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October 31, 1994

Document Control Desk
U.S. NUCLEAR REGULATORY COMMISSION
Mail Station P1-137
Washington, DC 20555

Gentlemen:

DOCKETS 50-266 AND 50-301
RESPONSE TO THE REQUEST FOR ADDITIONAL INFORMATION REGARDING
REQUEST FOR EXEMPTION FROM THE REQUIREMENTS OF SECTION III.G OF
APPENDIX R TO 10 CFR 50 FOR THE AUXILIARY FEEDWATER PUMP ROOM
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

On September 13, 1994 and October 13, 1994, the Nuclear Regulatory Commission transmitted requests for additional information regarding our August 5, 1994, request for exemption from the requirements of Section III.G of Appendix R to 10 CFR 50 for the auxiliary feedwater pump room. We have reviewed the information request and have provided our responses in the enclosed attachments.

Please contact us if you have any questions, or require any additional information.

Sincerely,

A handwritten signature in dark ink, appearing to read 'B. Link'.

Bob Link
Vice President
Nuclear Power

FDP/jg

Enclosure

cc: NRC Regional Administrator, Region III
NRC Resident Inspector

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ATTACHMENT 1
RESPONSE TO THE REQUEST FOR ADDITIONAL INFORMATION
APPENDIX R EXEMPTION REQUEST

- 1.0 In accordance with the requirements of 10 CFR 50.12(a)(2), provide an explanation of the special circumstances that are present with regard to the auxiliary feedwater pump room that qualify this area for consideration of an exemption under this part of the regulation. Describe why compliance with Section III.G of Appendix R to 10 CFR 50 is not readily achievable in this fire area.

Response:

Appendix R to 10 CFR 50 implemented fire protection requirements that address the issues of safe shutdown capability, emergency lighting, reactor coolant pump lubrication, and alternate shutdown systems. Our request for exemption concerns itself with Point Beach Nuclear Plant's safe shutdown capability. While the original configuration of the auxiliary feedwater pump room did not meet all of the requirements of Appendix R Section III.G or III.L, modifications that have been completed and those that have been proposed in the August 5, 1994, request for exemption will serve the underlying purpose of the rule.

Additionally, strict compliance with Section III.G or III.L of Appendix R would result in undue hardship and other costs that are significantly in excess of those contemplated when the regulation was adopted. Compliance with the regulation would necessitate a complete redesign of the auxiliary feedwater pump room. The implementation of this redesign would be costly because it would require significant plant modifications to comply with the prescribed separation criteria in Section III.G. For example, this would require construction of 3-hour, fire-rated barriers around each auxiliary feedwater pump or the relocation of the auxiliary feedwater pumps to meet the 20-foot horizontal separation criteria, as well as the rerouting of electrical cabling located within the separation space between redundant trains of Appendix R safe shutdown components.

Therefore, in accordance with Part (iii) of 10 CFR 50.12, Wisconsin Electric Power Company, the licensee for Point Beach Nuclear Plant, Units 1 and 2, requests exemption for Fire Area A23 from the separation requirements of 10 CFR 50, Appendix R, Section III.G.2.b which states:

"Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area."

Wisconsin Electric requests exemption from the above prescriptive requirements for two separate configurations within Fire Area A23. First, the auxiliary feedwater pumps and associated cables in the fire area are located approximately 14 feet apart on center, contrary to the 20-foot horizontal separation requirement. Second, intervening combustibles, in the form of cables in cable trays, are located within the separation space between redundant trains of Appendix R safe shutdown cables and components.

Wisconsin Electric believes that plant safe shutdown capability can be achieved with the existing configuration of safe shutdown components and fire protection features provided in this fire area. This arrangement satisfies the intent of the separation requirements in Section III.G.2.b of 10 CFR 50 Appendix R and therefore the requested exemption should be granted.

- 2.0 Describe the type of automatic suppression system provided in the auxiliary feedwater pump room and the level of compliance with any applicable National Fire Protection Association (NFPA) standards. Include an evaluation of the fire detection systems compliance with the applicable NFPA standard for protective signaling systems. Include an evaluation of the adequacy of the protection provided for the in-situ and transient fire hazards present in this area.

Response:

An automatic, total flooding Halon 1301 fire suppression system is currently provided for the auxiliary feedwater pump room. This multi-zone fire suppression system is designed to discharge halon into one of three separate fire areas; the auxiliary feedwater pump room, 4KV vital switchgear room, or cable spreading room. Directional valves are installed in the halon piping network to automatically direct halon flow to the fire area where the fire is detected. A sufficient quantity of halon gas is available to provide the necessary halon design concentration for any one of these rooms. This Halon system is designed as a single active failure proof system to assure automatic system actuation. It has one reserve halon storage bottle on the main bank of storage bottles and is

designed to automatically dump an entire reserve bank of halon storage bottles should the main bank fail to discharge.

NFPA 12A-1980, "Halon 1301 Fire Extinguishing Systems," was used as the design guideline and basis for the system design, installation, and testing of this system. The system is designed in accordance with NFPA-12A to provide a halon discharge time of ten seconds providing a minimum halon concentration of 5 percent throughout the auxiliary feedwater pump room for a soak time of 10 minutes. The actual halon concentration in the auxiliary feedwater pump room achieved during the initial acceptance functional test was between 6 and 9 percent for the 10 minute soak time.

The Halon system may be actuated manually or automatically. It may be manually actuated at the local control panels or by actuating the dump valves at the agent storage containers. It will be automatically actuated by the cross-zoned fire detection system installed throughout the auxiliary feedwater pump room fire area.

NFPA 72D, "Standard for the Installation, Maintenance, and Use of Proprietary Protective Signaling Systems" and NFPA 72E, "Standard on Automatic Fire Detectors" were used as the design guidelines for the design, installation and testing of this fire detection system. The fire detection system provides alarms both locally and in the control room. The fire detection system consists of both rate compensation heat detectors and early warning, photo-electric smoke detectors. The actuation of one heat detector or one smoke detector from each of two detection zones will automatically actuate the Halon system.

This fire protection system design is considered adequate to detect and control a fire involving the in-situ and transient fire hazards expected in the auxiliary feedwater pump room. The in-situ combustibles consist mainly of combustible cable jacketing material in cable trays and a small amount of lubricating oil associated with the auxiliary feedwater pumps. Further information is provided in our responses to Questions 3 and 4. Transient combustibles are controlled in this room by administrative control procedures that limit and monitor the type, quantity, and location of transient combustibles in the room.

- 3.0 Describe the types and applications of all cables that are considered as intervening combustibles and present an exposure hazard to the redundant trains of safe shutdown equipment and cabling. Specify if the cables are IEEE-383 qualified or not and whether the cables are used for power,

control or instrumentation. Provide a diagram showing all cable trays that are considered as a intervening combustible between redundant trains of all safe shutdown components located in this fire area, including those addressed under the 1985 exemption. Identify the function of the existing cable tray located at the northern end of the auxiliary feedwater pump room depicted in Attachment 2 of the August 5, 1994, exemption request that is not labeled.

Response:

The requested information concerning the cables that are considered as intervening combustibles is contained in Attachment 6. A diagram showing all cable trays that are considered as intervening combustibles is provided in Attachments 7 and 8. The cable tray at the northern end of the auxiliary feedwater pump room that was not identified in our previous submittal is FV03 and is indicated on Attachment 7. Additionally, it should be noted that the majority of cables installed in the auxiliary feedwater pump room are not IEEE 383 qualified because they are original plant design. However, all of the cables installed as part of the diesel generator addition project are IEEE 383 qualified.

- 4.0 Provide an evaluation of the actual combustible loading that could present an exposure hazard to the redundant trains of safe shutdown equipment and cabling, where an alternative method does not exist outside the auxiliary feedwater pump room. Include the locations, types and concentrations of the intervening combustibles relative to the location of the safe shutdown components, where alternative shutdown capability does not exist, outside of this fire area.

Response:

As described in our August 5, 1994 submittal, there are three primary types of combustibles that could present an exposure hazard to the redundant trains of safe shutdown equipment and cabling in the room. At the present time there is no alternate shutdown capability completely independent of the auxiliary feedwater pump room.

The three primary types of combustibles are:

1. Cable jacketing materials associated with cables routed in cable trays and conduit in the room. The combustible loading associated with cable in conduit is included in

our combustible loading calculations, however, for the purpose of this response, only cable in cable trays is considered to represent a potential fire exposure hazard.

2. Lubricating oil associated with the auxiliary feedwater pumps.
3. Transient combustibles that might be introduced in the room associated with maintenance or other work activities in the room.

Combustible Cable in Cable Trays

There is approximately 184,000 ft of cable, including the amount installed as part of the diesel generator addition project, representing a total heat load of less than 553×10^6 BTUs of combustible cable jacketing material routed in cable trays and conduit in the room. With a floor area of approximately 3713 ft², this represents a combustible loading of 148,000 BTU/ft².

The combustible loading/fire hazard for this room is classified by our Fire Protection Program as a moderate combustible loading/ordinary hazard. This classification method is based on standard fire protection engineering practice recognized by the National Fire Protection Association (NFPA) and Factory Mutual Engineering Corporation (FMEC).

An area with a moderate combustible loading is defined, by our program, as having, on average, greater than 10 lbs./ft² and less than or equal to 25 lbs./ft² of combustible material. This translates to between 100,000 BTU/ft² and 200,000 BTU/ft² combustible loading per net floor area. This is considered equivalent to a 2-hour ASTM E-119 standard time-temperature fire exposure based on a method of classifying building fire loading contained in the National Fire Protection Association Handbook. This handbook is commonly referenced in the nuclear industry.

The majority of the cable in this fire area is non-IEEE 383 rated cable. The cables are located uniformly about eight feet off the floor. Most of the exposed cabling is routed in cable trays in the east-west direction across the room, with the exception of three cable trays that extend in the north-south direction across the 20-foot separation zone between the FU and FR trays. These three cable trays will be covered with metal tray covers as described in our August 5, 1994, and September 9, 1994, submittals.

The routing of the cable trays of concern and those in the 20-foot intervening separation space are shown in Attachments 7 and 8. As described in our previous submittals, this cable tray arrangement does not provide a combustible pathway for fire to spread across the separation space between redundant safe shutdown cables and equipment in the room.

This arrangement of combustibles, in combination with the complete automatic halon fire suppression and fire detection system installed throughout the room, makes it very unlikely that a fire could spread across the room to affect redundant safe shutdown cables or equipment.

Lubricating Oil in the Auxiliary Feedwater Pumps

There is approximately 1/2 gallon of lubricating oil associated with each of the four auxiliary feedwater pumps. The lubricating oil is contained within the pump and can only potentially become ignited if it is sprayed onto a hot surface which raises its temperature above the flash point of approximately 380°F. Each pump is located in a separate cubicle which is only open at the front (see Attachments 7 and 8). This small quantity of oil is not expected to spread over an area of more than 25-30 ft² even if the entire quantity of oil was spilled out on the floor. This spill would be confined to the general vicinity of the pump, with the majority of it remaining within the boundaries of the cubicle walls. At worst case, there is a potential for a fire involving the oil to spread to any cable trays routed through a specific cubicle and along the cable tray. However, since the cable trays in the area above the pump cubicles are only routed in the east-west direction, there is no combustible pathway for a fire to spread in the north-south direction between redundant safe shutdown cables and components in the room. In addition, the automatic halon fire suppression and fire detection system is expected to detect and extinguish or control the spread of fire in the room.

Transient Combustibles

Transient combustible materials and hot work activities at Point Beach are administratively controlled by procedure and a permitting system. The type and quantity of materials used in the room are controlled through this program. Combustible and flammable liquids are required to be maintained and handled in limited quantities and in approved containers. Storage of any transient combustible materials in this safe shutdown area are restricted, unless absolutely necessary, and then only for a limited time. Trained plant

personnel evaluate any transient combustibles for their potential fire exposure hazard to equipment in the room. Plant personnel also monitor the program, as well as ensure that combustibles are removed from the area as soon as possible.

Because of the administrative control of combustibles and work activities in this safe shutdown area, it is unlikely that there would be enough transient combustible materials present to create a fire exposure that could spread over such a large area between redundant safe shutdown cables and components. Any transient combustible fire that might occur could potentially propagate to cable trays directly overhead. However, there is no combustible pathway for the fire to spread in the north-south direction between redundant safe shutdown cables and components.

- 5.0 Provide the fire test data or engineering analysis concerning the flame spread and fire resistance performance of cable tray assemblies provided with sheet metal covers and a single layer of ceramic fiber blanket as described in the August 5 1994, exemption request.

Response:

On December 29, 1978, Wisconsin Electric submitted responses to NRC Staff positions PF-40 through PF-49 for the Point Beach fire protection review. These positions were transmitted to Wisconsin Electric on August 14, 1978. PF-42 dealt with fire protection concerns in the cable spreading room. One of the concerns identified by the NRC questioned the use of cable tray covers. We stated, in our 1978 response, that the use of covered cable trays provides improved levels of fire prevention by eliminating the potential accumulation of foreign combustibles and cable exposure to potential ignition sources. This conclusion is supported by SAND 78-1456, "A Preliminary Report on Fire Protection Research Program Fire Barriers and Fire Retardant Coatings Tests".

This report demonstrates that an exposure fire to a totally enclosed tray containing IEEE 383 rated cables, similar to our proposed cable tray configuration, will self extinguish and will not propagate outside of the involved tray. Additionally, the use of metal cable tray covers is recognized by the NRC Staff in Generic Letters 83-33 and 86-10 as a method of retarding fire propagation along grouped cables in cable trays that present an intervening combustible between redundant trains.

- 6.0 Provide specific details concerning the cable tray "fire breaks" installed in each end of the enclosed trays. Include the type of material used and the fire test or industry standard used to qualify the assembly as an adequate fire stop.

Response:

The intent in providing fire breaks is to limit flame propagation through passive protection. The proposed fire break design has been fire tested and approved by American Nuclear Insurers in accordance with the requirements in Revision 0 of American Nuclear Insurer's "Guidelines for Cable Tray Fire Breaks", dated November 1987. Each cable tray fire break will consist of nine inches of silicone foam with one inch of carborundum fiberfax damming material on each side. The silicone foam will fill the full depth of the cable tray. Additionally, this fire break will be covered by a metal tray cover at least three feet in length, centered over the fire stop. A representative drawing of the proposed fire break is provided in Attachment 2.

- 7.0 Verify that an adequate hose stream can be applied from the floor level by fire brigade personnel to extinguish a fire involving the cable trays or equipment in the auxiliary feedwater pump room using the hose station installed on the north side of the fire area.

Response:

Fire attack plans have been developed to provide training guidance, to fire brigade members, for combating potential fires that could occur in the auxiliary feedwater pump room. In general, the fire brigade would be directed to combat and control any fire in progress in the general area of the auxiliary feedwater pump room. Once such a fire had been extinguished or adequately controlled, the fire brigade would then search for and combat any localized fire involving the overhead cable trays. A fire that might occur within the covered cable trays is expected to be contained within the trays. The trays would be cooled using available hose streams. At some point, the fire brigade may decide to remove the tray covers for cleanup operations or to extinguish any residual deep-seated fire still remaining in the cable bundle. The fire brigade is equipped with the required tools to remove the cable tray covers and access the trays, should this action be required. The local hose station is adequately sized to combat a fire anywhere in the auxiliary feedwater pump room. Additional hose stations, located just outside of the auxiliary feedwater pump room, are adequately sized, to combat a fire anywhere in the room.

8.0 Describe what operator actions, if any, are required in the auxiliary feedwater pump room for a fire in this area to achieve hot shutdown, including the allowable time to complete the required actions.

Response:

Depending on the size of, or damage caused by, a fire in the auxiliary feedwater pump room, plant operators may be required to enter the room in order to perform manual actions. These actions might include:

1. Manual opening of the suction and discharge motor-operated valves for the necessary motor-driven auxiliary feedwater pump(s) may be required. This action would only be required if valves failed to open, as designed, or spuriously shut because of fire damage to the affected cabling. Each of the valves may be manually opened by disengaging the clutch and operating the attached hand wheel. Opening the suction and discharge valves would be required in order to supply auxiliary feedwater flow to the associated steam generators. Our thermal hydraulic computer analyses indicate that some auxiliary feedwater flow needs to be provided to at least one steam generator per unit within 40 minutes following a trip of both units.
2. Verification that cooling water is being provided to the bearings of the operating auxiliary feedwater pumps may also be required. Cooling water flow to each pump's bearings is normally provided from the service water system through a normally open valve. Fire damage, however, could potentially cause a pump's supply valve to spuriously shut, requiring operator action to restore cooling water flow. The supply valve for each pump is located within the respective pump cubicle, shielding it from the rest of the room. Additionally, an emergency backup water supply, for the turbine-driven auxiliary feedwater pumps, is provided from the fire protection system. This backup supply is provided automatically following a loss of pressure in the service water system.
3. Certain fire scenarios in the auxiliary feedwater pump room result in only certain channels of process monitoring instrumentation being available. A matrix describing the available instrumentation for the three analyzed fire scenarios is provided in Attachment 5. In order to ensure that auxiliary feedwater is being supplied to the steam generator in the reactor coolant system loop being monitored by available instrumentation, a motor-driven auxiliary feedwater pump for a given train may be required to supply auxiliary feedwater to a steam

generator in the opposite train. An operator may accomplish this by manually opening the associated cross connect valve. These cross connect valves are located in the respective motor-driven auxiliary feedwater pump cubicles. As stated above, our thermal hydraulic computer analyses indicate that some auxiliary feedwater needs to be provided to at least one steam generator per unit within 40 minutes following a trip of both units.

Each of the fire scenarios evaluated assumes the worst case fire, with fire damage occurring instantly when the fire starts. These evaluations also assume that all of the equipment and cabling in one half of the auxiliary feedwater pump room is damaged by the fire. Realistically, there are no anticipated fire scenarios in this room that would propagate as quickly, or cause as much damage as the evaluated fire scenarios. In addition, we fully expect that the fire detection and automatic suppression system will have detected and extinguished any fire well before any operator actions within the auxiliary feedwater pump room would be required.

- 9.0 Specify the process monitoring instrumentation needed for safe shutdown located in the auxiliary feedwater pump room for the 3 cases identified in the exemption request where compliance with the separation criteria of Section III.G.2.b of Appendix R will not be achieved.

Response:

The parameters that must be monitored in order to reach and maintain safe shutdown are as follows:

1. Reactor source range flux
2. Pressurizer level
3. Reactor coolant system pressure
4. Reactor coolant system hot leg temperature
5. Reactor coolant system cold leg temperature
6. Steam generator pressure
7. Steam generator level

A matrix describing the available instrumentation for the above parameters in the three analyzed fire scenarios is provided in Attachment 5. It should be noted that most fire

scenarios have several different instrumentation options available. Plant modifications described in our August 5, 1994, exemption request and the subsequent clarification letter are included in the attached matrix and further enhance our operational flexibility with regards to instrumentation options for a fire in the auxiliary feedwater pump room.

- 10.0 In the exemption that was granted for this fire area by the NRC on July 3, 1985, the staff stated in the safety evaluation that there was no alternate shutdown capability for the service water components independent of the auxiliary feedwater pump room. In the August 5, 1994, exemption request, the licensee states that alternate shutdown systems installed allow for the operation of two service water pumps independent of the auxiliary feedwater pump room. Please resolve the discrepancy between the safety evaluation and the exemption request.

Response:

Subsequent to the NRC staff's July 5, 1985 approval of our request for exemption for the auxiliary feedwater pump room, Point Beach Nuclear Plant installed an alternate shutdown system. This system provides an alternate means to power safe shutdown components following a fire in the vital switchgear room. Since this system was installed subsequent to the original exemption request, it was not described in that exemption request. However, the August 5, 1994, exemption request accurately describes the current plant configuration, namely that the alternate shutdown system does allow for the operation of two service water pumps independent of the auxiliary feedwater pump room.

- 11.0 Describe any modifications affecting fire protection and/or Appendix R in the auxiliary feedwater pump room that have been made since receiving NRC approval of the original exemption in 1985.

Response:

Since receiving approval in 1985 for the original exemption for the auxiliary feedwater pump room, several modifications to the fire protection equipment have been performed. These modifications did not change the basic fire protection design for this room.

In 1994, a modification was performed to the fire doors that provide access to the auxiliary feedwater pump room. This modification involved changing the direction of the fire

doors' swing to allow the doors to open out of the room. This modification was performed to address an issue related to in-plant flooding. Should an in-plant flooding event occur in the auxiliary feedwater pump room, any buildup of water in the auxiliary feedwater pump room could exit the room through the doors into the turbine hall.

In 1993, 3M fire barrier material was installed on the base plates that supported fire-wrapped conduit in the auxiliary feedwater pump room. This modification was performed in response to Wisconsin Electric's internal evaluation of issues related to Thermo-Lag.

In 1992, several conduit routed through the auxiliary feedwater pump room, associated with the installation of the plant's new swing batteries, were wrapped with 1-hour, fire-rated material. This modification was performed to ensure that these conduits would not be affected by a fire in the auxiliary feedwater pump room.

In 1986, the smoke detectors in the auxiliary feedwater pump room were modified. Originally, the installed smoke detectors were comprised of a photo-electric smoke sensing chamber and a thermal detection device. The modification in 1986 involved the disconnection of the thermal detection portion of the smoke detector because the setpoint of the thermal detection device was set too close to the ambient temperature of the room. This condition caused numerous false alarms. We determined that the smoke detectors' additional feature was not required since we already had a separate heat detection system comprised of rate compensation heat detectors installed throughout the room. Since receiving approval in 1985 for the original exemption for the auxiliary feedwater pump room, there have been few modifications related to the Appendix R. As described in Question 10, two 480 volt distribution buses and a number of transfer switches were installed in 1991 to provide the plant with the capability of alternate shutdown. This modification would allow the plant to shutdown in the event of a fire in the 4KV vital switchgear room.

In 1992, a swing 125 VDC distribution system was installed. This modification added new 125 VDC distribution buses, batteries, and battery chargers to the system, providing additional operational flexibility and alternate DC power sources.

Currently, the plant is in the process of installing two additional emergency diesel generators. These generators are being installed for several reasons. First, the additional diesel generators will enable the removal of any one diesel from service without entering a Technical

Specification Limiting Condition for Operation. Second, the additional diesel generators will provide a larger margin between the accident condition loading requirements and the generating capacity of the diesel generators. Third, the diesel generators will provide excess emergency power generating capacity, which will allow some non-essential loads to be powered during accident conditions. Finally, if desired, the new diesel generators could be utilized as a qualified alternate AC power source, in lieu of the existing combustion turbine, to address station blackout considerations.

12.0 Specify the horizontal and vertical separation of Cable Tray G-04 from local Control Panels A and B and Conduit D01-2.

Response:

The requested horizontal separation distances are provided in Attachment 3. The requested vertical separation distances are provided in Attachment 4.

13.0 In a letter dated October 13, 1994, the NRC requested additional information regarding our proposed fire protection for Conduit D01-2. This request states:

"You stated that Conduit D01-2 would be wrapped with the E-50 series fire barrier material, manufactured by 3M Corporation, to provide a 1-hour rating to ensure that the conduit is protected from a fire in the fire area. Please provide the fire endurance test reports, and any other supporting documentation used to qualify this configuration as a 1-hour rated fire barrier."

In preparation for our submittal of the August 5, 1994 exemption request, we determined that a short section of Conduit D01-2 was located in the 20-foot separation area between the FU and FR cable trays in the auxiliary feedwater pump room. This short section of conduit is the only portion of the 125 VDC red instrumentation channel that could potentially be affected by certain fire scenarios in the room. We determined that we could provide additional flexibility in the 125 VDC distribution in this room simply by protecting this short section of conduit. The additional flexibility provided by protecting the D01-2 conduit is shown in the Instrumentation Options Matrix in Attachment 5.

By letter dated September 9, 1994, we proposed to protect the conduit using a 1-hour, fire-rated E-50 series fire barrier assembly manufactured by 3M Corporation. This

system is already installed on several conduit located in the auxiliary feedwater pump room. The configuration and specific details about Conduit D01-2 are included in Attachment 9. The location of D01-2 with respect to other cable trays in the room is shown on Attachments 3 and 4.

Conduit D01-2 is a 4-inch diameter conduit that enters through the east wall of the auxiliary feedwater pump room approximately four inches and then turns upward for approximately twelve inches, exiting the room through the ceiling. A detailed design of the fire barrier system for this conduit has not been completed; however, preliminary design has been completed with the assistance of 3M Corporation. This design consists of a 1-hour, fire-rated assembly using E-53 or E-54 fire barrier mat from 3M Corporation. The mat would be arranged to enclose the conduit into the corner of the wall and ceiling in the room using 3M-approved installation details 5500-C7-2 and 6100-E1. Both details are provided in Attachment 9. The proposed assembly will be installed, as per the installation details, by contractors trained in the use and application of these systems.

These 3M installation details were developed based on 3M fire tests that demonstrate the performance of these designs. The fire test reports are included in the ten volume set of documentation, "3M Fire Protection Products Documentation For The Flexible Wrap System", which 3M made available to the industry in August 1993. The fire test references for the proposed details are as follows:

| <u>Installation Detail</u> | <u>Associated Fire Test</u> |
|--|--|
| 3M Detail 5500-C7-2, "Conduit Near Slab" | 3M Fire Test #86-78 in 3M Documentation Pkg Vol. X |
| 3M Detail 6100-E1, "Electrical Raceway Penetration Firestop" | 3M Fire Test #86-18 and #86-19; Twin City Testing Lab #414186-331 in 3M Documentation Pkg Vol. VII |

A copy of the cover page from the applicable fire tests and the associated cover of the volume from the 3M Documentation Package is provided in Attachment 9.

ATTACHMENT 2

3' METAL COVER
(CENTERED OVER FIRESTOP)
(BOTH SIDES)

CABLE TRAY

ELECTRICAL CABLING

9" SEAL FULL TRAY DEPTH
D.C. 3-6548 RTV SILICONE
FOAM OR APPROVED EQUAL

1" CARBORUNDUM FIBERFRAX DAMMING
OR APPROVED EQUAL

Refer to ANI Letters Dated 3/30/84, 5/10/83 & 9/17/82

INSULATION CONSULTANT & MANAGEMENT SERVICE
FOR TYPICAL DETAIL DWG.-POINT BEACH

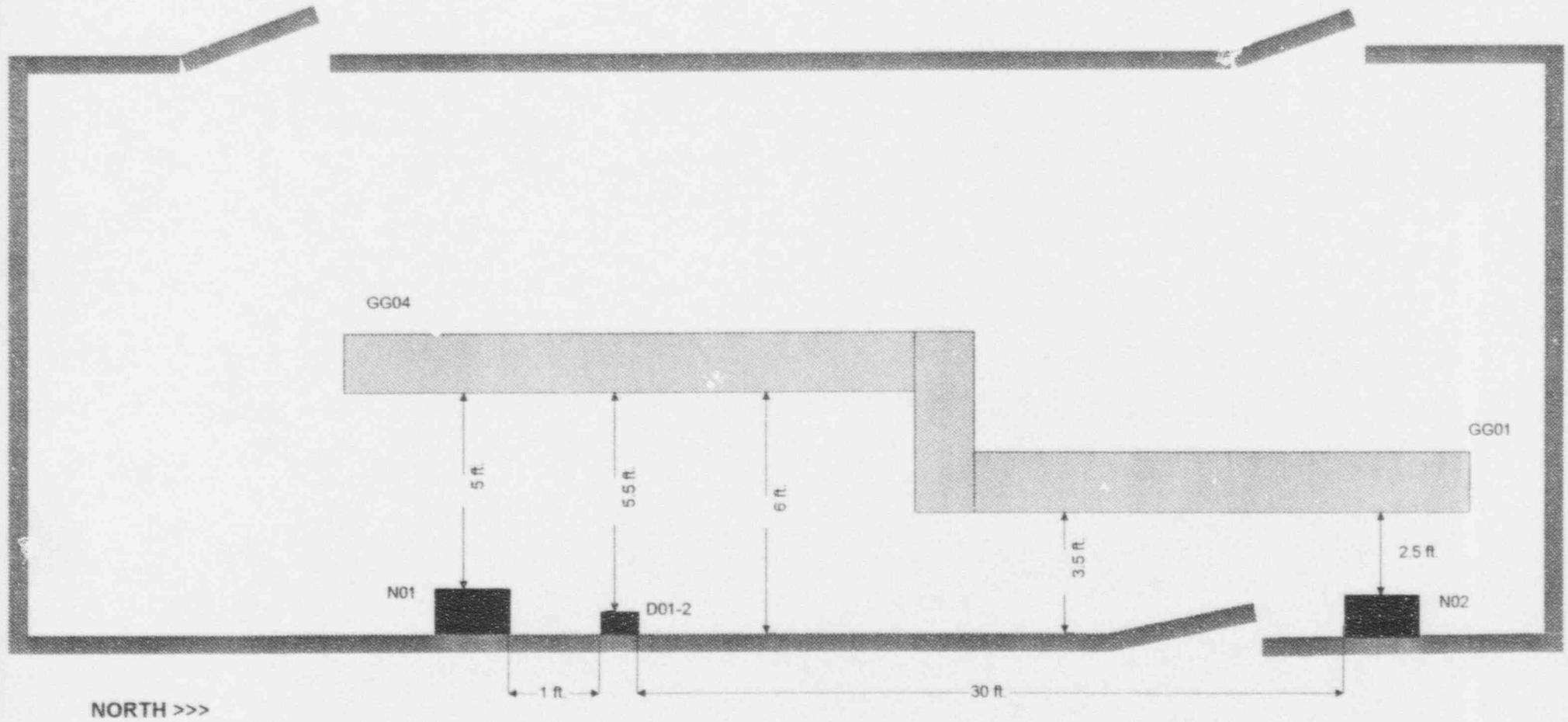
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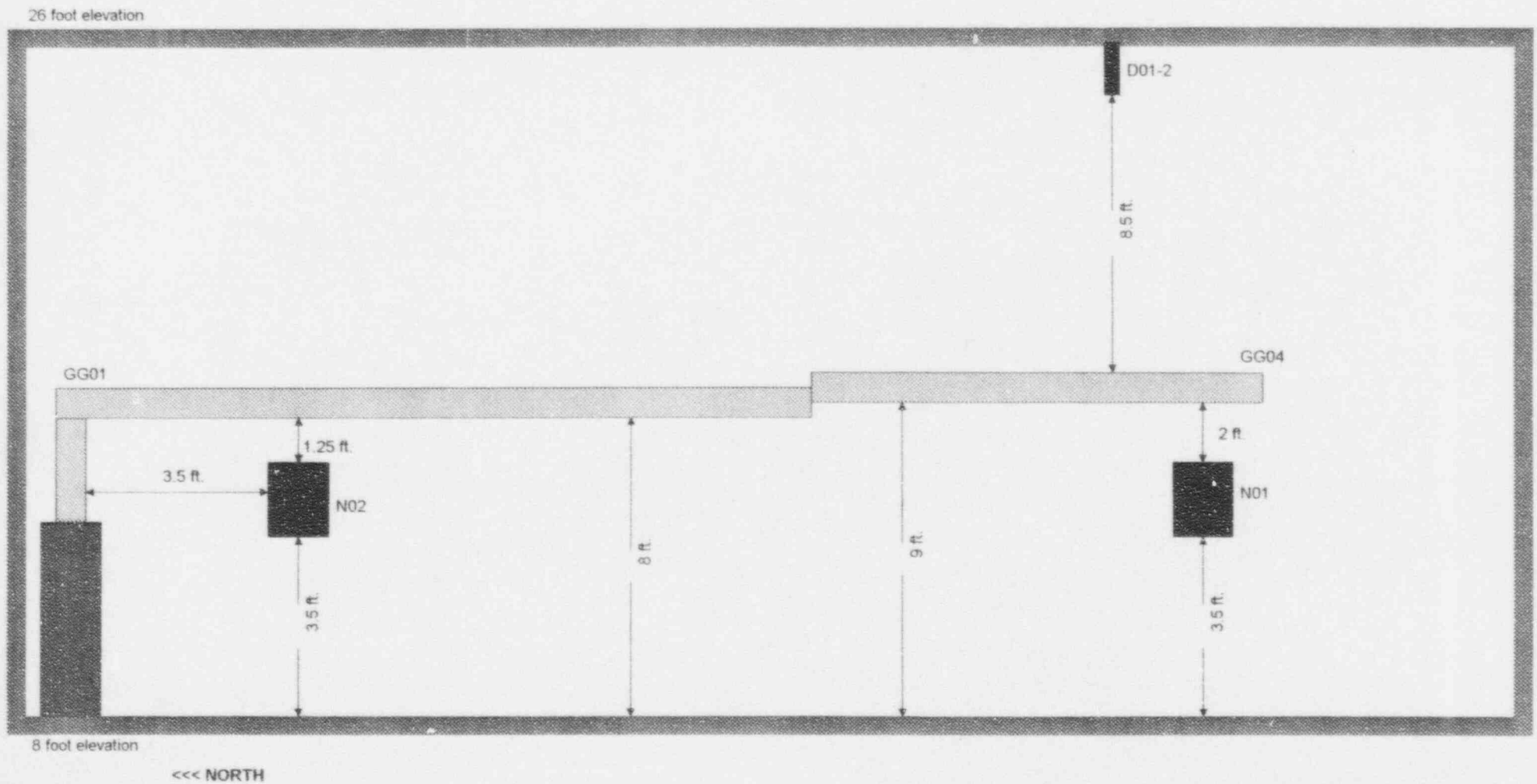
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| BY <i>RKV</i> | CHD <i>W</i> | APP <i>W</i> | APP <i>GS</i> |
| DATE 6-7-85 | DATE 6-7-85 | DATE 6-12-85 | DATE 6-12-85 |
| SCALE NTS | DWG. NO. W-E-01-06 | | |

Support
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ATTACHMENT 3
HORIZONTAL
SEPARATION
DISTANCES
(TOP VIEW)



ATTACHMENT 4
VERTICAL
SEPARATION
DISTANCES
(SIDE VIEW)



ATTACHMENT 5

APPENDIX R SAFE SHUTDOWN INSTRUMENTATION CHANNEL OPTIONS

Attachment 5
Auxiliary Feed Water Pump Fire Area
Appendix R Safe Shutdown Instrumentation Channel Options

| Fire Location | Unit to be Shutdown | Available Instrumentation Channel(s) | Instruments provided on Available Channel | Undamaged Cable Trays/Conduits Associated with Selected Instrument Channel in Aux. Fdwp Rm | Compliance with Appendix R III.G.2 Separation Criteria |
|--|---------------------|--|---|---|--|
| South side of Room South of FR Cable Tray | Unit 1 | D03 White Channel Instrumentation Bus | ITE-450D T-Hot Leg ITE-450A T-Cold Leg IPT-469 SG Press. WR ILT-460B SG Lvl. WR IPT-420A RCS Press. WR ILT-427 Prz. Lvl IN-32 Source Range | FU Cable Trays (on north side of room) contain power cables to D107 battery charger for D03 125 Vdc Inst. Bus D03 also has an alternate feed from D109 outside the AFP Rm Fire Area 1S077 Conduit (1 hr. fire wrapped) supplies power to: ITE-450D T-Hot Leg ITE-450A T-Cold Leg ILT-460B SG Lvl. WR IPT-420A RCS Press. WR | FU Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 1S077 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| OR | | | | | |
| | Unit 1 | D04 Yellow Channel Instrumentation Bus and D01 Red Channel Instrumentation Bus | ITE-451D T-Hot Leg ITE-451A T-Cold Leg IPT-479 SG Press. WR ILT-470B SG Lvl. WR IPT-420 RCS Press. WR ILT-426 Prz. Lvl IN-31 Source Range | FW Cable Trays (on north side of room) contain power cables to the D109 swing battery charger for D04 125 Vdc Inst. Bus D04 also has an alternate feed from D109 outside the AFP Rm Fire Area 1S079 Conduit (to be protected per Appendix R III.G.2) supplies power to: ITE-451D T-Hot Leg ITE-451A T-Cold Leg ILT-470B SG Lvl. WR FU Cable Trays (on north side of room) contain power cables to the D09 swing battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D11 DC Dist. Pnl. | FU and FW Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. D01-2 and 1S079 Conduits to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittals. |

Attachment 5
Auxiliary Feed Water Pump Fire Area
Appendix R Safe Shutdown Instrumentation Channel Options

| Fire Location | Unit to be Shutdown | Available Instrumentation Channel(s) | Instruments provided on Available Channel | Undamaged Cable Trays/Conduits Associated with Selected Instrument Channel in Aux. Fdmp Rm | Compliance with Appendix R III.G.2 Separation Criteria |
|--|---------------------|---|---|--|---|
| South side of Room South of FR Cable Tray | Unit 2 | D04 Yellow Channel Instrumentation Bus and | 2TE-451D T-Hot Leg 2TE-451A T-Cold Leg 2PT-479 SG Press. WR 2LT-470B SG Lvl. WR 2PT-420 RCS Press. WR | FW Cable Trays (on north side of room) contain power cables to the D109 swing battery charger for D04 125 Vdc Inst. Bus D04 also has an alternate feed from D109 outside the AFP Rm Fire Area 2S079 Conduit (1 hr. fire wrapped) supplies power to: 2TE-451D T-Hot Leg 2TE-451A T-Cold Leg 2LT-470B SG Lvl. WR | FU and FW Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 2S079 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. D01-2 Conduit to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittals. |
| | | D03 White Channel Instrumentation Bus or | 2LT-427 Prz. Lvl 2N-32 Source Range | FU Cable Trays (on north side of room) contain power cables to D107 battery charger for D03 125 Vdc Inst. Bus D03 also has an alternate feed from D109 outside the AFP Rm Fire Area | |
| | | D01 Red Channel Instrumentation Bus | 2LT-426 Prz. Lvl 2N-31 Source Range | FU Cable Trays (on north side of room) contain power cables to the D09 swing battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl | |
| OR | | | | | |
| | Unit 2 | D04 Yellow Channel Instrumentation Bus and | 2TE-450B T-Hot Leg 2TE-450C T-Cold Leg | FW Cable Trays (on north side of room) contain power cables to D109 swing battery charger for D04 125 Vdc Inst. Bus D04 also has an alternate feed from D109 outside the AFP Rm Fire Area 2S079 Conduit (1 hr. fire wrapped) supplies power to: 2TE-450B T-Hot Leg 2TE-450C T-Cold Leg | FU and FW Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 2S079 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. D01-2 Conduit to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittals. |
| | | D01 Red Channel Instrumentation Bus | 2PT-468 SG Press. WR 2LT-460A SG Lvl. WR 2PT-420C RCS Press. WR 2LT-426 Prz. Lvl 2N-31 Source Range | FU Cable Trays (on north side of room) contain power cables to the D09 swing battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl | |

Attachment 5
Auxiliary Feed Water Pump Fire Area
Appendix R Safe Shutdown Instrumentation Channel Options

| Fire Location | Unit to be Shutdown | Available Instrumentation Channel(s) | Instruments provided on Available Channel | Undamaged Cable Trays/Conduits Associated with Selected Instrument Channel in Aux. Edgmp Rm | Compliance with Appendix R III.G.2 Separation Criteria |
|--|---------------------|--|--|---|--|
| North side of Room North of FU Cable Tray | Unit 1 | D03 White Channel Instrumentation Bus | ITE-450D T-Hot Leg ITE-450A T-Cold Leg IPT-469 SG Press. WR ILT-460B SG Lvl. WR IPT-420A RCS Press. WR ILT-427 Priz. Lvl. IN-32 Source Range | FK Cable Trays (on south side of room) contain power cables to the D109 swing battery charger for D03 125 Vdc Inst. Bus D03 also has an alternate feed from D109 outside the AFP Rm Fire Area IS077 Conduit (1 hr. fire wrapped) supplies power to: ITE-450D T-Hot Leg ITE-450A T-Cold Leg IPT-469 SG Press. WR ILT-460B SG Lvl. WR IPT-420A RCS Press. WR | FK Cable Tray meets Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. IS077 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| OR | | | | | |
| | Unit 1 | D01 Red Channel Instrumentation Bus | ITE-451B T-Hot Leg ITE-451C T-Cold Leg IPT-483 SG Press. WR ILT-470A SG Lvl. WR IPT-420C RCS Press. WR ILT-426 Priz. Lvl. IN-31 Source Range | FP Cable Trays (on south side of room) contain power cables to D07 battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl. 1C205-5 Conduit (on south side of room) contains cables for: ITE-451B T-Hot Leg ITE-451C T-Cold Leg IPT-483 SG Press. WR ILT-470A SG Lvl. WR | FP Cable Tray and Conduit 1C205-1 meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. D01-2 Conduit to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittal. |

Attachment 5
Auxiliary Feed Water Pump Fire Area
Appendix R Safe Shutdown Instrumentation Channel Options

| Fire Location | Unit to be Shutdown | Available Instrumentation Channel(s) | Instruments provided on Available Channel | Undamaged Cable Trays/Conduits Associated with Selected Instrument Channel in Aux. Edgemp Rm | Compliance with Appendix R III.G.2 Separation Criteria |
|--|---------------------|---|---|---|--|
| North side of Room North of FU Cable Tray | Unit 2 | D04 Yellow Channel Instrumentation Bus and | 2TE-451D T-Hot Leg 2TE-451A T-Cold Leg 2PT-479 SG Press. WR 2LT-470B SG Lvl. WR 2PT-420 RCS Press. WR | FR Cable Trays (on south side of room) contain power cables to D10R battery charger for D04 125 Vdc Inst. Bus D04 also has an alternate feed from D109 outside the AFP Rm Fire Area 2S079 Conduit (1 hr. fire wrapped) supplies power to: 2TE-451D T-Hot Leg 2TE-451A T-Cold Leg 2LT-470B SG Lvl. WR | FR, FK and FP Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 2S079 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| | | D03 White Channel Instrumentation Bus or | 2LT-427 Pz. Lvl 2N-32 Source Range | FK Cable Trays (on south side of room) contain power cables to the D109 swing battery charger for D03 125 Vdc Inst. Bus D03 also has an alternate feed from D109 outside the AFP Rm Fire Area | |
| | | D01 Red Channel Instrumentation Bus | 2LT-426 Pz. Lvl 2N-31 Source Range | FP Cable Trays (on south side of room) contain power cables to D07 battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl. | |

OR

| | | | | |
|--------|---|--|--|--|
| Unit 2 | D04 Yellow Channel Instrumentation Bus and | 2TE-450B T-Hot Leg 2TE-450C T-Cold Leg | FR Cable Trays (on south side of room) contain power cables to the D109 swing battery charger for D03 125 Vdc Inst. Bus D03 also has an alternate feed from D109 outside the AFP Rm Fire Area 2S079 Conduit (1 hr. fire wrapped) supplies power to: 2TE-450B T-Hot Leg 2TE-450C T-Cold Leg | FR and FP Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 2S079 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| | D01 Red Channel Instrumentation Bus | 2PT-468 SG Press. WR 2LT-460A SG Lvl. WR 2PT-420C RCS Press. WR 2LT-426 Pz. Lvl 2N-31 Source Range | FP Cable Trays (on south side of room) contain power cables to D07 battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl. | |

Attachment 5
Auxiliary Feed Water Pump Fire Area
Appendix R Safe Shutdown Instrumentation Channel Options

| Fire Location | Unit to be Shutdown | Available Instrumentation Channel(s) | Instruments provided on Available Channel | Undamaged Cable Trays/Conduits Associated with Selected Instrument Channel in Aux. Fdwp Rm | Compliance with Appendix R III.G.2 Separation Criteria |
|--|---------------------|---------------------------------------|---|--|---|
| Fire in Center of Room Between FU and FR Trays | Unit 1 | D03 White Channel Instrumentation Bus | 1TE-450D T-Hot Leg 1TE-450A T-Cold Leg 1PT-469 SG Press. WR 1LT-460B SG Lvl. WR 1PT-420A RCS Press. WR 1LT-427 Prz. Lvl. 1N-32 Source Range | FK Cable Trays (on south side of room) contain power cables to the D109 swing battery charger for D03 125 Vdc Inst. Bus D03 also has an alternate feed from D109 outside the AFP Rm Fire Area alternatively, if the D109 swing battery charger is used for the D04 125 Vdc Inst. Bus to shutdown Unit 2 then, FU Cable Trays (on the south side of the room) are available contain power cables to the D107 battery charger for D03 125 Vdc Inst. Bus. 1S077 Conduit (1 hr. fire wrapped) supplies power to: 1TE-450D T-Hot Leg 1TE-450A T-Cold Leg 1PT-469 SG Press. WR 1LT-460B SG Lvl. WR 1PT-420A RCS Press. WR | FK and FU Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 1S077 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| OR | | | | | |
| | Unit 1 | D01 Red Channel Instrumentation Bus | 1TE-451B T-Hot Leg 1TE-451C T-Cold Leg 1PT-483 SG Press. WR 1LT-470A SG Lvl. WR 1PT-420C RCS Press. WR 1LT-426 Prz. Lvl. 1N-31 Source Range | FP Cable Trays (on south side of room) contain power cables to D07 battery charger for D01 125 Vdc Inst. Bus D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl 1C205-5 Conduit (on south side of room) contains cables for: 1TE-451B T-Hot Leg 1TE-451C T-Cold Leg 1PT-483 SG Press. WR 1LT-470A SG Lvl. WR | FP Cable Tray and Conduit 1C205-5 meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. D01-2 Conduit to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittals. |

Attachment 5
Auxiliary Feed Water Pump Fire Area
Appendix R Safe Shutdown Instrumentation Channel Options

| Fire Location | Unit to be Shutdown | Available Instrumentation Channel(s) | Instruments provided on Available Channel | Undamaged Cable Trays/Conduits Associated with Selected Instrument Channel in Aux. Fdpm Rm | Compliance with Appendix R III.G.2 Separation Criteria |
|---|---------------------|--|---|---|--|
| Fire in Center of Room Between FU to FR Trays | Unit 2 | D04 Yellow Channel Instrumentation Bus | 2TE-451D T-Hot Leg 2TE-451A T-Cold Leg 2PT-479 SG Press. WR 2LT-470B SG Lvl. WR 2PT-420 RCS Press. WR | FW Cable Trays (on north side of room) contain power cables to the D109 swing battery charger for D04 125 Vdc Inst. Bus. D04 also has an alternate feed from D109 outside the AFP Rm Fire Area. alternatively, if the D109 swing battery charger is used for the D03 125 Vdc Inst. Bus to shutdown Unit 1 then, FR Cable Trays (on the south side of the room) are available contain power cables to the D108 battery charger for D04 125 Vdc Inst. Bus. 2S079 Conduit (1 hr. fire wrapped) supplies power to: 2TE-451D T-Hot Leg 2TE-451A T-Cold Leg 2LT-470B SG Lvl. WR | FW, FR, FU and FR Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 2S079 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| | | D03 White Channel Instrumentation Bus | 2LT-427 Prz. Lvl. 2N-32 Source Range | FU Cable Trays (on north side of room) contain power cables to D107 battery charger for D03 125 Vdc Inst. Bus. D03 is also supplied from the alternate feed from D109 outside the AFP Rm Fire Area. | |
| | | D01 Red Channel Instrumentation Bus | 2LT-426 Prz. Lvl. 2N-31 Source Range | FP Cable Trays (on south side of room) contain power cables to the D09 swing battery charger for D01 125 Vdc Inst. Bus. D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl. | D01-2 Conduit to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittals. |

OR

| | | | | |
|--------|--|---|--|--|
| Unit 2 | D04 Yellow Channel Instrumentation Bus | 2TE-450B T-Hot Leg 2TE-450C T-Cold Leg | FW Cable Trays (on north side of room) contain power cables to D109 swing battery charger for D04 125 Vdc Inst. Bus. D04 also has an alternate feed from D109 outside the AFP Rm Fire Area. or if the D109 swing battery charger is used for the D03 125 Vdc Inst. Bus to shutdown Unit 1 then, FR Cable Trays (on the south side of the room) are available contain power cables to the D108 battery charger for D04 125 Vdc Inst. Bus. 2S079 Conduit (1 hr. fire wrapped) supplies power to: 2TE-450B T-Hot Leg 2TE-450C T-Cold Leg | FW, FR and FP Cable Trays meet Appendix R III.G.2.b with July 5, 1985 approved exemption request for 20 ft. separation with intervening combustibles in east - west direction between FU and FR cable trays. 2S079 Conduit meets Appendix R III.G.2.c for 1 hr. fire rated barrier with detection and suppression in fire area. |
| | D01 Red Channel Instrumentation Bus | 2LT-426 Prz. Lvl. 2N-31 Source Range | FP Cable Trays (on south side of room) contain power cables to the D09 swing battery charger for D01 125 Vdc Inst. Bus. D01-2 Conduit (to be protected per Appendix R III.G.2) contains power cables from D01 125 Vdc Inst. Bus to D12 DC Dist. Pnl. | D01-2 Conduit to be protected in accordance with Appendix R III.G.2 to provide operators with an additional alternative instrumentation channel as described in the August 5, 1994 and September 9, 1994 WE exemption request submittals. |

ATTACHMENT 6

INTERVENING COMBUSTIBLE CABLES

Attachment 6: Intervening Combustible Cables

| CABLE | SIZE | FUNCTION | FROM | TO |
|---------|----------|------------|---------|--------------|
| 13213MH | 12 | POWER | C47 | 1C157 |
| 1A201E | 16 | INSTRUMENT | 1A02-16 | 2A04-51 |
| 1A401D | 12 | POWER | 2A04 | C02 |
| 1A401E | 10 | INSTRUMENT | 1A4-52 | 1A06-63 |
| 1K0012E | 12 | POWER | 1A06 | C02 |
| 1K0013C | 12 | POWER | 1A06 | C02 |
| 1K0023B | 12 | POWER | 2A05 | C02 |
| 1K0101B | 12 | POWER | 1A06 | C01 |
| 1K0123B | 12 | POWER | C02 | 1X14 CONNBOX |
| 24212MH | 12 | POWER | C48 | 1C167 |
| 24301E | 12 | POWER | 2C-003 | C-069 |
| 24302E | 12 | POWER | 2C-003 | C-069 |
| 2A101C | 10 | CONTROL | 2A01-18 | 2A03-44 |
| 2A101D | 12 | CONTROL | 2A01-18 | 2A03-41 |
| 2A201D | 12 | CONTROL | 2A02-34 | 2A04-51 |
| 2A201E | 10 | CONTROL | 2A02-34 | 2A04-48 |
| 2A22C | 12 | POWER | 2C-003 | C-069 |
| 2A22D | 12 | POWER | 2C-003 | C-069 |
| 2A24A | 500 MCM | POWER | 2A01-24 | 2Q13 |
| 2A24B | 500 MCM | POWER | 2A01-24 | 2Q14 |
| 2A25A | 350 MCM | POWER | 2A01-25 | 2X11 |
| 2A28A | 350 MCM | POWER | 2A02-28 | 2X12 |
| 2A29A | 500 MCM | POWER | 2A02-29 | 2Q16 |
| 2A29B | 500 MCM | POWER | 2A02-29 | 2Q17 |
| 2A301B | 12 | POWER | 2A03 | C02 |
| 2A31C | 12 | POWER | 2C-003 | C-069 |
| 2A31D | 12 | POWER | 2C-003 | C-069 |
| 2A401C | 12 | POWER | 2A04 | C02 |
| 2A44C | 12 | POWER | 2A03 | C02 |
| 2A44D | 12 | CONTROL | 2A01-18 | 2A03-44 |
| 2A45A | 1000 MCM | POWER | 2A03-45 | 2X04-X |
| 2A45B | 1000 MCM | POWER | 2A03-45 | 2X04-X |
| 2A45C | 1000 MCM | POWER | 2A03-45 | 2X04-X |
| 2A45D | 1000 MCM | POWER | 2A03-45 | 2X04-X |
| 2A45E | 1000 MCM | POWER | 2A03-45 | 2X04-X |
| 2A45F | 1000 MCM | POWER | 2A03-45 | 2X04-X |
| 2A45G | 12 | POWER | 2A03 | C02 |
| 2A45H | 10 | POWER | 2A03 | C02 |
| 2A45L | 12 | CONTROL | 0C-223B | 2A-03(45) |
| 2A47A | 1000 MCM | POWER | 2A04-47 | 2X04-Y |
| 2A47B | 1000 MCM | POWER | 2A04-47 | 2X04-Y |
| 2A47C | 1000 MCM | POWER | 2A04-47 | 2X04-Y |
| 2A47D | 1000 MCM | POWER | 2A04-47 | 2X04-Y |
| 2A47E | 1000 MCM | POWER | 2A04-47 | 2X04-Y |
| 2A47F | 1000 MCM | POWER | 2A04-47 | 2X04-Y |
| 2A47G | 12 | POWER | 2A04 | C02 |
| 2A47H | 10 | POWER | 2A04 | C02 |
| 2A47L | 12 | CONTROL | 0C-223B | 2A-04(47) |

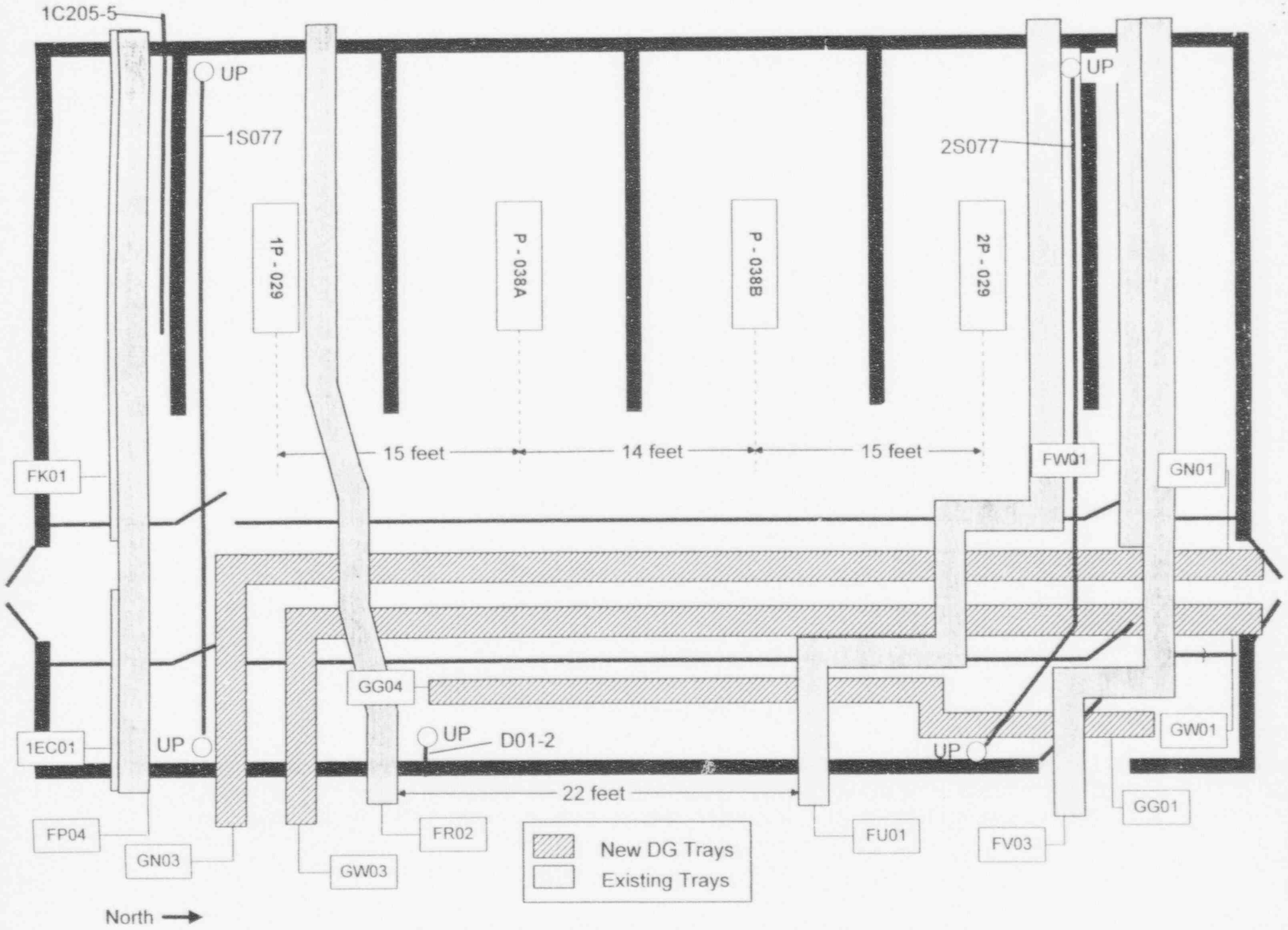
Attachment 6: Intervening Combustible Cables

| CABLE | SIZE | FUNCTION | FROM | TO |
|-----------|------|----------|-----------|-----------|
| 2A48C | 12 | POWER | 2A04 | C02 |
| 2A48D | 12 | CONTROL | 2A02-34 | 2A04-48 |
| 2A70C | 12 | POWER | 2A04 | C02 |
| 2K0012E | 12 | POWER | 2A05 | C02 |
| 2K0013C | 12 | POWER | 2A03 | C02 |
| 2K0013E | 12 | POWER | 2A05 | C02 |
| 2K0021A | 12 | POWER | C65A | C02 |
| 2K0021B | 12 | POWER | C35 | C02 |
| 2K0023A | 12 | POWER | 1A06 | C02 |
| 2K0101A | 12 | POWER | 2A05 | C01 |
| 2K0113A | 12 | POWER | 2A05 | C01 |
| 2TR22A | 16 | POWER | 2C-004 | C-069 |
| 2TR22B | 16 | POWER | 2C-004 | C-069 |
| 2TR22C | 16 | POWER | 2C-004 | C-069 |
| 2TR22D | 16 | POWER | 2C-004 | C-069 |
| 2TR22E | 16 | POWER | 2C-004 | C-069 |
| 2TR22F | 16 | POWER | 2C-004 | C-069 |
| 2X401E | 10 | POWER | 2A03 | C02 |
| 2X401F | 10 | POWER | 2A04 | C02 |
| D1305A | 4 | POWER | D13 | 1A03-40 |
| D1306A | 4 | POWER | D13 | 2A03-41 |
| D1307A | 4 | POWER | D13 | 1A04-50 |
| D1308A | 4 | POWER | D13 | 2A04-51 |
| H32J | 8 | CONTROL | 0C-223B | 2A-03(45) |
| H32K | 8 | CONTROL | 0C-223B | 2A-04(47) |
| J21A | 12 | POWER | C-001 | FO-03922 |
| K0014B | 12 | POWER | 2A03 | C02 |
| K0082A | 12 | CONTROL | C01 | TS3020 |
| K0083C | 12 | CONTROL | C01 | PANEL K2A |
| K0083D | 12 | CONTROL | C01 | PANEL K2B |
| K0119A | 12 | POWER | C01 | Z31 |
| K0122A | 12 | CONTROL | C01 | TB127 |
| K0122B | 12 | CONTROL | C01 | TB127 |
| K5011B | 12 | CONTROL | 2C20 | Z39 |
| WE2K5005A | 12 | POWER | D01 | 2C20 |
| ZB1A601C | 12 | POWER | 1A-06 | C-002 |
| ZB1A63B | 12 | POWER | 1A-06(63) | C-002 |
| ZB1A63E | 12 | POWER | 1A-06(63) | C-002 |
| ZB1A64B | 12 | POWER | 1A-06(64) | C-002 |
| ZB1A64C | 10 | POWER | 1A-06(64) | C-002 |
| ZB1A65B | 12 | POWER | C-001 | 1A-06(65) |
| ZB1A65C | 10 | POWER | C-001 | 1A-06(65) |
| ZB1B17BB | 12 | POWER | 1A-06 | C-002 |
| ZB1B17BC | 12 | POWER | 1B-03 | C-002 |
| ZB1B17BE | 12 | POWER | 1B-04 | C-002 |
| Z31B18CB | 12 | POWER | 1B-04 | C-002 |
| ZB1B23CB | 12 | POWER | 1B-04 | C-002 |
| ZB1NB134L | 12 | POWER | 1A06 | 1C167 |

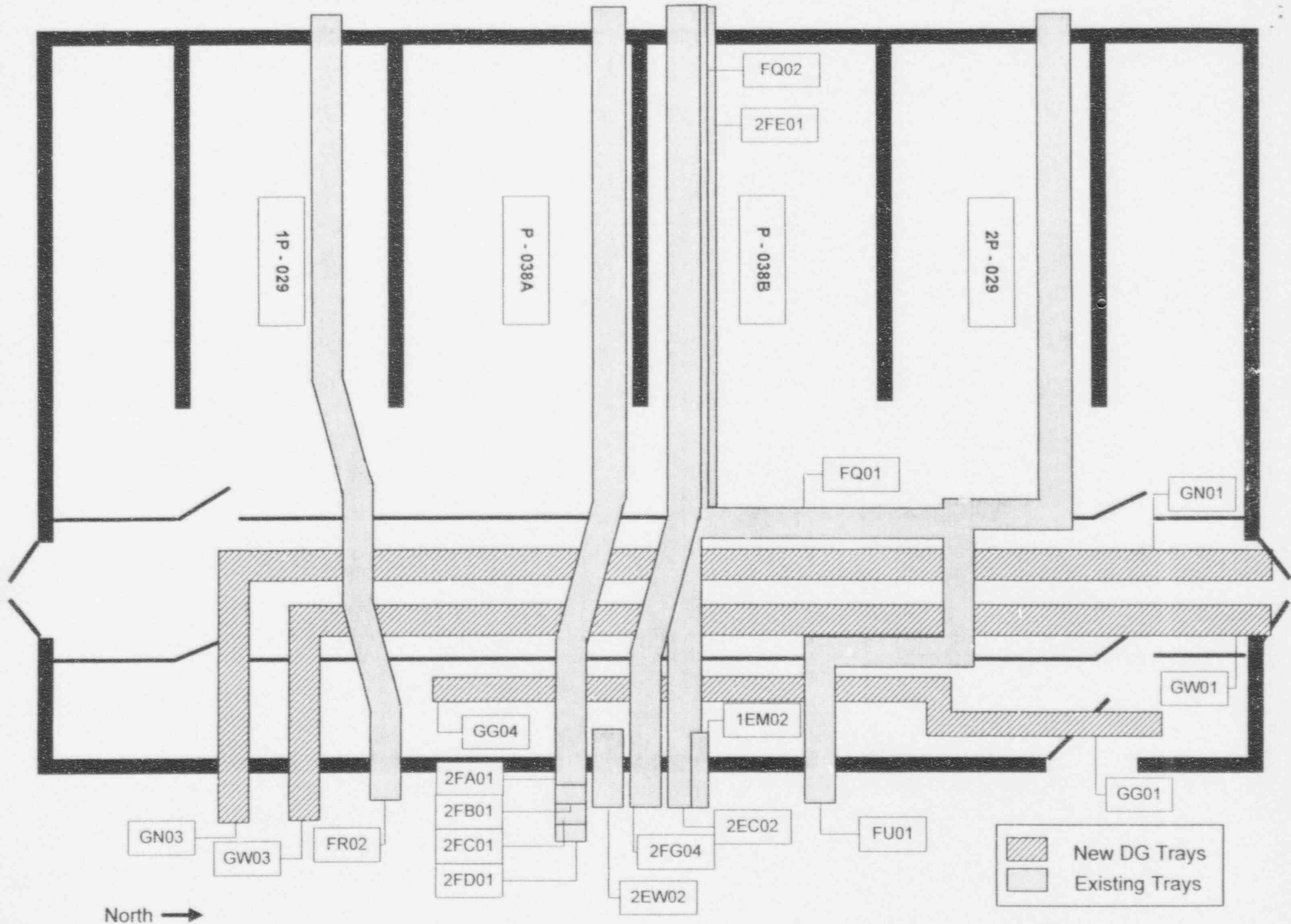
Attachment 6: Intervening Combustible Cables

| CABLE | SIZE | FUNCTION | FROM | TO |
|-----------|---------|----------|-----------|-------------|
| ZC2A501A | 12 | POWER | 2A-05 | C-002 |
| ZC2A72B | 12 | POWER | 2A05 | C02 |
| ZC2A74B | 12 | POWER | C-001 | 2A-05 |
| ZC2A74C | 10 | POWER | C-001 | 2A-05 |
| ZC2A75B | 12 | POWER | 2A-05 | C-002 |
| ZC2A75C | 10 | POWER | 2A-05 | C-002 |
| ZC2A76B | 12 | POWER | 2A-05 | C-002 |
| ZC2A76C | 12 | POWER | 2A-03 | C-002 |
| ZC2B36AA | 250 MCM | POWER | 2B52-36A | 2B336A-B958 |
| ZC2B37AK | 12 | CONTROL | 2N04 | 2B03 |
| ZC2B37AL | 12 | CONTROL | 2N04 | 2B03 |
| ZC2B37BJ | 250 MCM | POWER | 2B03 | 2B337B-1B31 |
| ZC2B37BK | 12 | CONTROL | 2N04 | 2B03 |
| ZC2B37BL | 12 | CONTROL | 2N04 | 2B03 |
| ZC2B38AA | 250 MCM | POWER | 2B03 | 2P14A |
| ZC2B40BC | 12 | POWER | 2A-05 | C-002 |
| ZC2J148G | 12 | CONTROL | 2B03-37 | 2B42-06 |
| ZC2J149G | 12 | POWER | 2B03-37 | 2B42-06 |
| ZC2J150G | 12 | POWER | 2B03-37 | 2B42-06 |
| ZC2NA134L | 12 | POWER | 2A05 | 2C157 |
| ZE1391C | 12 | POWER | 1B391 | 2C20 |
| ZE1391D | 12 | POWER | 1B391 | 2C20 |
| ZE1391E | 12 | POWER | 1A05 | 2C20 |
| ZE23212HE | 12 | POWER | 2A05 | 2C20 |
| ZE2391C | 12 | POWER | 2B391 | 2C20 |
| ZE2A73C | 12 | POWER | 2A-05 | C-002 |
| ZE2B37CA | 250 MCM | POWER | 2B03 | B33 |
| ZED0101C | 10 | POWER | D-01 | 2C-20 |
| ZENA010A | 12 | POWER | C-001 | LS-3930A |
| ZENA010B | 12 | POWER | C-001 | LS-3930B |
| ZF1A66C | 12 | POWER | 1A-06(66) | C-002 |
| ZF1A66E | 12 | POWER | C-002 | C-035 |
| ZFG0201E | 12 | POWER | 1A-06 | C-002 |

Attachment 7



Attachment 8



ATTACHMENT 9

D01-2 CONDUIT INFORMATION

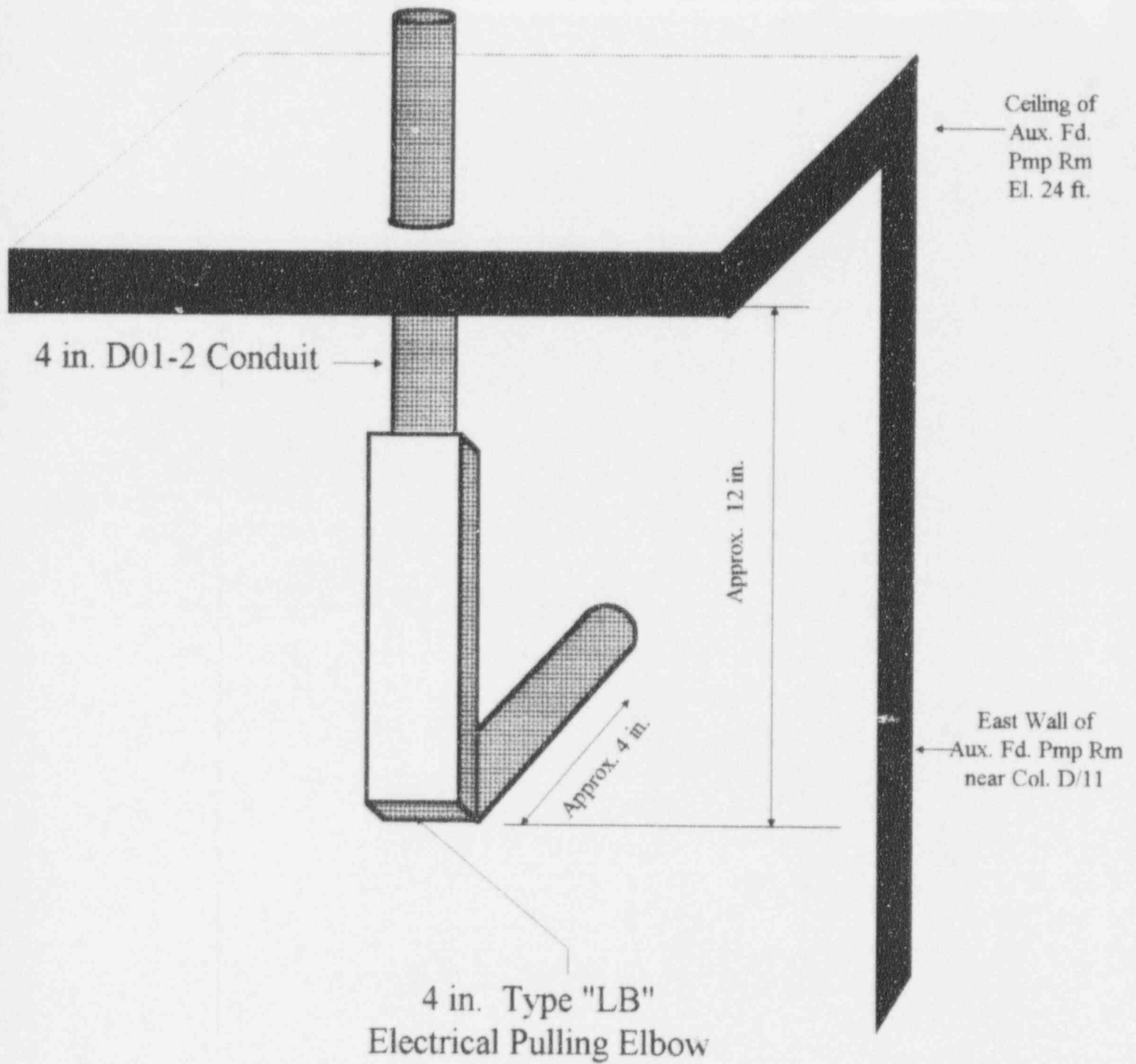


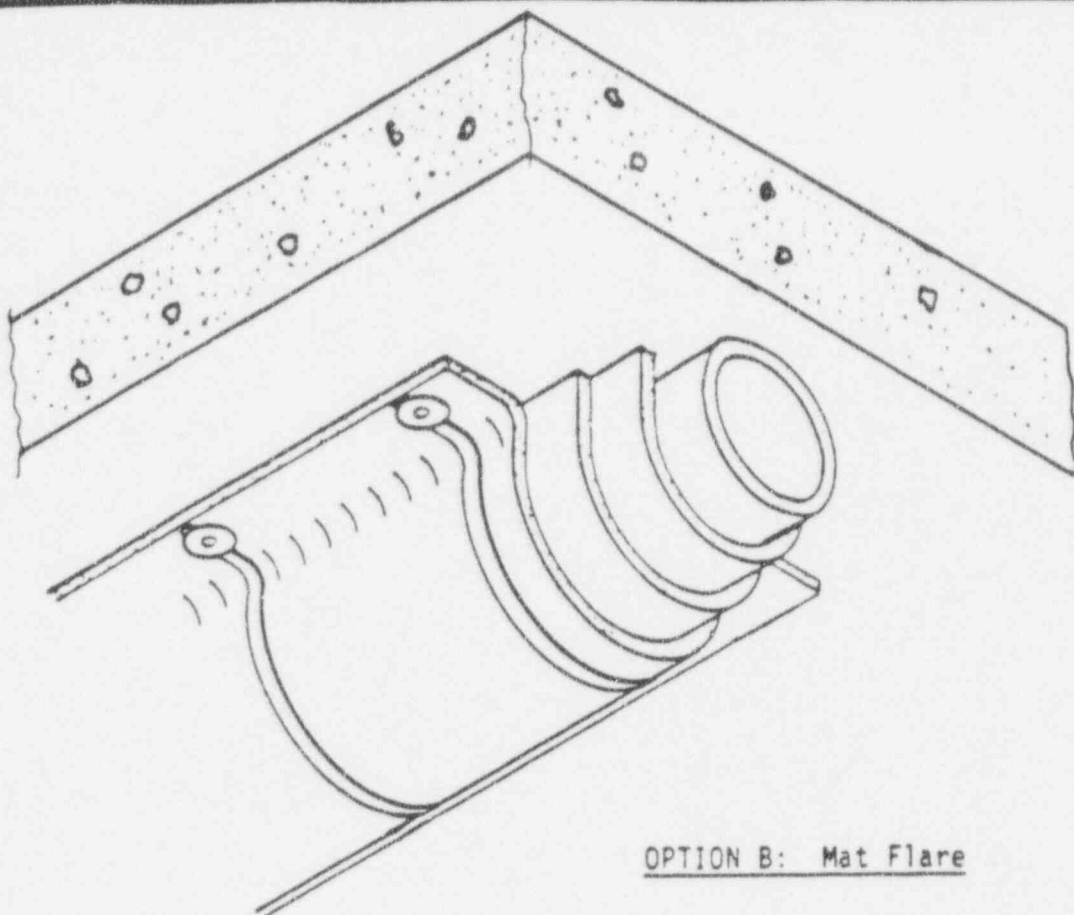
Figure 1.0
D01-2 Conduit Raceway in Auxiliary Feed Water Pump Room

D01-2 Raceway Information

| | | | |
|--|--------------|--------|-------|
| 61.02 Raceway(general) | D01-2 | | |
| 02 Description | SITE RACEWAY | | |
| 11 Function | POWER | | |
| 14 From destination(s) | D-01 | | |
| 15 To destination(s) | D-12 | | |
| 33 Allowable percent fill | 18 | | |
| 61 Type | CONDUIT | | |
| 62 Area(sqin)]Act fill]Dsgn fill | 12.88 | 2.24 | 2.24 |
| 63 Cable(s) | ZED0106A | | |
| 66 Race(lbs/ft)]Tot Act]Tot Dsgn | 9.73 | 13.61 | 13.61 |
| 67 Width(in)]Act fill]Dsgn fill | 4.00 | 3.40 | 3.40 |
| 68 Percent fill actual]design | 17.39 | 17.39 | |
| 83 Number of Cables actual]design | 4 | 4 | |
| 84 Ampacity Cable Area actual]design (In**2) | 2.8900 | 2.8900 | |
| 85 Number of Conductors actual]design | 4 | 4 | |

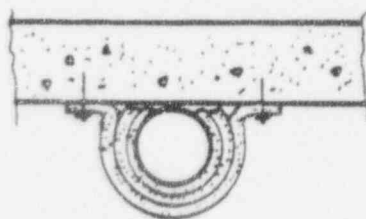
Cable ZED01106A Description

| | | | |
|-------------------------------------|----------------------|--------|--|
| 02 Description | 4-1/C #250 MCM POWER | | |
| 04 Number of cable(s) | 4 | | |
| 15 Function | POWER | | |
| 17 From destination | D-01 | | |
| 18 To destination | D-12 | | |
| 61.06 Cable(general) | ZED0106A | | |
| 21 Maximum load(amps) | 216.00 | | |
| 72 Cable weight(lb/ft) | 3.88 | | |
| 73 Cable width(in) | 3.40 | | |
| 75 Ampacity cable area (sqin) | 2.8900 | | |
| 84 Minimum ampacity Actual] Design | 216.00 | 216.00 | |
| 85 Ampacity Actual \ Design]... | 216.00 | 216.00 | |

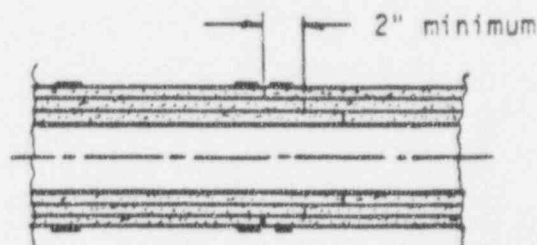


OPTION B: Mat Flare

1. Wrap as many layers of E-53A mat as possible completely around the conduit per 5500-C1.
2. Apply the remaining inner layer(s) of E-53A Mat so that the edges of the mat contacts the concrete.
3. Flare out the third (and final) layer of E-53A so that it extends a minimum of 2" onto the concrete.
4. Install concrete anchors, washers, and stainless steel banding at 8" maximum spacing throughout the system and within 2" of all seams and terminations. An alternative to banding is stainless steel welded wire mesh fully covering the E-53A Mat.
5. Fill any gaps between the mat and concrete with CP 25N/S Caulk.

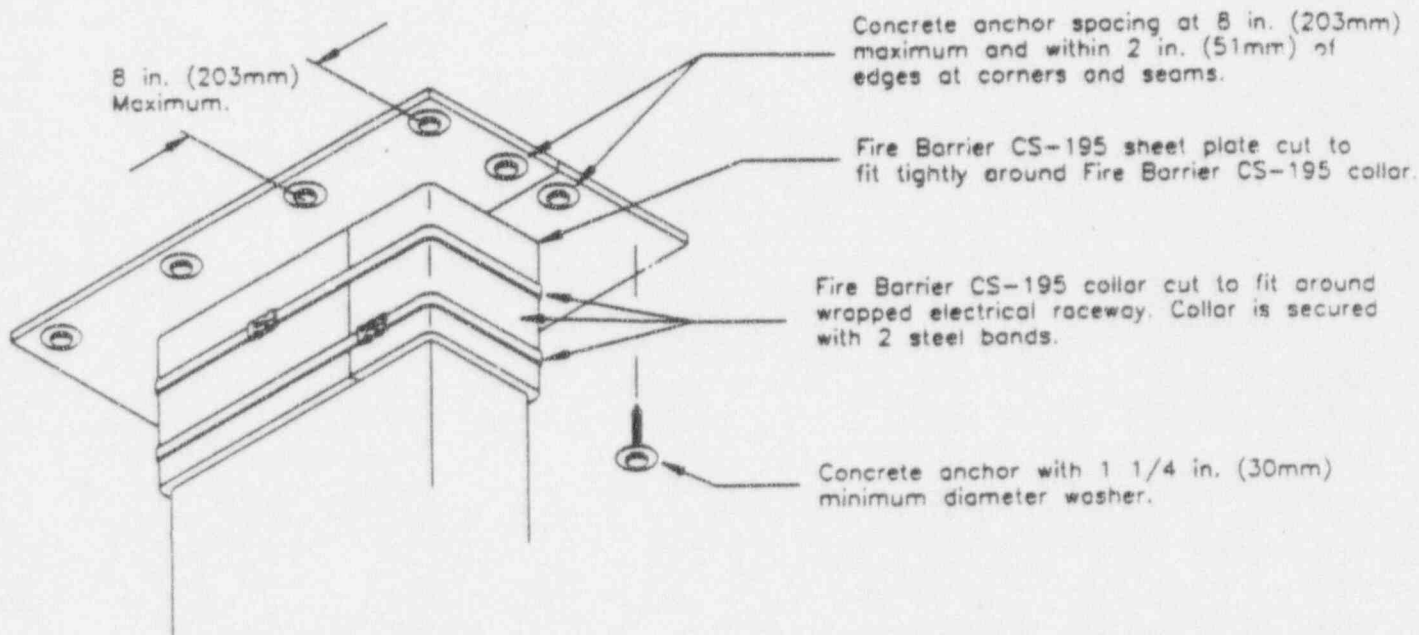


Cross-sectional View



NOTE: No collar or overlap is required on the last layer seam. This applies ONLY when the conduit is against the concrete.

| | | | | | |
|--|--------------|-----------|----------------------|-----|---|
| <small>ALL statements, technical information and recommendations contained herein are based on tests and research to be performed under the conditions of use and application as shown on drawings. The user must be advised that any damage, injury or consequences resulting from the use of this material or design, 3M's only liability shall be to replace any of our products found to be defective.</small> | ISSUE | DATE | REV. | CH. | CONDUIT NEAR SLAB INTERAM™ E-50 SERIES 1-HOUR SYSTEM |
| | 1 | 6-19-87 | | | |
| | NOT TO SCALE | | 6-26-87 R.G. KOZA | | |
| | K.A. Jensen | | R.G. Koza | | |
| Ceramic Materials Department/3M | 3M | 5500-C7-2 | | | Page 2 of 4 |



COLLAR VARIATIONS

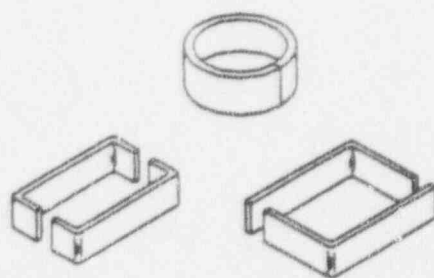
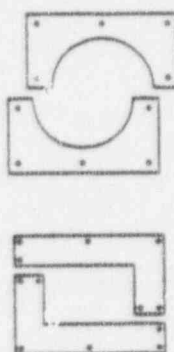
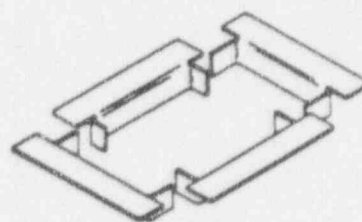


PLATE VARIATIONS



COMBINED COLLAR AND PLATE



All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, however, since the conditions of use and application are beyond our control, 3M shall not be liable for any damage, direct or consequential, resulting from the use of this material or design. 3M's only warranty shall be to replace any of our products found to be defective.

| ISSUE | DATE | REV. | CH. |
|-----------|---------|-----------------|-----------------|
| 1 | 10-1-90 | | |
| CON. I.D. | E-1001 | SUPERSEDED | 5500-E3-7 |
| DR. | E.A.A. | APP. <i>RQW</i> | R.J.I. 10/24/90 |
| DWG. I.D. | 6100-F1 | | |

3M Brand Fire Protection Products
Electrical Raceway
Penetration Firestop

E-50 Series
1 Hour System

3M / St. Paul