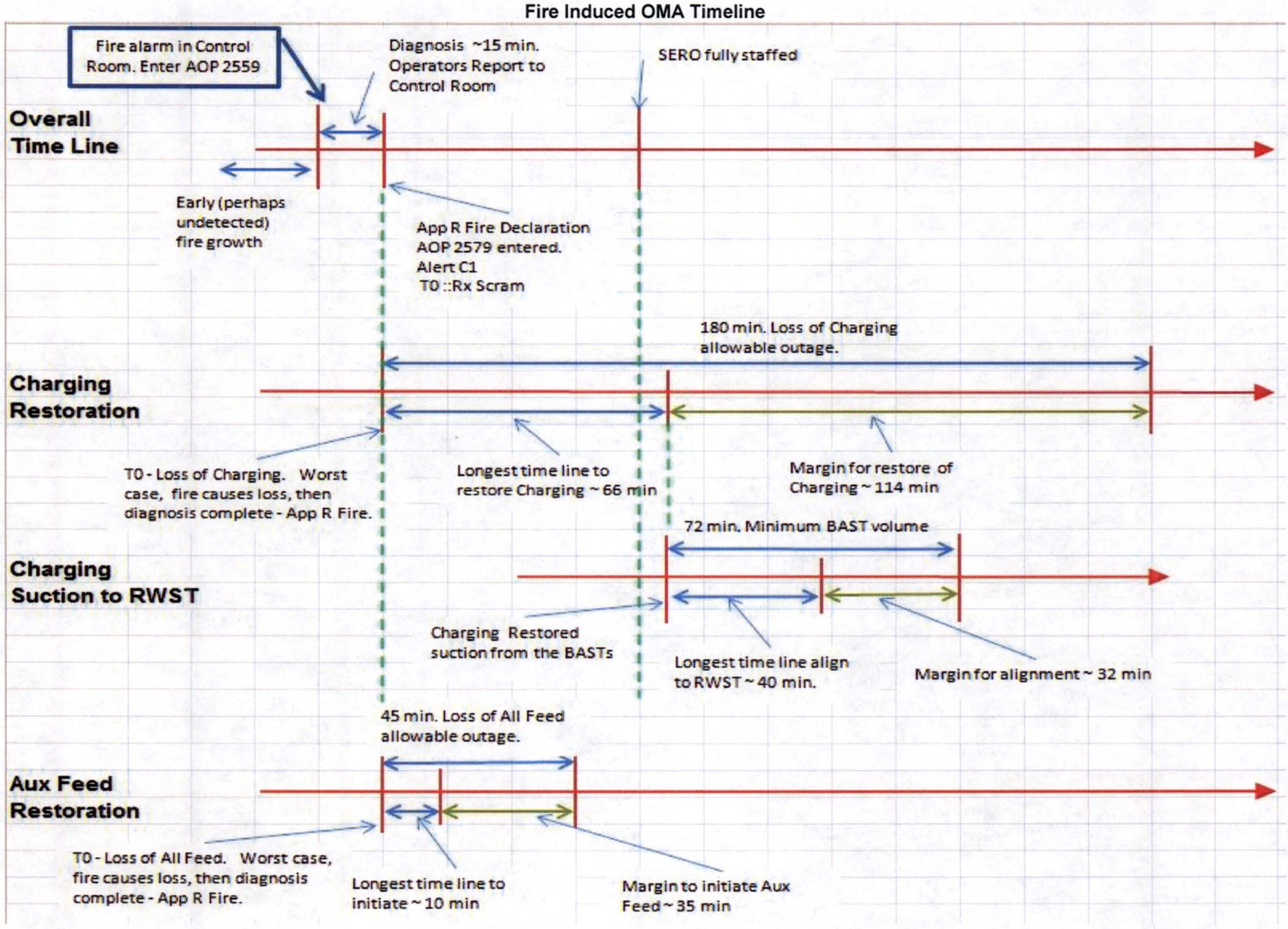
Confirmation time was included in the action time. For valves that are operated in the field, if the valves are being manually opened or closed, there is local indication plus the mechanical stops to confirm valve operation. For valves that are throttled, the field operator is in communication with the control room personnel who are monitoring control board indication to confirm the proper response. All breakers have local mechanical indication verifying its position (open or closed). All sequenced steps are coordinated from the control room. The times listed include this coordination.

The operators are provided with dedicated radio communication equipment. The Appendix R communication system utilizes a portion of the MPS 800 MHz trunked radio system. The system consists of 800 MHz portable radio units, a control room base station transmitter, antennas, a main communication console located inside the control room and redundant repeaters. The control room base station transmitter is provided to ensure two-way voice communications with the control room without affecting plant safety systems that may have sensitive electronic equipment located in the area. The resulting design configuration ensures communications capability for all Appendix R fire scenarios.

Addressing Corrective or Reactive Actions

The specified times to perform each OMA action includes the time needed to perform potential corrective or reactive actions in the event the action did not accomplish the desired result. All corrective or reactive actions are contained in a series of Appendix R AOPs corresponding to each Appendix R fire area which are entered once an Appendix R fire is declared. The time line estimates are based on complete performance of the AOP steps.

Equipment required to complete a required action is included in a preventative maintenance program and is listed in the TRM. The TRM identifies surveillances for the equipment utilized in each OMA. MPS2 has evaluated and modified the Motor Operated Valves relied upon by OMAs consistent with NRC Information Notice (IN) 92-18 (February 28, 1992). This IN 92-18 detailed the potential for fires to damage Motor Operated Valves that are required for safe shutdown so that the valves can no longer be remotely or manually operated. As a result of the evaluation and modification activities associated with the IN 92-18, the potential for fires to damage Motor Operated Valves that are required for safe shutdown so that the valves can no longer be remotely or manually operated has been minimized. Furthermore, the equipment operated to perform these OMAs is not fire affected and therefore is reasonably expected to operate as designed.


Fire Induced OMA Timeline
Fire alarm in Control Room. Enter AOP 2559
Diagnosis ~15 min. Operators Report to Control Room
SERO fully staffed
Overall Time Line
Early (perhaps undetected) fire growth
App R Fire Declaration AOP 2579 entered. Alert C1 T0 ::Rx Scram
180 min. Loss of Charging allowable outage.
Charging Restoration
T0 - Loss of Charging. Worst case, fire causes loss, then diagnosis complete - App R Fire.
Longest time line to restore Charging ~ 66 min
Margin for restore of Charging ~ 114 min
72 min. Minimum BAST volume
Charging Suction to RWST
Charging Restored suction from the BASTs
Longest time line align to RWST ~ 40 min.
Margin for alignment ~ 32 min
45 min. Loss of All Feed allowable outage.
Aux Feed Restoration
T0 - Loss of All Feed. Worst case, fire causes loss, then diagnosis complete - App R Fire.
Longest time line to initiate ~ 10 min
Margin to initiate Aux Feed ~ 35 min

9.0 Deviations from Other Exemptions for Affected Fire Areas

By letter dated June 30, 2011 (Reference 14), DNC submitted an exemption request for OMAs contained in the MPS2 Appendix R Compliance Report. DNC subsequently removed four OMAs from the requested exemption by letter dated February 29, 2012 (Reference 15) because loss of instrument air was not a postulated event. The NRC approved the requested exemptions by letters dated July 12, 2012 (Reference 16) and December 18, 2012 (Reference 18). Table 2 in Section 6.0 provides a list of the OMAs for affected fire area previously reviewed and approved by the NRC. The table identifies the equipment, the OMA, the time to accomplish the OMA, the initiating fire area and the area location. Section 7.0 provides additional discussion of actions associated with the various OMAs including associated times to complete the OMA actions for the affected fire area.

With respect to deviations from codes, standards, and listings by independent testing laboratories, there are no Generic Letter 86-10 evaluations or exemptions for the areas discussed in the exemption request that pertain to fire suppression or detection system deviations from NFPA codes. Fire suppression and detection systems installed in the plant areas discussed in the exemption request have been designed in general compliance with, and installed to meet the intent of the requirements set forth in NFPA codes and standards as discussed in the Section 3.0 related to fire protection features associated with affected fire areas.

There are numerous Generic Letter 86-10 evaluations and exemptions for the plant areas discussed in the exemption request that document the acceptability of fire barrier deviations. The subject of these barrier deviations include the use of water curtains in lieu of rated fire barriers, insufficient barrier/seal depth to meet a full 3-hour fire rating, fire damper installations that do not conform to manufacturer's instructions, exposed steel in fire barriers, use of non-rated doors in fire barriers and use of partial height walls as fire barriers. Barrier deviations that could allow the spread of fire combustion products to an adjacent area that either serves as a travel path for OMAs or is an action location for an OMA have been evaluated found to not adversely impact OMA travel paths or action areas. Based on the Generic Letter 86-10 evaluations for the affected fire areas and the conclusions drawn by the evaluations, there is no adverse impact on the ability to perform OMAs and the conclusions of the Generic Letter 86-10 evaluations would remain valid with OMAs in place.

Fire Area R-14 / FHA Area T-7

There are four Generic Letter 86-10 evaluations and no exemptions beyond the previously approved OMA exemption (Reference 18) that are applicable to this fire area. Three of these evaluations (Number 102, FP-EV-03-0004, and FP-EV-06-0002) address issues pertaining to fire barriers. These evaluations concluded that this area is sufficiently bounded to withstand the hazards associated with the area and to protect equipment within the fire area from a fire outside the area. Further, none of the fire barrier issues addressed by these evaluations would adversely impact, through the

spread of fire or combustion products, plant areas where OMAs are performed or the respective travel paths necessary to reach these areas. The final evaluation (FP-EV-98-0007) documents the acceptability of partial suppression in Appendix R Fire Area R-14. Appendix R Fire Area R-14 consists of the lower 6.9 kV and 4.16 kV switchgear room (FHA Area T-7) and the east cable vault (FHA Area T-9). FHA Area T-7 contains redundant safe shutdown cabling protected with 3-hour fire-rated wrap and is provided with smoke detection, while FHA Area T-9 contains redundant safe shutdown cabling with 1-hour fire-rated wrap and is provided with automatic suppression and detection. While these areas are independently compliant with Appendix R III.G.2 requirements, the fact that 1-hour fire wrap was used in FHA Area T-9 requires area wide suppression for all of Appendix R Fire Area R-14. The evaluation documents the acceptability of not having automatic suppression in FHA Area T-7 based on the independent compliance to Appendix R separation requirements of each of these fire areas, low combustible loading in FHA Area T-7, and the fact that there are two individual rooms that are separated by fire rated construction that would prevent a fire in FHA Area T-7 from spreading to FHA Area T-9.

Fire Area R-9/FHA Area A-20

There are four Generic Letter 86-10 evaluations and no exemptions beyond the previously approved OMA exemption (Reference 18) that are applicable to this fire area. All of these evaluations (Number 086, FP-EV-99-0005, FP-EV-99-0006 and FP-EV-99-0015) address issues pertaining to fire barriers. These evaluations concluded that this area was sufficiently bounded to withstand the hazards associated with the area and to protect equipment within the area from a fire outside the area. Further, none of the fire barrier issues addressed by these evaluations would adversely impact, through the spread of fire or combustion products, plant areas where OMAs are performed or the respective travel paths necessary to reach these areas.

Fire Area R-10/FHA Area A-21

There are five Generic Letter 86-10 evaluations and no exemptions beyond the previously approved OMA exemption (Reference 18) that are applicable to this fire area. All of these evaluations (FP-EV-98-0042, FP-EV-99-0002, FP-EV-99-0005, FP-EV-99-0006 and FP-EV-99-0015) address issues pertaining to fire barriers. These evaluations concluded that this area was sufficiently bounded to withstand the hazards associated with the area and to protect equipment within the area from a fire outside the area. Further, none of the fire barrier issues addressed by these evaluations would adversely impact, through the spread of fire or combustion products, plant areas where OMAs are performed or the respective travel paths necessary to reach these areas.

Fire Area R-13/FHA Area T-6

There are nine Generic Letter 86-10 evaluations and no exemptions beyond the previously approved OMA exemption (Reference 18) that are applicable to this fire area. Eight of these evaluations (FP-EV-98-0042, FP-EV-98-0047, FP-EV-98-0052, FP-EV-99-0002, FP-EV-99-0019, FP-EV-03-0001, FP-EV-03-0002, and FP-EV-03-0003) address issues pertaining to fire barriers. These evaluations concluded that this area was sufficiently bounded to withstand the hazards associated with the area and to

protect equipment within the fire area from a fire outside the area. Several of these evaluations address barriers that separate Fire Area R-13/FHA Area T-6 from areas that contain travel paths for OMAs required for a fire in this area. However, none of these fire barrier issues would adversely impact, through the spread of fire or combustion products, plant areas where OMAs are performed or their respective travel paths. This is based on barrier continuity (absence of openings), inherent fire resistance of the barriers, low combustible loading in Fire Area R-13/FHA Area T-6 (consisting almost entirely of fire retardant IEEE 383 cable), and installed smoke detection in Fire Area R-13/FHA Area T-6 (which would allow for early response by the fire brigade). Engineering evaluation FP-EV-98-0052 documents the acceptability of several unsealed steel deck rib voids that may allow for the spread of smoke and hot gasses between Fire Area R-13/FHA Area T-6 and Fire Area R-14/FHA Area T-9. However, there would be no impact on OMAs, as areas requiring OMAs for a fire in Fire Area R-13/FHA Area T-6 and the respective travel paths to reach these areas are independent of Fire Area R-14/FHA Area T-9.

The final evaluation (FP-EV-98-0002) documents that a fire in Fire Area R-13/FHA Area T-6 would not be of sufficient magnitude to activate the fire dampers installed in the heating, ventilation, and air conditioning ductwork that provides cooling for the east 480V load center room (Fire Area R-11/FHA Area A-28). Closure of these dampers may result in the loss of credited safe shutdown equipment in east 480V load center room due to overheating. One of the fire dampers discussed in this evaluation is located in the floor/ceiling assembly that separates Fire Area R-13/FHA Area T-6 from Fire Area R-2/FHA Area T-10. Fire Area R-2/FHA Area T-10 may require OMAs in the event of a fire in Fire Area R-13/FHA Area T-6. Despite the fact that this fire damper would not activate, OMAs in Fire Area R-2/FHA Area T-10 would not be impacted. This is based on low combustible loading in Fire Area R-13/FHA Area T-6 which consists almost entirely of fire retardant IEEE 383 cable, the configuration of the combustibles prevents direct fire exposure to the barrier separating these areas, and the fact that storage of transient combustibles is prohibited in the vicinity of this barrier by the site's fire protection program procedures (References 12 and 13).

Fire Area R-14/FHA Area T-9

There are eight Generic Letter 86-10 evaluations and no exemptions beyond the previously approved OMA exemptions (Reference 18) that are applicable to this fire area. Seven of these evaluations (Number 087, FP-EV-98-0051, FP-EV-98-0052, FP-EV-99-0012, FP-EV-03-0001, FP-EV-03-0004 and FP-EV-06-0002) address issues pertaining to fire barriers. These evaluations concluded that this area was sufficiently bounded to withstand the hazards associated with the area and to protect equipment within the fire area from a fire outside the area. A fire in this area may require OMAs in Fire Area R-2/FHA Area T-10. Engineering evaluation FP-EV-98-0051 documents the acceptability of penetration seals in the ceiling of this fire area (floor of Fire Area R-2/FHA Area T-10) due to the installed depth of seal material being slightly less than that required for a full 3-hour fire rating. Despite this fact, OMAs in Fire Area R-2/FHA Area T-10 would not be impacted due to a fire in Fire Area R-14/FHA Area T-9. This is based on the equivalent fire loading in Fire Area R-14/FHA Area T-9 (approximately 101

minutes) being much less than the 3-hour fire test the qualified seal was exposed to and installed suppression and detection in Fire Area R-14/FHA Area T-9. Further, the combustibles in Fire Area R-14/FHA Area T-9 consist of fire-retardant Thermo-lag wrap and IEEE 383 cable, making a large fire in this area unlikely. Engineering evaluation FP-EV-98-0052 documents the acceptability of several unsealed steel deck rib voids that may allow for the spread of smoke and hot gasses between Fire Area R-14/FHA Area T-9 and Fire Area R-13/FHA Area T-6. Despite this fact, there would be no impact on OMAs, as areas requiring OMAs for a fire in Fire Area R-14/FHA Area T-9 are independent of Fire Area R-13/FHA Area T-6. Further, travel paths to reach these areas exist that are independent of Fire Area R-13/FHA Area T-6. As such, none of the fire barrier issues addressed by these evaluations would adversely impact, through the spread of fire or combustion products, plant areas where OMAs are performed or the respective travel paths necessary to reach these areas.

The final evaluation (FP-EV-98-0007) documents the acceptability of partial suppression in Fire Area R-14. Appendix R Fire Area R-14 consists of the lower 6.9 kV and 4.16 kV switchgear room (FHA Area T-7) and the east cable vault (FHA Area T-9). FHA Area T-7 contains redundant safe shutdown cabling protected with 3-hour fire-rated wrap and is provided with smoke detection, while FHA Area T-9 contains redundant safe shutdown cabling with 1-hour fire-rated wrap and is provided with automatic suppression and detection. While these areas are independently compliant with Appendix R III.G.2 requirements, the fact that 1-hour fire-rated wrap was used in FHA Area T-9, requires area wide suppression for all of Fire Area R-14. The evaluation documents the acceptability of not having automatic suppression in FHA Area T-7 based on the independent compliance to Appendix R separation requirements of each of these fire areas, low combustible loading in FHA Area T-7 and the fact that these are two individual rooms that are separated from one another by fire rated construction that would prevent a fire in FHA Area T-7 from spreading to FHA Area T-9.

10.0 OMA Times and Validation

Validation Methods

A validation of OMAs was performed in support of the initial June 30, 2011 submittal which originally included the four OMAs in this request (Reference 14). A review of procedure changes and physical changes since 2011 did not identify any impacts or changes related to the validation methods used. The OMAs identified in this request are contained in the AOP series of fire procedures for Appendix R. During validation of these procedures, the OMAs were performed as outlined below. The time performance objectives were met as a result of the validation.

Operations personnel train to the AOPs which identify, among other things, the steps to perform each OMA. The times allotted to perform these tasks are easily achieved by operators during training sessions, evaluated requalification training, and supervised walkdowns. For each case, there is sufficient margin to account for the uncertainties associated with stress, environmental factors, and unexpected delays. Time critical

OMAs are identified within operating procedures and have been incorporated into operator training and Job Performance Measures (JPMs).

The TCAs come from various sources:

- Safety analyses as documented in the Safety Function Requirement Manual (SFRM).
- MPS Appendix R Compliance report and supporting analyses.

Validation Process

1. Validation Objectives
   a. Ensure that the times are met as specified with a goal of completion within 80% of the time requirement.
   b. Demonstrate that the language, level of information, sequencing and number of tasks in the procedure is compatible with the minimum staffing, qualifications training and experience of plant personnel.
   c. Verify lighting, component labeling, accessibility of equipment, tools, keys, flashlights, and other devices or supplies are adequate for successful completion of the time critical task.
2. Validation shall be performed on a frequency in accordance with Licensed Operator Requalification Training (LORT) curriculum plan.
3. Validation shall be performed by one of the following methods:
   a. Simulator Scenario: Most effective method for testing control room procedures to ensure assumed time lines can be accomplished.
   b. In-Plant Walk Through: Most effective method for testing local TCAs or when simulator modeling constraints prevent effective simulator validation.
   c. Reasonable Engineering Judgment: Is to be used where the simulator scenarios and walk through methods are not appropriate for the task to be performed. Reasonable engineering judgment should be used in conjunction with simulator scenarios and walk through methods.
   d. Training records such as simulator scenarios and JPMs may be used to document validation of TCAs provided the requirements are met.
4. Validation Attributes
   a. A validation team should consist of the following:
      - Team Leader: Person in charge of performing the validation who is knowledgeable of the task and the TCA requirements.
      - TCA Performers: Minimum number of personnel required to perform the task per analysis.
      - Optional Personnel: Training, Engineering, Probabilistic Risk Assessment, Procedures may observe or participate in the validation process.

b. Special equipment, tools, keys, flashlights or other devices or supplies that are required to support the TCA are readily available.

5. Validation Performance

a. Simulator

- Performers take their positions in the simulator control room.
- Briefing is performed on initial conditions and team member responsibilities, including recording of time data.
- Evaluation team is positioned so as not to interfere with, distract performers or inhibit traffic paths.
- Copies of applicable procedures and related support documents are available for use consistent with availability in the actual control room.
- The simulated event is executed according to the predetermined scenario.
- For periodic or unannounced validations, the scenario should continue until the TCA is completed. If the time requirement has been exceeded, the scenario should be continued to aid in determining required changes to accomplish the TCA within the required time. The team leader determines when there is no benefit to continuing the scenario.

b. Walk Through

- If the performer must obtain a procedure to perform the TCA, the action should be done as he/she would during normal operations. For those procedures that are pre-staged, a working copy of the procedure is available at the location where the performer would be expected to obtain the procedure.
- Performers begin validation at a location where the performer may reasonably be expected to be, based on the event in progress.
- Evaluation team members are stationed at locations appropriate for the TCA.
- The team leader will instruct the performer to perform the procedure or section of the procedure, consistent with the method of notification expected during an actual event.
- Performers simulate the actions required by the applicable procedures:
  - Obtain required equipment such as keys, ladders, spool pieces, etc. and place where required by the procedure.
  - Locate the designated equipment.
  - Simulate using the equipment.
  - Locate and read required instrumentation.
  - Simulate communications necessary to perform the TCA.

c. Equipment Operating Times

- Actual operating time for plant equipment should be used, where available, including valve stroke times for remote and locally operated valves.
- Where it is not possible to obtain a stroke time for the specific valve to be operated or for a similar valve, an appropriate estimate of stroke time may be used.

d. Time Keeping

Designated time members record the following information on the appropriate attachment:

- Procedure Number: Procedure being validated
- Scenario/ JPM number: if used
- Validation Date: Date of evaluation
- Start Time: Actual time the procedure was started
- Validation Personnel: Personnel performing actions required by the procedure being validated
- Evaluation Personnel: Personnel monitoring the validation of the procedure
- Initial Conditions/ Malfunctions/ Procedures Used
- Timed Actions: Actions requiring to be timed
- Critical Times: Times associated with the action as applicable
- Clock Time: Completion time for each required action
- Elapsed Time: Difference from action completion time to start time

e. Human performance Protocols

TCA validation includes the use of current plant human performance protocols and standards for the tasks and procedures being performed. These include but may not be limited to:

- Communications standard
- Procedure use and adherence standard
- Briefing requirements
- Place keeping requirements
- Verification techniques such as self checking, peer checking, independent verification, concurrent verification
- Personal protection equipment requirements
- Other plant specific human performance protocols

f. Evaluation of Time Critical Action validation

- A completion time within 80% of the TCA required time is considered adequate assurance that the TCA can be reliably performed.
- If the TCA is completed within 80%-100% of the required time, then perform the following:
  - Consider additional validations of the TCA using other performers.
  - Submit a condition report to evaluate for a degrading trend in TCA completion time.
- IF, during the performance of periodic or unannounced validations, more than one shift or individual fails to meet the required time, submit a condition report to evaluate the ability to meet the plant licensing basis associated with the TCA.

Addressing Uncertainties

When a particular amount of time has been allocated for diagnosing an event, there are additional uncertainties, such as recovery from unexpected delays, environmental factors, operator response to stress, etc. that are addressed. These uncertainties have been considered when developing required response times for each OMA.

AOP 2559, "Fire" has various attachments that have Appendix R egress/access routes which provide a safe pathway to reach the required equipment necessary to complete each OMA. In all cases, emergency lights have been provided to ensure adequate lighting. These lights are described in the TRM. During a fire event, the implementation of the control room actions ensure the radiation levels along these pathways, and at the location of each affected OMA, are within the normal and expected levels. Area temperatures may be slightly elevated due to a loss of normal ventilation, however; in no case would the temperatures prevent access along the defined routes or prevent the performance of an OMA.

Justification of Exemption

10 CFR 50.12, "Specific Exemptions," states that the NRC may grant exemptions from the requirements of the regulations of this part provided two conditions are met. They are: 1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security; and 2) the Commission will not consider granting an exemption unless special circumstances are present.

Condition 1

1. The exemption is authorized by law

   As required by 10 CFR 50.12(a)(1), this requested exemption is "authorized by law." This requested exemption is for manual actions that were previously identified in the MPS2 Appendix R Compliance Report submitted and determined to be acceptable in an SER dated July 17, 1990. While the four OMAs in this exemption request had previously been approved for exemption in some fire areas, per SER dated December 18, 2012, the consideration did not include

impacts related to a loss of instrument air. This exemption request is seeking approval of new OMAs related to loss of instrument air for certain affected fire areas. In accordance with RIS 2006-10, an exemption request is required for this category of OMAs.

2. The exemption will not present an undue risk to public health and safety
In each OMA case, the current MPS2 Appendix R Compliance Report indicates operator access is assured either by an alternate path or access is not required until after the fire has been suppressed. The AOPs were validated and performance of the actions was verified as reasonable within the timeframes required. As a result, this exemption request will not result in undue risk to the public health and safety. DNC has determined that the subject manual action is feasible for use in achieving post-fire safe shutdown.

3. The exemption is consistent with the common defense and security
The intent of 10 CFR 50, Appendix R, paragraph III.G.2, is to ensure one train of systems necessary to achieve and maintain hot shutdown will remain available in the event of a fire. The four OMAs discussed in this exemption request provide that assurance. As a result, this exemption request is consistent with the common defense and security.

OMA 1 is related to manually opening RWST Isolation valve 2-CH-192. RWST Isolation valve 2-CH-192 is part of the single flow path which provides charging pump suction from the RWST. This single path supply does not meet the Appendix R III.G.2 requirements because there is no redundant pathway. This flow path is used after the BASTs are depleted. OMA 1 is required to allow local opening of RWST Isolation valve 2-CH-192 to align the charging pump suction to the RWST.

OMA 9 is related to operation of AFW Flow Control valve 2-FW-43B at Fire Shutdown Panel C-10 or local manual operation. AFW Flow Control valve 2-FW-43B is an AOV which controls flow from the AFW pumps to SG Number 2. A fire in Fire Areas R-13 and R-14 directly impacts the AFW train. Circuits for AFW Flow Control valve 2-FW-43B traverse through Fire Area R-13 (detection no automatic suppression) and terminate in the same panel (Hot Shutdown Panel C-21) as AFW Flow Control valve 2-FW-43A. In Fire Area R-14 (detection, no automatic suppression) the conduit carrying cable for AFW Flow Control valve 2-FW-43B is less than a foot away from the conduit for AFW Flow Control valve 2-FW-43A. Since the conduit is within close proximity to the other train conduit, the 20 foot separation criterion of Appendix R III.G.2 is not met and OMA 9 is required to operate AFW Flow Control valve 2-FW-43B.

OMA 10 is related to local manual operation of ADV 2-MS-190A. Valve 2-MS-190A is the ADV which provides a steam path to atmosphere for cooling the RCS via SG Number 1. The OMA for this valve is the result of loss of instrument air. Instrument air is a single train system and, therefore, does not meet Appendix R

III.G.2 requirements because there is no redundant train. Loss of instrument air will result in both ADV 2-MS-190A and ADV 2-MS-190B failing closed. Thus, OMA 10 is required to open ADV 2-MS-190A and restore the pathway.

OMA 11 is related to operation of ADV 2-MS-190B at Fire Shutdown Panel C-10 or local manual operation. Valve 2-MS-190B is an ADV which provides a steam path for cooling the RCS via SG Number 2. Instrument air is a single train system and, therefore, does not meet Appendix R III.G.2 requirements because there is no redundant train. Loss of instrument air will result in the loss of both ADV 2-MS-190A and ADV 2-MS-190B, and OMA 11 is required to operate ADV 2-MS-190B and restore the pathway.

Condition 2
Special circumstances support the issuance of an exemption
10 CFR 50.12(a)(2) states that the NRC will not consider granting an exemption to the regulations unless special circumstances are present. This exemption meets the special circumstances criteria of 10 CFR 50.12(a)(2)(ii), "application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

If manual actions are not used to meet the underlying purpose of the rule, modifications to: (1) provide additional fire suppression systems, detection systems, or fire barriers, or (2) re-route cabling or wrap cabling, would be required to achieve compliance. Such modifications represent an unwarranted burden on DNC since modifications are not necessary to achieve the underlying purpose of the rule.

The requested exemption is for manual actions that were previously identified in the MPS2 Appendix R Compliance Report submitted and determined to be acceptable in an SER dated July 17, 1990 (Reference 8). While the OMAs were not specifically addressed in the SER, the safety basis established in the July 17, 1990 SER did include discussion of operator manual actions and remains valid. In each case, the current MPS2 Appendix R Compliance Report indicates operator access is assured either by an alternate path or access is not required until after the fire has been suppressed. The AOPs were validated and performance of the actions was verified as reasonable within the timeframes required. While the four OMAs in this exemption request had previously been approved for exemption in some fire areas, per SER dated December 18, 2012, the approval did not consider the impacts related to a loss of instrument air. Additionally this exemption request is seeking approval of new OMAs related to loss of instrument air for certain affected fire areas. In accordance with RIS 2006-10, an exemption request is required for this category of OMAs.

Conclusion
The special circumstances for issuance of the exemption are satisfied in accordance with the requirements of 10 CFR 50.12(a)(2)(ii), since application of the rule is not necessary to achieve the underlying purpose of the rule. Furthermore, the requested exemption is authorized by law, will not result in undue risk to the public health and

safety, and is consistent with the common defense and security which meets the requirements of 10 CFR 50.12(a)(1).

The Fire Protection Program at MPS2, including defense-in-depth features such as fire detection and suppression systems installed in specific fire areas/zones within the plant, has been previously reviewed and approved by the NRC as described in the background section of this attachment, and found acceptable during fire protection related inspections. Due to the mitigating factors and existing defense-in-depth features already provided and discussed in this attachment, the existing level of defense-in-depth is considered acceptable for the manual actions contained in this exemption request.

References

1. R. W. Reid, NRC, to W. G. Counsil, North East Energy Company, "Issuance of Amendment No. 43 to Facility Operating License No. DPR-65 for the Millstone Nuclear Power Station, Unit No. 2," dated September 19, 1978.
2. R. A. Clark, NRC, to W. G. Counsil, North East Energy Company, "Safety Evaluation of Acceptable Fire Protection Items, Millstone Unit No. 2," Docket No 50-336, dated October 21, 1980.
3. H. R. Denton, NRC, to W. G. Counsil, North East Energy Company, "Fire Protection Exemption – Haddam Neck Plant and Millstone Station Unit 2," dated November 11, 1981.
4. A. C. Thadani, NRC, to J. F. Opeca, North East Energy Company, "Appendix R Exemption Requests for Millstone Unit 2," dated April 15, 1986.
5. A. C. Thadani, NRC, to E. J. Mroczka, North East Energy Company, "Appendix R Exemption Requests for Millstone Unit 2," dated January 15, 1987.
6. E. J. Mroczka, North East Energy Company, to U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 2, Fire Protection Evaluation, 10CFR50 Appendix R Compliance Review," dated May 29, 1987.
7. A. C. Thadani, NRC, to E. J. Mroczka, North East Energy Company, "Appendix R Exemption Requests for Millstone Unit 2," dated April 29, 1988.
8. S. A. Varga, NRC, to E. J. Mroczka, North East Energy Company, "Revocation of Exemption from 10 CFR, Appendix R, Sections III.G and III.L for Certain Fire Areas – Millstone Nuclear Power Station, Unit No. 2," dated July 17, 1990.
9. G. S. Vissing, NRC, to J. F. Opeca, North East Energy Company, "Millstone Power Station, Unit 2 – Issuance of Amendment No. 191," dated November 3, 1995.
10. E. G. Adensam, NRC, to M. L. Bowling, North East Energy Company, "Millstone Power Station, Unit 2 – Exemption from the Requirements of 10 CFR Part 50, Appendix R – Millstone Power Station, Unit 2," dated March 16, 1999.
11. Millstone Unit 2 Combustible Loading Re-Analysis Calculation, Revision 2, dated December 2013.
12. Fire Prevention Inspections, Procedure Number SFP-10, Revision 005-03, dated February 20, 2013.
13. Fire Protection/Appendix R (Fire Safe Shutdown) Program, Procedure Number CM-AA-FPA-100, Revision 11, dated November 23, 2015.

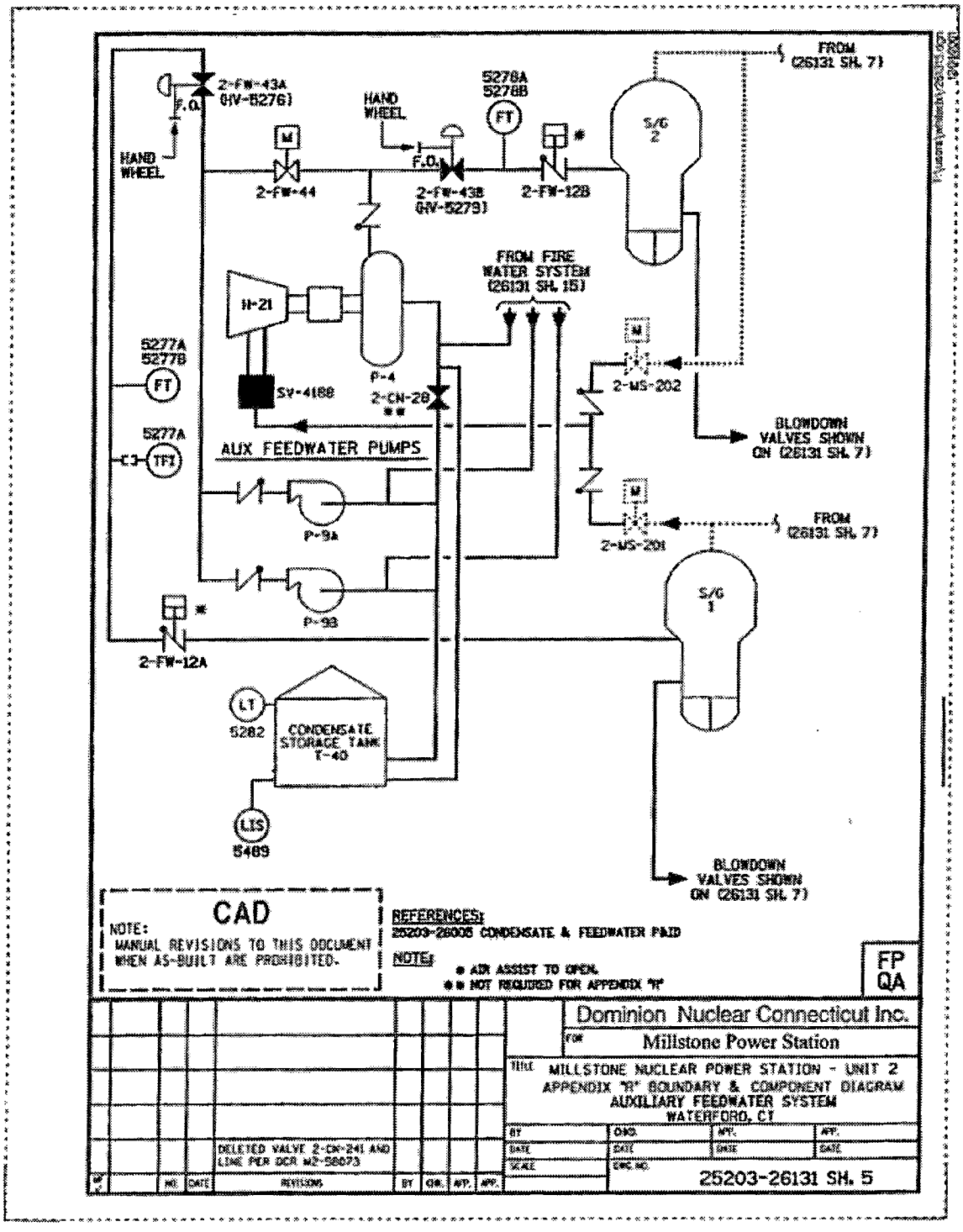
14. J. A. Price, DNC, to NRC, "Dominion Nuclear Connecticut, Inc., Millstone Power Station Unit 2, Request for Exemption from 10 CFR 50, Appendix R, Section III.G., 'Fire Protection of Safety Shutdown Capability,'" dated June 30, 2011.
15. L. N. Hartz, DNC, to NRC, "Dominion Nuclear Connecticut, Inc., Millstone Power Station Unit 2, Response to Request for Additional Information, Request for Exemption from 10 CFR 50, Appendix R, Section III.G., 'Fire Protection of Safe Shutdown Capability,'" dated February 29, 2012.
16. J. Kim, NRC, to D. A. Heacock, "Millstone Power Station, Unit 2 – Exemption from the Requirements of 10 CFR Part 50, Appendix R, Section III.G.2 (TAC No. ME6693)," dated July 12, 2012.
17. J. A. Price, DNC, to NRC, "Dominion Nuclear Connecticut, Inc., Millstone Power Station Unit 2, Request for a Revision of an Exemption from 10 CFR 50, Appendix R, Section III.G., 'Fire Protection of Safe Shutdown Capability,'" dated October 29, 2012.
18. J. Kim, NRC, to D. A. Heacock, "Millstone Power Station, Unit 2 – Correction to Previously Issued Exemption from the Requirements of 10 CFR Part 50, Appendix R, Section III.G.2 (TAC No. ME6693)," dated December 18, 2012.

Attachment 2

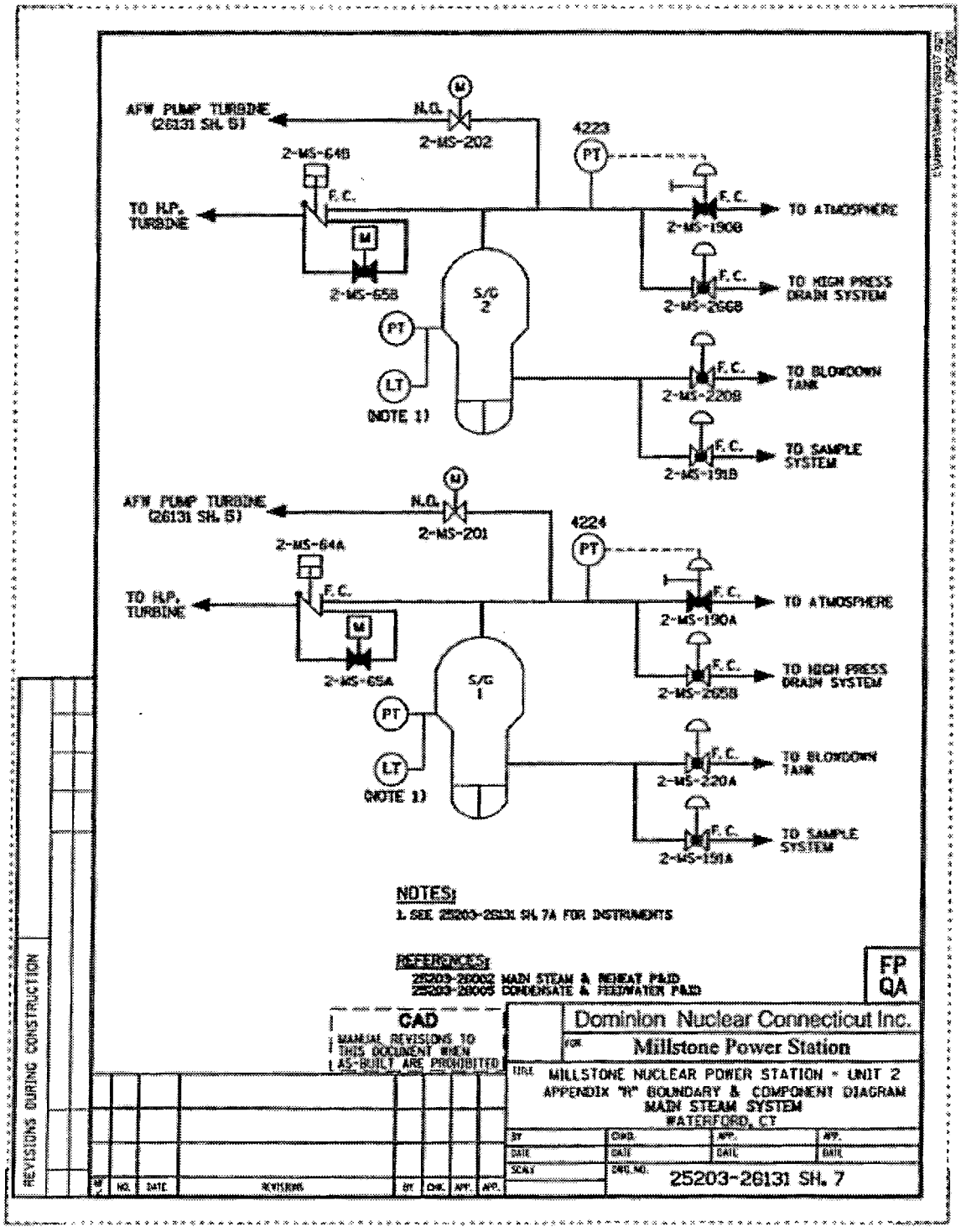
Simplified Sketches of System Configurations and Facility Alignment

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2

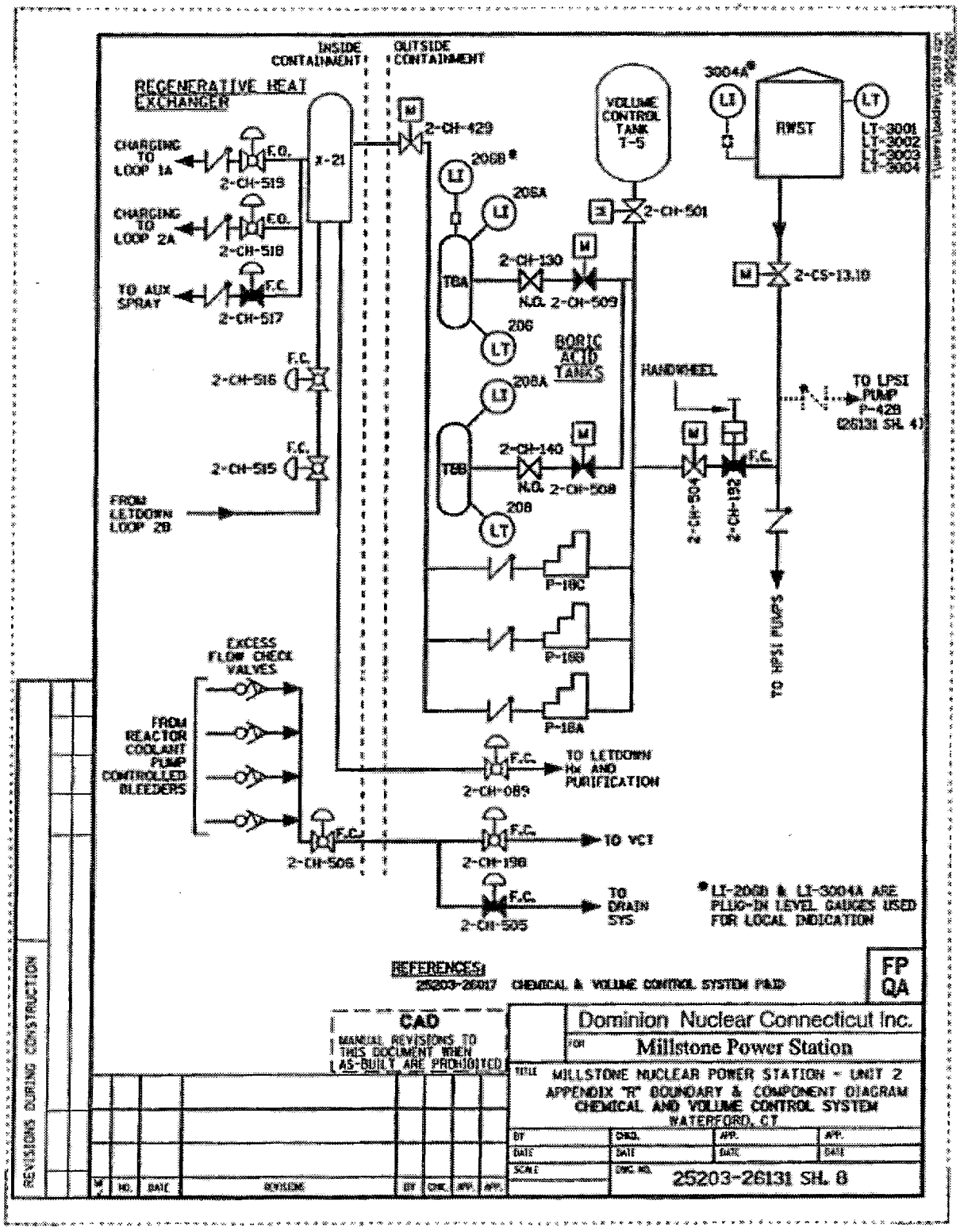
Sketch 25203-26131 SH. 5, Auxiliary Feedwater System



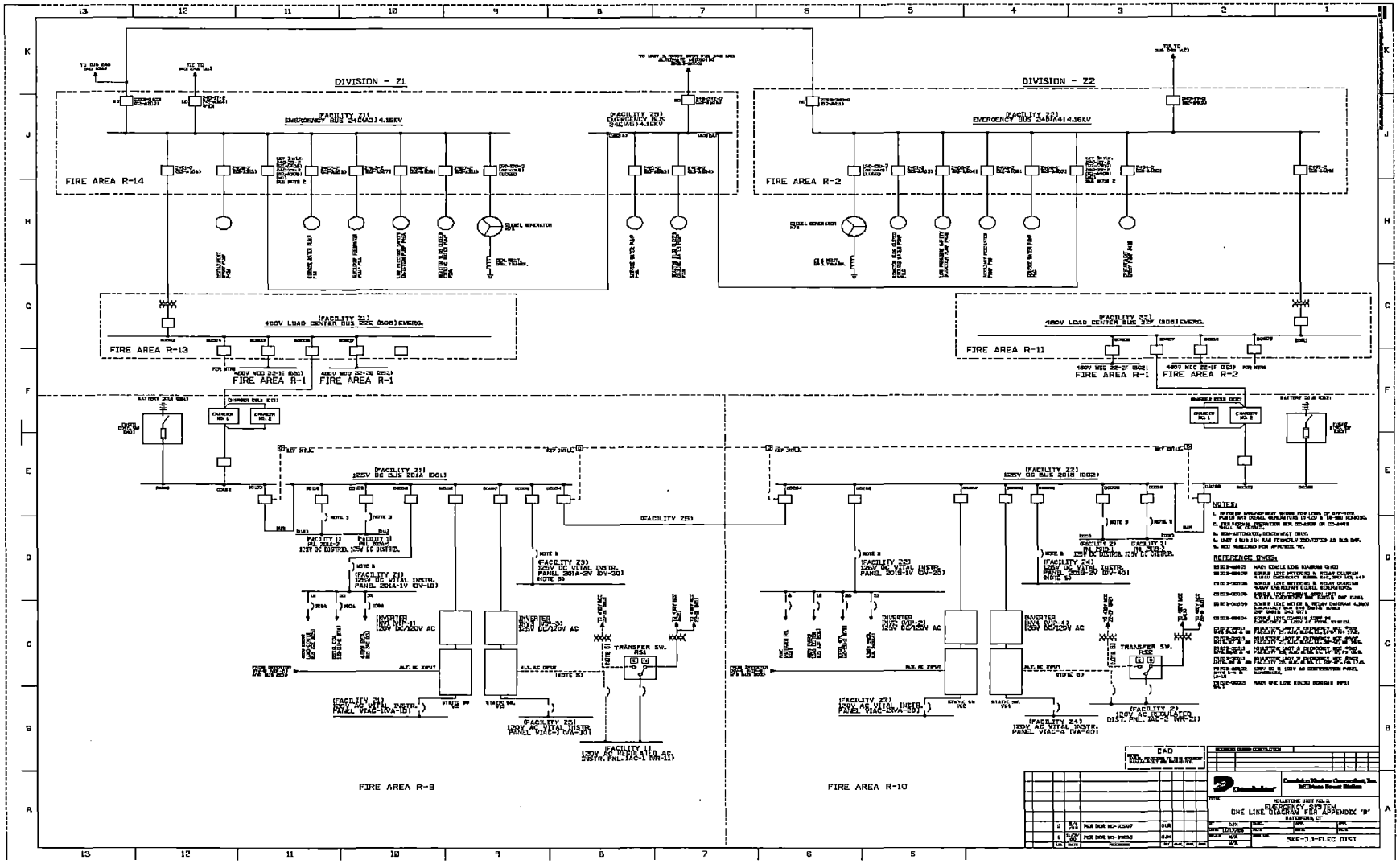
Sketch 25203-26131 SH. 7, Main Steam System



Sketch 25203-26131 SH. 8, Chemical and Volume Control System



Sketch SKE-3.1-Electrical Distribution, One Line Diagram for Appendix R Sheet



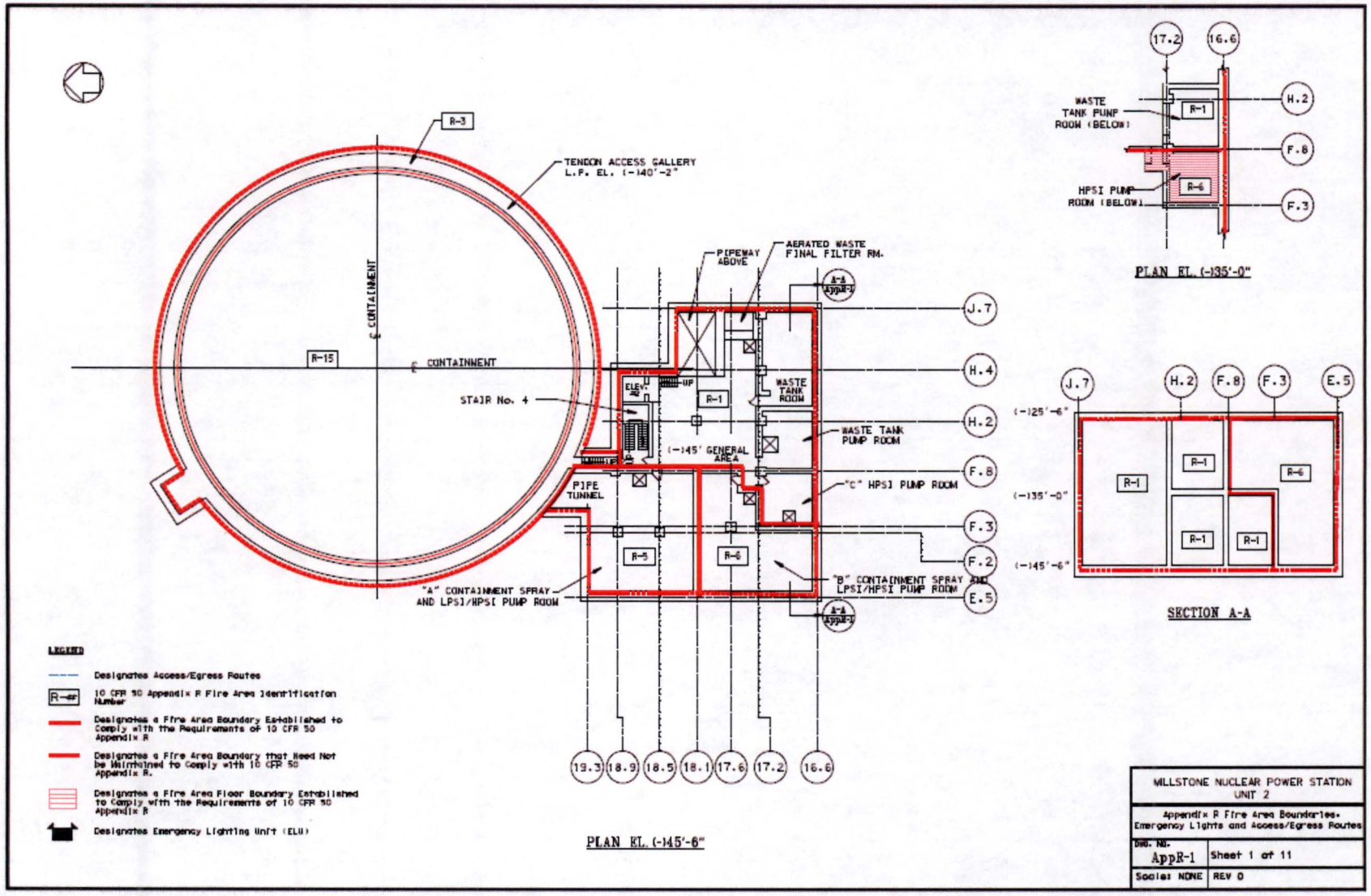
Serial No. 16-335
Docket No. 50-336

Attachment 3

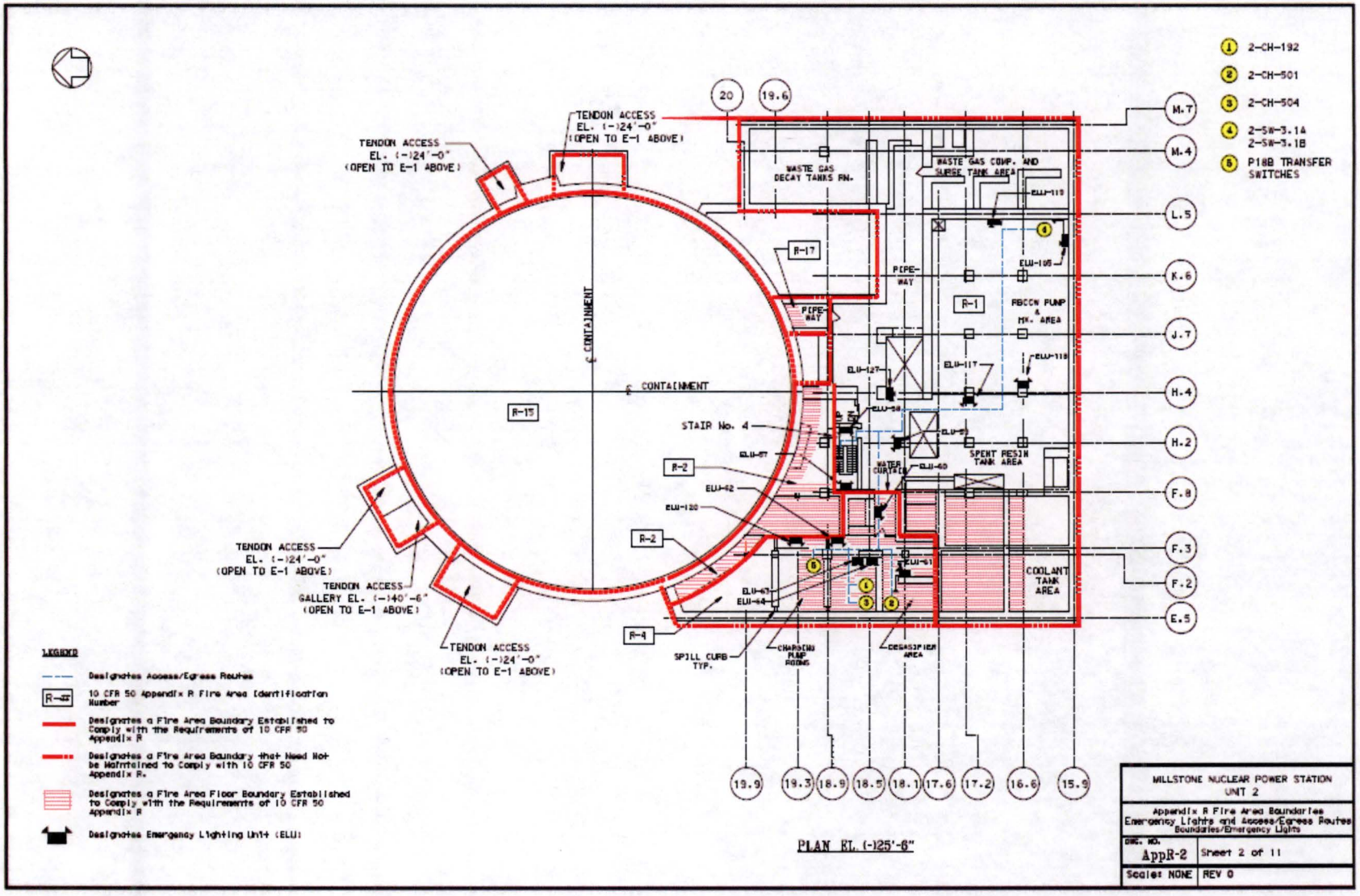
Appendix R Fire Area Boundaries, Emergency Lights, and Access/Egress Routes

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2

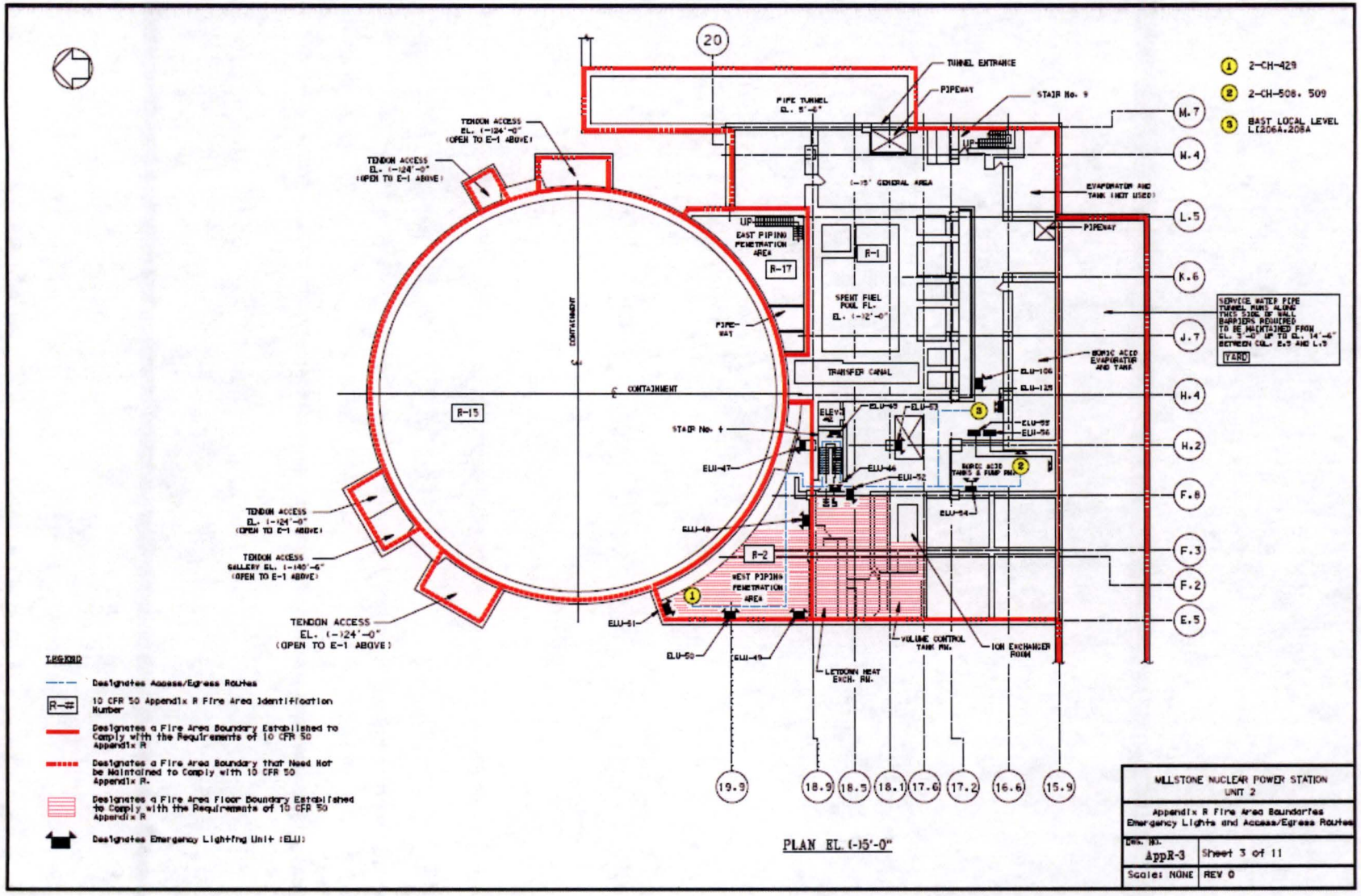
AppR-1


R-3
TENDON ACCESS GALLERY
L.F. EL. (-)40'-2"
℄ CONTAINMENT
R-15
℄ CONTAINMENT
STAIR No. 4
PIPEWAY ABOVE
AERATED WASTE FINAL FILTER RM.
ELEV. UP
R-1
WASTE TANK ROOM
(-)45' GENERAL AREA
WASTE TANK PUMP ROOM
"C" HPSI PUMP ROOM
PIPE TUNNEL
R-5
R-6
"A" CONTAINMENT SPRAY AND LPSI/HPSI PUMP ROOM
"B" CONTAINMENT SPRAY AND LPSI/HPSI PUMP ROOM
J.7
H.4
H.2
F.8
F.3
F.2
E.5
19.3
18.9
18.5
18.1
17.6
17.2
16.6
PLAN EL. (-)45'-6"
17.2
16.6
WASTE TANK PUMP ROOM (BELOW)
HPSI PUMP ROOM (BELOW)
H.2
F.8
F.3
PLAN EL. (-)35'-0"
J.7
H.2
F.8
F.3
E.5
(-)25'-6"
(-)35'-0"
(-)45'-6"
SECTION A-A
LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries, Emergency Lights and Access/Egress Routes
DWG. NO. AppR-1
Sheet 1 of 11
Scale: NONE
REV 0

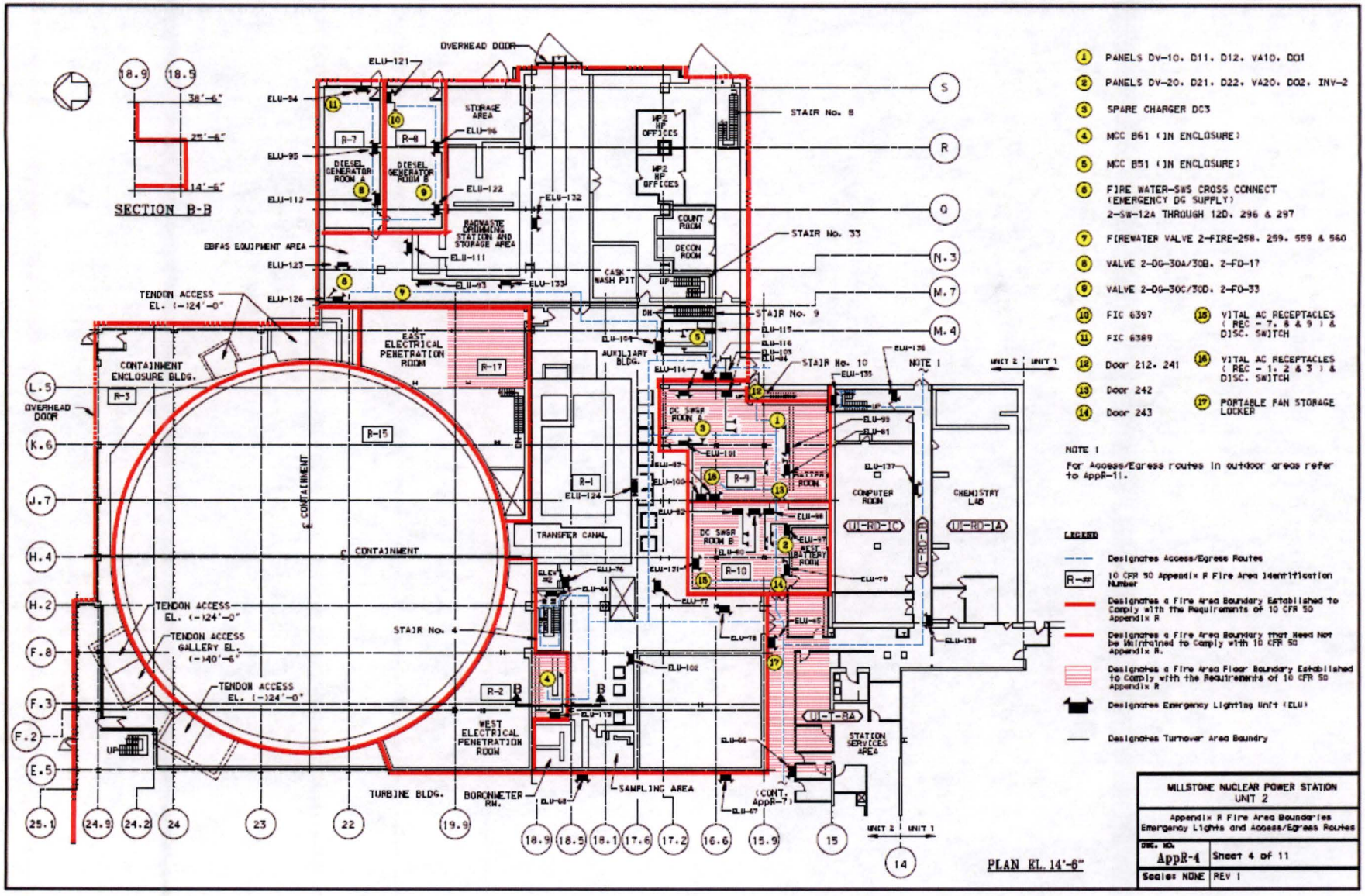
AppR-2


1 2-CH-192
2 2-CH-501
3 2-CH-504
4 2-SW-3.1A
2-SW-3.1B
5 P18B TRANSFER SWITCHES
TENDON ACCESS EL. (-)24'-0" (OPEN TO E-1 ABOVE)
TENDON ACCESS GALLERY EL. (-)40'-6" (OPEN TO E-1 ABOVE)
WASTE GAS DECAY TANKS RM.
WASTE GAS COMP. AND SURGE TANK AREA
PIPE-WAY
RBCCW PUMP & HX. AREA
SPENT RESIN TANK AREA
COOLANT TANK AREA
STAIR No. 4
WATER CURTAIN
SPILL CURB TYP.
CHARGING PUMP RODMS
DEGASIFIER AREA
℄ CONTAINMENT
R-1
R-2
R-4
R-15
R-17
ELU-117
ELU-118
ELU-119
ELU-120
ELU-121
ELU-122
ELU-123
ELU-124
ELU-125
ELU-126
ELU-127
LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
PLAN EL (-)25'-6"
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes Boundaries/Emergency Lights
DWG. NO. AppR-2
Sheet 2 of 11
Scale: NONE
REV 0

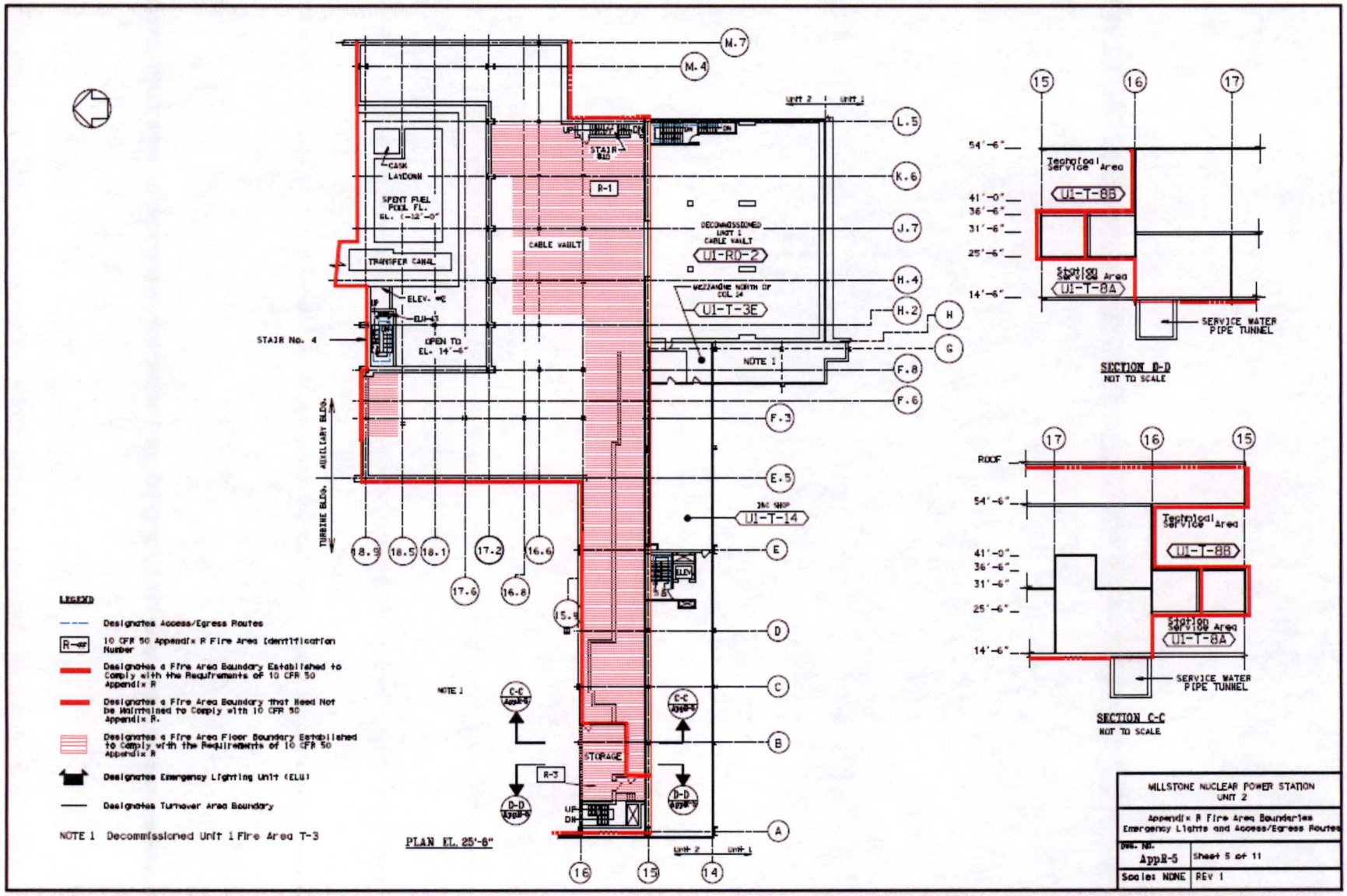
AppR-3


20
TUNNEL ENTRANCE
PIPEWAY
STAIR No. 9
FIRE TUNNEL EL. 5'-6"
TENDON ACCESS EL. (-)24'-0" (OPEN TO E-1 ABOVE)
TENDON ACCESS EL. (-)24'-0" (OPEN TO E-1 ABOVE)
(-)15' GENERAL AREA
EVAPORATOR AND TANK (NOT USED)
UP
EAST PIPING PENETRATION AREA
R-17
R-1
SPENT FUEL POOL EL. (-)12'-0"
PIPE-WAY
CONTAINMENT
TRANSFER CANAL
BORIC ACID EVAPORATOR AND TANK
R-15
STAIR No. 4
ELEV.
SERVICE WATER PIPE TUNNEL RUNS ALONG THIS LINE OF WALL. BARRIERS REQUIRED TO BE MAINTAINED FROM EL. 5'-6" UP TO EL. 14'-6" BETWEEN COL. E.5 AND L.5
YARD
BORIC ACID TANKS & PUMP PAN
R-2
WEST PIPING PENETRATION AREA
TENDON ACCESS EL. (-)24'-0" (OPEN TO E-1 ABOVE)
TENDON ACCESS GALLERY EL. (-)40'-6" (OPEN TO E-1 ABOVE)
TENDON ACCESS EL. (-)24'-0" (OPEN TO E-1 ABOVE)
VOLUME CONTROL TANK RM.
ION EXCHANGER ROOM
LETDOWN HEAT EXCH. RM.
1 2-CH-429
2 2-CH-508, 509
3 BAST LOCAL LEVEL LI206A,208A
M.7
M.4
L.5
K.6
J.7
H.4
H.2
F.8
F.3
F.2
E.5
19.9
18.9
18.5
18.1
17.6
17.2
16.6
15.9
LEGEND
Designates Access/Egress Routes
R-## 10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
PLAN EL. (-)15'-0"
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
Dwg. No. AppR-3
Sheet 3 of 11
Scale: NONE
REV 0

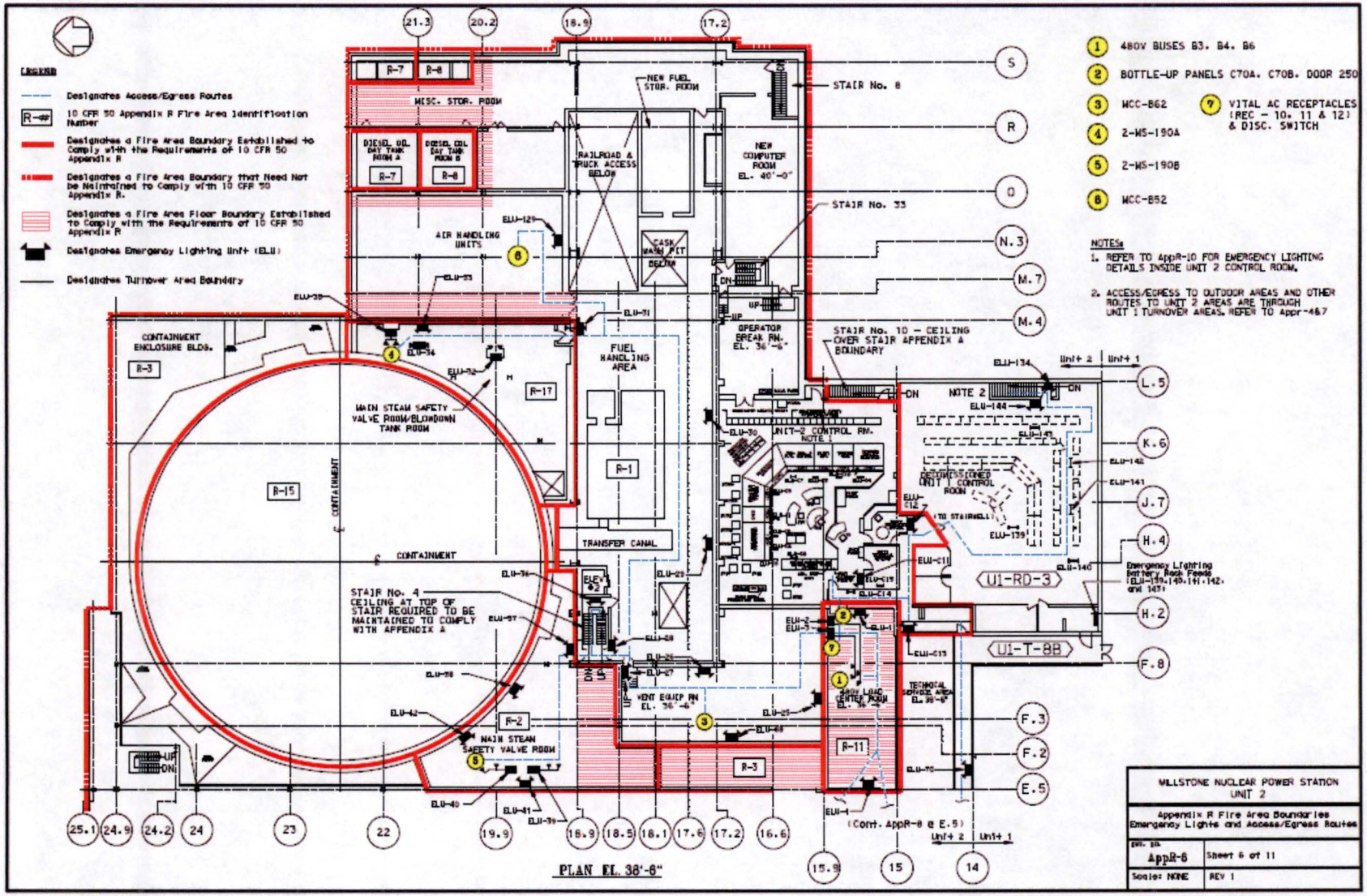
AppR-4


SECTION B-B
PLAN EL. 14'-6"
1 PANELS DV-10, D11, D12, VA10, DC1
2 PANELS DV-20, D21, D22, VA20, DC2, INV-2
3 SPARE CHARGER DC3
4 MCC B61 (IN ENCLOSURE)
5 MCC B51 (IN ENCLOSURE)
6 FIRE WATER-SWS CROSS CONNECT (EMERGENCY DG SUPPLY) 2-SW-12A THROUGH 12D, 296 & 297
7 FIREWATER VALVE 2-FIRE-258, 259, 559 & 560
8 VALVE 2-DG-30A/30B, 2-FD-17
9 VALVE 2-DG-30C/30D, 2-FD-33
10 FIC 6397
11 FIC 6389
12 Door 212, 241
13 Door 242
14 Door 243
15 VITAL AC RECEPTACLES (REC - 7, 8 & 9) & DISC. SWITCH
16 VITAL AC RECEPTACLES (REC - 1, 2 & 3) & DISC. SWITCH
17 PORTABLE FAN STORAGE LOCKER
NOTE 1
For Access/Egress routes in outdoor areas refer to AppR-11.
LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not Be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
Designates Turnover Area Boundry
CONTAINMENT ENCLOSURE BLDG.
EAST ELECTRICAL PENETRATION ROOM
WEST ELECTRICAL PENETRATION ROOM
AUXILIARY BLDG.
TURBINE BLDG.
TRANSFER CANAL
SAMPLING AREA
STAIR No. 4
STAIR No. 8
STAIR No. 9
STAIR No. 10
STAIR No. 33
TENDON ACCESS EL. (-)124'-0"
TENDON ACCESS GALLERY EL. (-)140'-6"
OVERHEAD DOOR
STORAGE AREA
DIESEL GENERATOR ROOM A
DIESEL GENERATOR ROOM B
RADWASTE DRUMMING STATION AND STORAGE AREA
EBFAS EQUIPMENT AREA
MP2 HP OFFICES
COUNT ROOM
DECON ROOM
CASK WASH PIT
DC SWGR ROOM A
DC SWGR ROOM B
BATTERY ROOM
COMPUTER ROOM
CHEMISTRY LAB
STATION SERVICES AREA
BORONIMETER RM.
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
DWG. NO. AppR-4
Sheet 4 of 11
Scale: NONE
REV 1

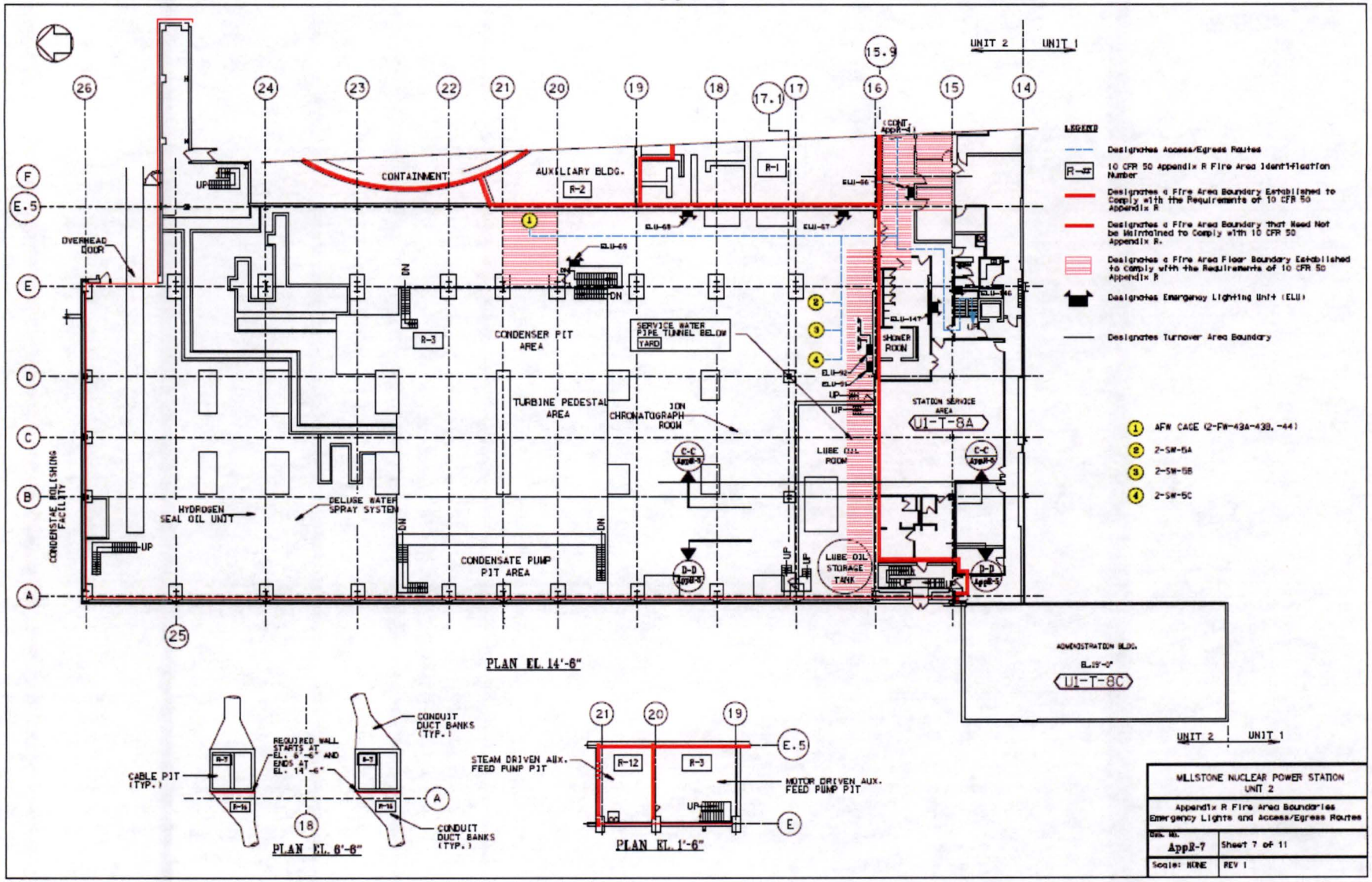
AppR-5


PLAN EL. 25'-6"
SECTION D-D
NOT TO SCALE
SECTION C-C
NOT TO SCALE
NOTE 1 Decommissioned Unit 1 Fire Area T-3
LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
Designates Turnover Area Boundary
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
Doc. No. AppR-5
Sheet 5 of 11
Scale: NONE
REV 1

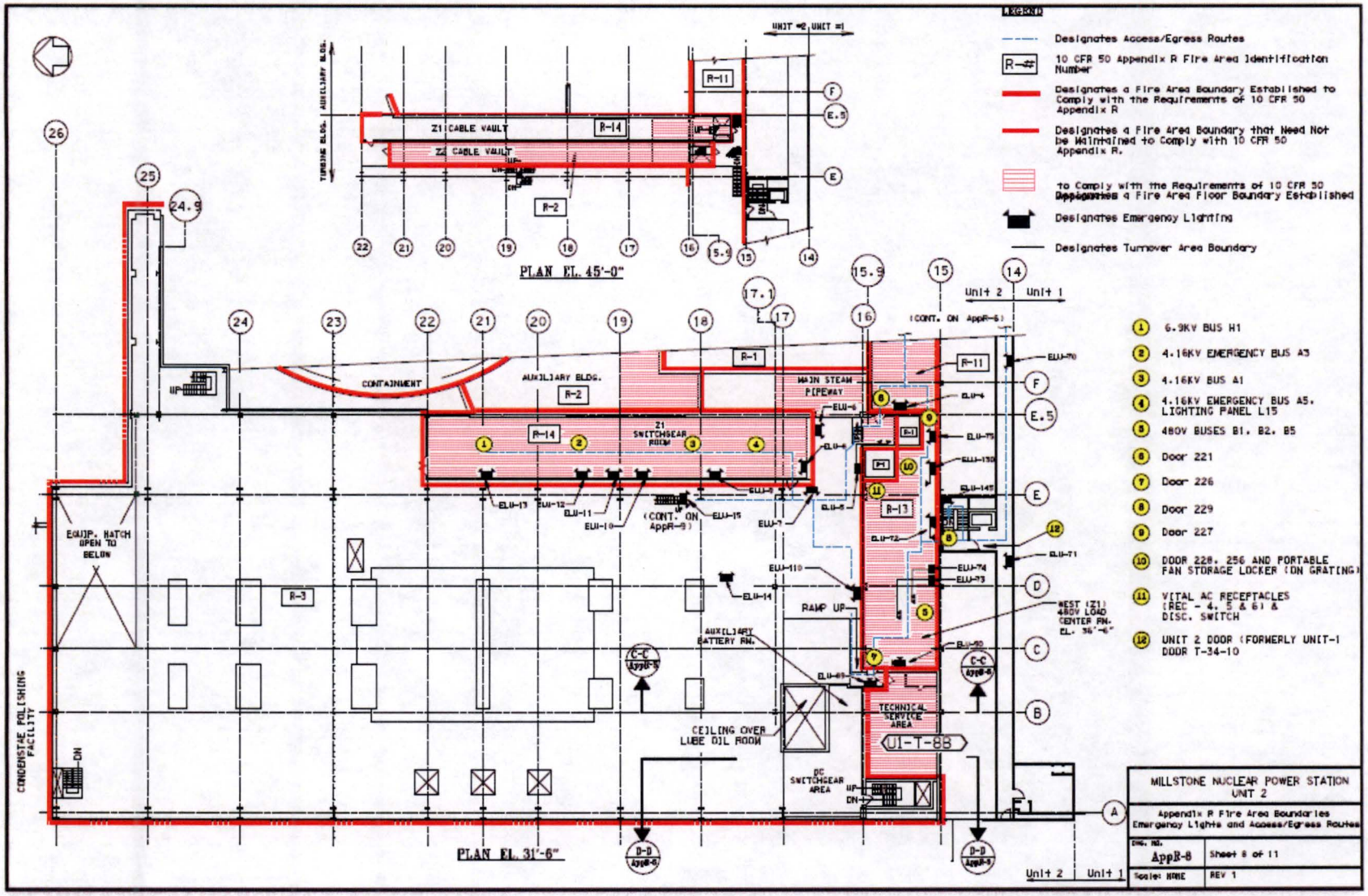
AppR-6


LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
Designates Turnover Area Boundary
1 480V BUSES B3, B4, B6
2 BOTTLE-UP PANELS C70A, C70B, DOOR 250
3 MCC-B62
4 2-MS-190A
5 2-MS-190B
6 MCC-B52
7 VITAL AC RECEPTACLES (REC - 10, 11 & 12) & DISC. SWITCH
NOTES:
1. REFER TO AppR-10 FOR EMERGENCY LIGHTING DETAILS INSIDE UNIT 2 CONTROL ROOM.
2. ACCESS/EGRESS TO OUTDOOR AREAS AND OTHER ROUTES TO UNIT 2 AREAS ARE THROUGH UNIT 1 TURNOVER AREAS. REFER TO Appr-4&7
CONTAINMENT ENCLOSURE BLDG.
MISC. STOR. ROOM
DIESEL OIL DAY TANK ROOM A
DIESEL OIL DAY TANK ROOM B
NEW FUEL STOR. ROOM
RAILROAD & TRUCK ACCESS BELOW
NEW COMPUTER ROOM EL. 40'-0"
STAIR No. 8
STAIR No. 33
AIR HANDLING UNITS
CASK WASH PIT BELOW
OPERATOR BREAK RM. EL. 36'-6"
STAIR No. 10 - CEILING OVER STAIR APPENDIX A BOUNDARY
FUEL HANDLING AREA
MAIN STEAM SAFETY VALVE ROOM/BLOWDOWN TANK ROOM
UNIT-2 CONTROL RM.
DECOMMISSIONED UNIT 1 CONTROL ROOM
TO STAIRWELL
TRANSFER CANAL
CONTAINMENT
STAIR No. 4 CEILING AT TOP OF STAIR REQUIRED TO BE MAINTAINED TO COMPLY WITH APPENDIX A
VENT EQUIP RM EL. 36'-6"
MAIN STEAM SAFETY VALVE ROOM
ESS LOAD CENTER ROOM EL. 36'-6"
TECHNICAL SERVICE AREA EL. 36'-6"
U1-RD-3
U1-T-8B
Emergency Lighting Battery Pack Feeds (ELU-139, 140, 141, 142, and 143)
NOTE 2
(Cont. AppR-8 @ E.5)
PLAN EL. 38'-6"
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
AppR-6
Sheet 6 of 11
Scale: NONE
REV 1

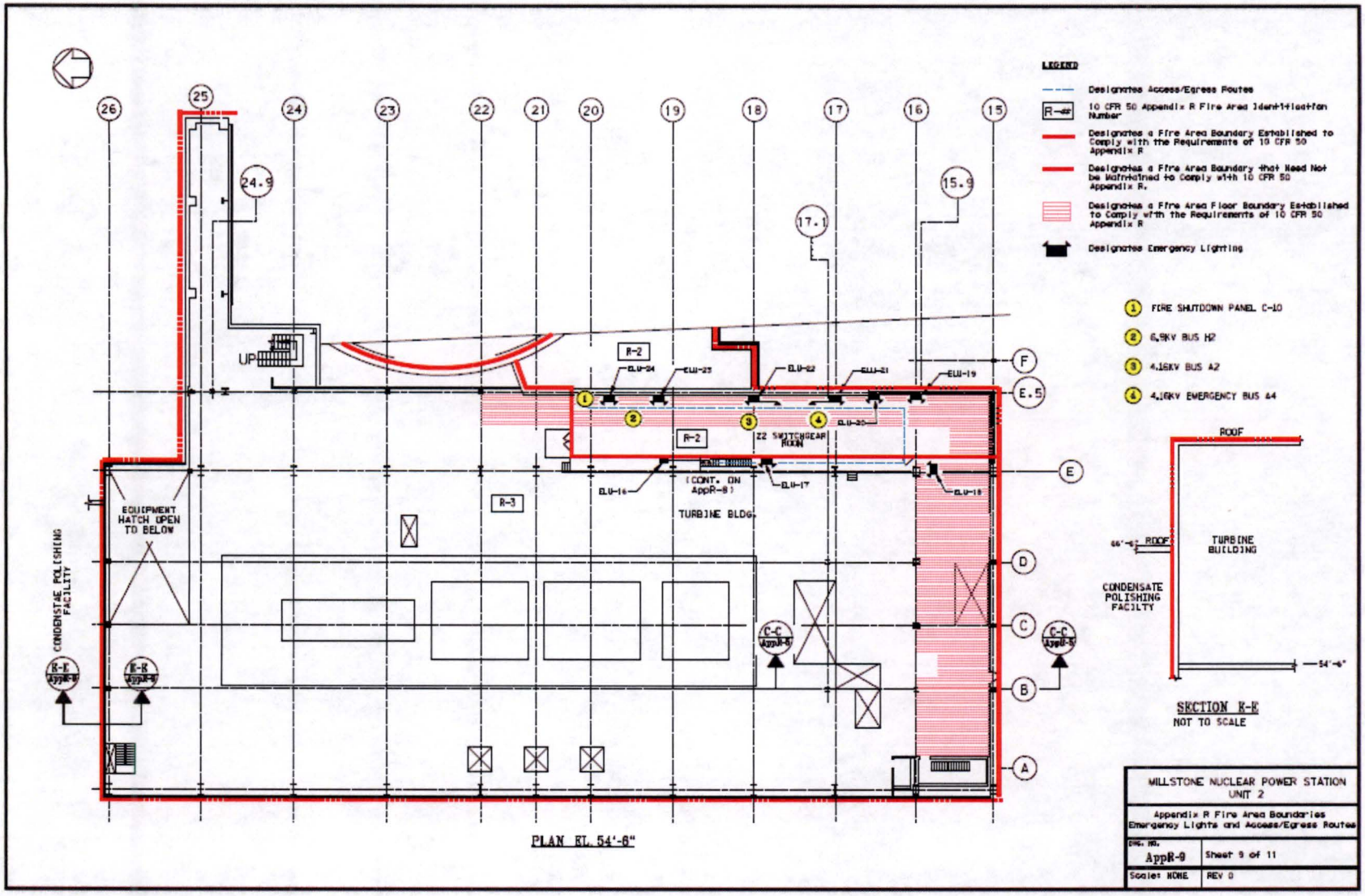
AppR-7


UNIT 2
UNIT 1
CONTAINMENT
AUXILIARY BLDG.
R-2
R-1
R-3
CONDENSER PIT AREA
SERVICE WATER PIPE TUNNEL BELOW YARD
TURBINE PEDESTAL AREA
ION CHROMATOGRAPH ROOM
SHOWER ROOM
STATION SERVICE AREA
U1-T-8A
LUBE OIL ROOM
LUBE OIL STORAGE TANK
OVERHEAD DOOR
HYDROGEN SEAL OIL UNIT
DELUGE WATER SPRAY SYSTEM
CONDENSATE POLISHING FACILITY
CONDENSATE PUMP PIT AREA
ADMINISTRATION BLDG.
U1-T-8C
LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary That Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
Designates Turnover Area Boundary
1 AFW CAGE (2-FW-43A-43B, -44)
2 2-SW-5A
3 2-SW-5B
4 2-SW-5C
PLAN EL 14'-6"
CABLE PIT (TYP.)
REQUIRED WALL STARTS AT EL. 6'-6" AND ENDS AT EL. 14'-6"
CONDUIT DUCT BANKS (TYP.)
PLAN EL 6'-6"
STEAM DRIVEN AUX. FEED PUMP PIT
MOTOR DRIVEN AUX. FEED PUMP PIT
PLAN EL 1'-6"
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
Dwg. No. AppR-7
Sheet 7 of 11
Scale: NONE
REV 1

AppR-8


LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates a Fire Area Boundary that Need Not be Maintained to Comply with 10 CFR 50 Appendix R.
to Comply with the Requirements of 10 CFR 50
Designates Emergency Lighting
Designates Turnover Area Boundary
1 6.9KV BUS H1
2 4.16KV EMERGENCY BUS A3
3 4.16KV BUS A1
4 4.16KV EMERGENCY BUS A5. LIGHTING PANEL L15
5 480V BUSES B1. B2. B5
6 Door 221
7 Door 226
8 Door 229
9 Door 227
10 DOOR 228. 256 AND PORTABLE FAN STORAGE LOCKER (ON GRATING)
11 VITAL AC RECEPTACLES (REC - 4. 5 & 6) & DISC. SWITCH
12 UNIT 2 DOOR (FORMERLY UNIT-1 DOOR T-34-10
PLAN EL. 45'-0"
PLAN EL. 31'-6"
Z1 CABLE VAULT
Z2 CABLE VAULT
CONTAINMENT
AUXILIARY BLDG.
TURBINE BLDG.
Z1 SWITCHGEAR ROOM
MAIN STEAM PIPEWAY
EQUIP. HATCH OPEN TO BELOW
RAMP UP
AUXILIARY BATTERY RM.
CEILING OVER LUBE OIL ROOM
TECHNICAL SERVICE AREA
DC SWITCHGEAR AREA
REST (Z1) 480V LOAD CENTER RM. EL. 36'-6"
CONDENSATE POLISHING FACILITY
U1-T-88
(CONT. ON AppR-8)
(CONT. ON AppR-6)
Unit 2
Unit 1
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
Dwg. No. AppR-8
Sheet 8 of 11
Scale: NONE
REV 1

AppR-9


LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
Designates a Fire Area Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
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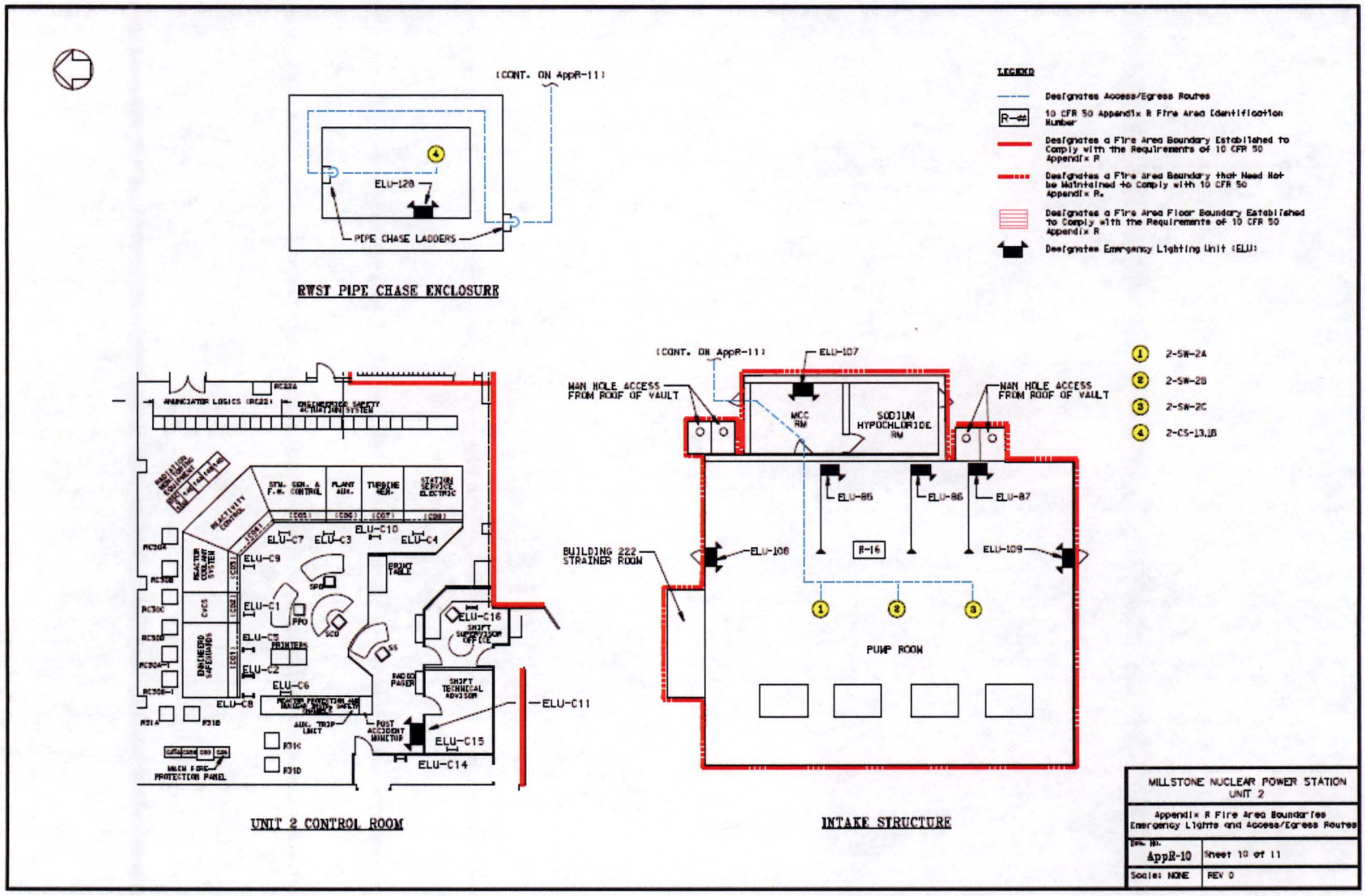
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting
1 FIRE SHUTDOWN PANEL C-10
2 6.9KV BUS H2
3 4.16KV BUS A2
4 4.16KV EMERGENCY BUS A4
26
25
24
23
22
21
20
19
18
17
16
15
24.9
17.1
15.9
F
E.5
E
D
C
B
A
UP
R-2
R-3
ELU-24
ELU-23
ELU-22
ELU-21
ELU-19
ELU-20
ELU-16
ELU-17
ELU-18
Z2 SWITCHGEAR ROOM
(CONT. ON AppR-8)
TURBINE BLDG.
EQUIPMENT HATCH OPEN TO BELOW
CONDENSATE POLISHING FACILITY
R-R AppR-9
E-E AppR-9
C-C AppR-9
C-C AppR-9
ROOF
TURBINE BUILDING
CONDENSATE POLISHING FACILTY
54'-6"
PLAN EL. 54'-6"
SECTION R-R
NOT TO SCALE
MILLSTONE NUCLEAR POWER STATION
UNIT 2
Appendix R Fire Area Boundaries
Emergency Lights and Access/Egress Routes
DWG. NO.
AppR-9
Sheet 9 of 11
Scale: NONE
REV 0

AppR-10


(CONT. ON AppR-11)
ELU-128
PIPE CHASE LADDERS
RWST PIPE CHASE ENCLOSURE
LEGEND
Designates Access/Egress Routes
10 CFR 50 Appendix R Fire Area Identification Number
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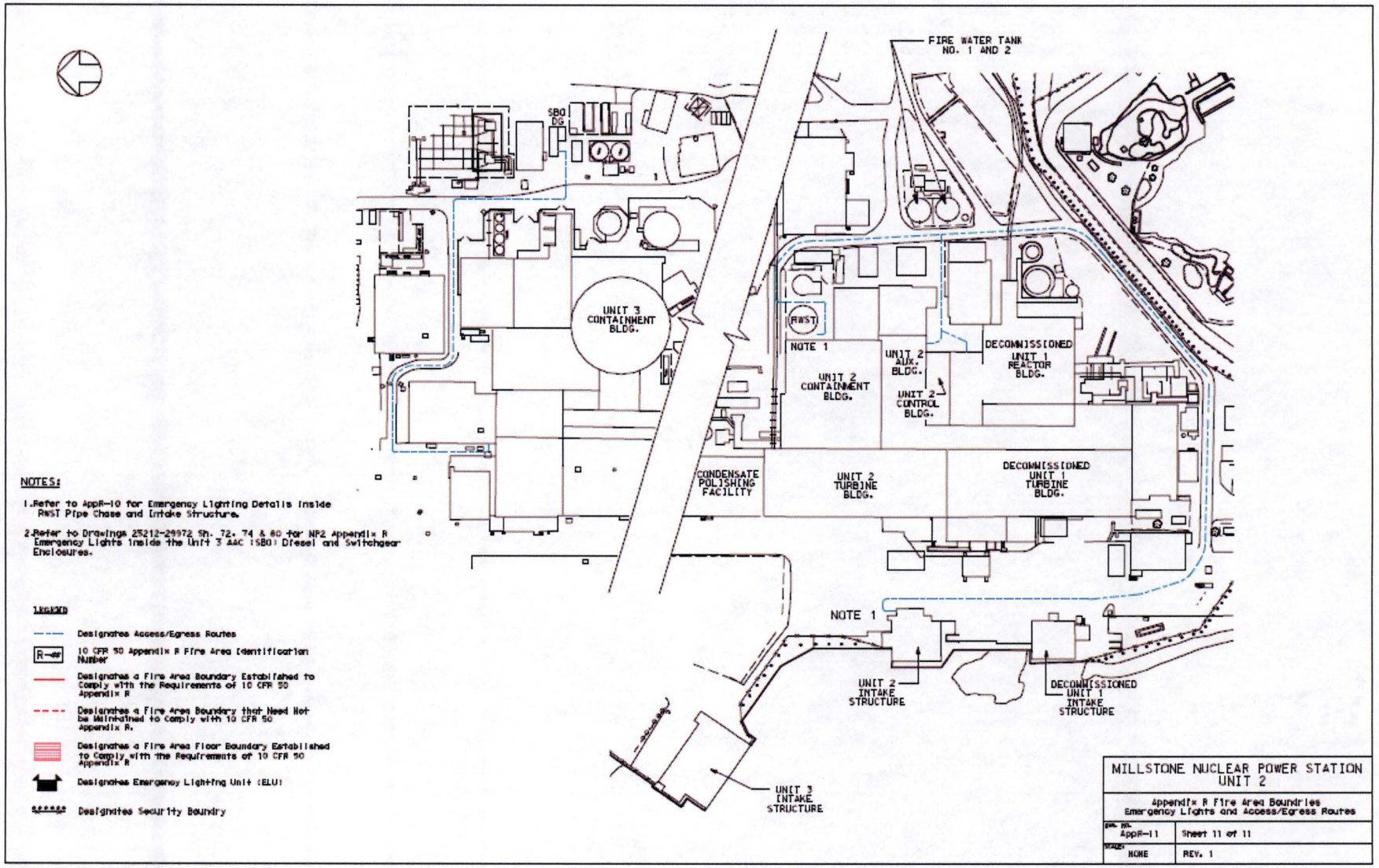
Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
ANNUNCIATOR LOGICS (RC22)
ELU-C7
ELU-C3
ELU-C10
ELU-C4
ELU-C9
ELU-C1
ELU-C5
ELU-C2
ELU-C6
ELU-C8
ELU-C16
ELU-C11
ELU-C15
ELU-C14
UNIT 2 CONTROL ROOM
(CONT. ON AppR-11)
ELU-107
MAN HOLE ACCESS FROM ROOF OF VAULT
MCC RM
SODIUM HYPOCHLORIDE RM
ELU-85
ELU-86
ELU-87
BUILDING 222 STRAINER ROOM
ELU-108
R-16
ELU-109
PUMP ROOM
1 2-SW-2A
2 2-SW-2B
3 2-SW-2C
4 2-CS-13.1B
INTAKE STRUCTURE
MILLSTONE NUCLEAR POWER STATION UNIT 2
Appendix R Fire Area Boundaries Emergency Lights and Access/Egress Routes
Dwg. No. AppR-10
Sheet 10 of 11
Scale: NONE
REV 0

AppR-11


FIRE WATER TANK
NO. 1 AND 2
SBO
DG
UNIT 3
CONTAINMENT
BLDG.
RWST
NOTE 1
UNIT 2
CONTAINMENT
BLDG.
UNIT 2
AUX.
BLDG.
UNIT 2
CONTROL
BLDG.
DECOMMISSIONED
UNIT 1
REACTOR
BLDG.
CONDENSATE
POLISHING
FACILITY
UNIT 2
TURBINE
BLDG.
DECOMMISSIONED
UNIT 1
TURBINE
BLDG.
NOTE 1
UNIT 2
INTAKE
STRUCTURE
DECOMMISSIONED
UNIT 1
INTAKE
STRUCTURE
UNIT 3
INTAKE
STRUCTURE
NOTES:
1.Refer to AppR-10 for Emergency Lighting Details Inside RWST Pipe Chase and Intake Structure.
2.Refer to Drawings 25212-29972 Sh. 72, 74 & 80 for NP2 Appendix R Emergency Lights inside the Unit 3 AAC (SBO) Diesel and Switchgear Enclosures.
LEGEND
Designates Access/Egress Routes
R-##
10 CFR 50 Appendix R Fire Area Identification Number
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Designates a Fire Area Floor Boundary Established to Comply with the Requirements of 10 CFR 50 Appendix R
Designates Emergency Lighting Unit (ELU)
Designates Security Boundry
MILLSTONE NUCLEAR POWER STATION
UNIT 2
Appendix R Fire Area Boundries
Emergency Lights and Access/Egress Routes
DWG. NO. AppR-11
Sheet 11 of 11
SCALE: NONE
REV. 1