

# NORTHEAST UTILITIES



THE CONNECTICUT LIGHT AND POWER COMPANY  
WESTERN MASSACHUSETTS ELECTRIC COMPANY  
HOLYOKE WATER POWER COMPANY  
NORTHEAST UTILITIES SERVICE COMPANY  
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270  
HARTFORD, CONNECTICUT 06141-0270  
(203) 665-5000

October 27, 1989

Docket No. 50-213  
B13262

Re: 10CFR50.12  
10CFR50, Appendix R  
ISAP Topic 1.14

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

Gentlemen:

Haddam Neck Plant  
Fire Protection - Request for Exemptions

On August 30, 1988, a meeting was held between the NRC Staff and Connecticut Yankee Atomic Power Company (CYAPCO) at the NRC offices in Rockville, Maryland. This meeting was held to discuss several fire protection related issues at the Haddam Neck Plant. During this meeting, a number of conditions associated with the design of fire protection features, some of which pertained to the new switchgear building, were discussed. These conditions do not conform with the Staff fire protection requirements and guidelines. The NRC Staff requested additional clarification on several issues but indicated, tentatively, that the conditions were acceptable. The Staff noted however, that in at least three locations these conditions impact existing exemptions from the technical requirements of 10CFR50, Appendix R and that supplemental exemption requests should be submitted. In addition, included with these supplemental exemption requests is one newly identified area where CYAPCO believes an exemption is warranted.

CYAPCO hereby submits the attached exemption requests for NRC Staff review and concurrence pursuant to 10CFR50.12. CYAPCO believes that the exemptions requested provide for equivalent fire protection and that the modifications that would be required to comply with the requirements of 10CFR50, Appendix R would not enhance fire protection safety in the facility and that the existing conditions meet the underlying purpose of the regulation. In addition, CYAPCO believes that the exemptions requested also satisfy the general standards of 10CFR50.12(a), in that they are authorized by law, will not endanger life or property or common defense and security, and are otherwise in the public interest.

The Commission's regulations, specifically 10CFR50.12(a), provide that exemptions may be granted from the requirements in 10CFR50 if "special circumstances" are present and the exemptions are "authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security." Under 10CFR50.12(a)(2)(ii) "special circumstances" warranting an exemption are present whenever, among other things,

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application of the regulation in particular circumstances "is not necessary to achieve the underlying purpose of the rule."

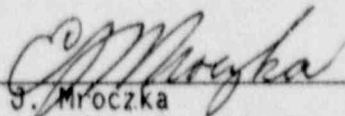
On the basis of the information provided herewith, CYAPCO concludes that the exemptions are justified under the standard of 10CFR50.12. As demonstrated in Attachment 1, the requested exemptions will not present an undue risk to the public health and safety since no significant increase in the risk associated with any fire scenario will result from the granting of the exemptions. Furthermore, "special circumstances" are present in that application of the regulation is not necessary to achieve the underlying purpose of Appendix R. The purpose of Appendix R is to provide reasonable assurance that at least one train of systems necessary to achieve and maintain safe shutdown remains available. As shown in Attachment 1, the requested exemptions will satisfy the underlying purpose of the rule since the ability to achieve and maintain safe shutdown is maintained for any fire scenario.

In summary, CYAPCO has concluded that the exemptions for those areas discussed in Attachment 1 are warranted under the standards of 10CFR50.12. In addition, the many fire protection modifications made during previous outages, including the ongoing construction of the New Switchgear Building, represent CYAPCO's prudent steps to improve the fire protection features and capabilities at the Haddam Neck Plant and demonstrate CYAPCO's good faith efforts to comply with the requirements of Appendix R.

The exemptions requested and the associated technical justifications are included in Attachment 1. We trust you will find this information satisfactory and we remain available to answer any questions you may have during your review of this material.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

  
\_\_\_\_\_  
E. J. Mroczka  
Senior Vice President

cc: W. T. Russell, Region I Administrator  
A. B. Wang, NRC Project Manager, Haddam Neck Plant  
J. T. Shedlosky, Senior Resident Inspector, Haddam Neck Plant

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Attachment 1  
Haddam Neck Plant  
Requests for Exemptions

October 1989

Exemption Request No. 1  
Appendix R, Section III.G.(1)(a)  
Auxiliary Feedwater Valves

Exemption Requested

CYAPCO is requesting an exemption from the requirements of 10CFR50 Appendix R, Section III.G.(1)(a), that require one train of systems necessary to achieve and maintain hot shutdown conditions remain free from fire damage, for Auxiliary Feedwater Valves FW-MOV-35 and FW-MOV-160.

Description

Motor-Operated Valves FW-MOV-35 and FW-MOV-160 are located in the auxiliary feedwater pump room (Fire Area R-2). These valves are used to direct auxiliary feedwater flow to the steam generators along either the preferred path through the auxiliary feedwater regulating valves or along the alternate path, directly to the steam generators. The valves are aligned in their design hot shutdown position during normal plant power operations and would not be required to change position in the event of an Appendix R fire scenario. A fire in the auxiliary feedwater pump room could damage these valve motor operators; however, because these valves will fail as is, this would not prevent the plant from achieving and maintaining hot shutdown. CYAPCO requests an exemption from the requirement of Appendix R that systems necessary to achieve and maintain safe shutdown be free of fire damage in that fire damage to FW-MOV-35 and FW-MOV-160 will not prevent the plant from achieving and maintaining hot shutdown.

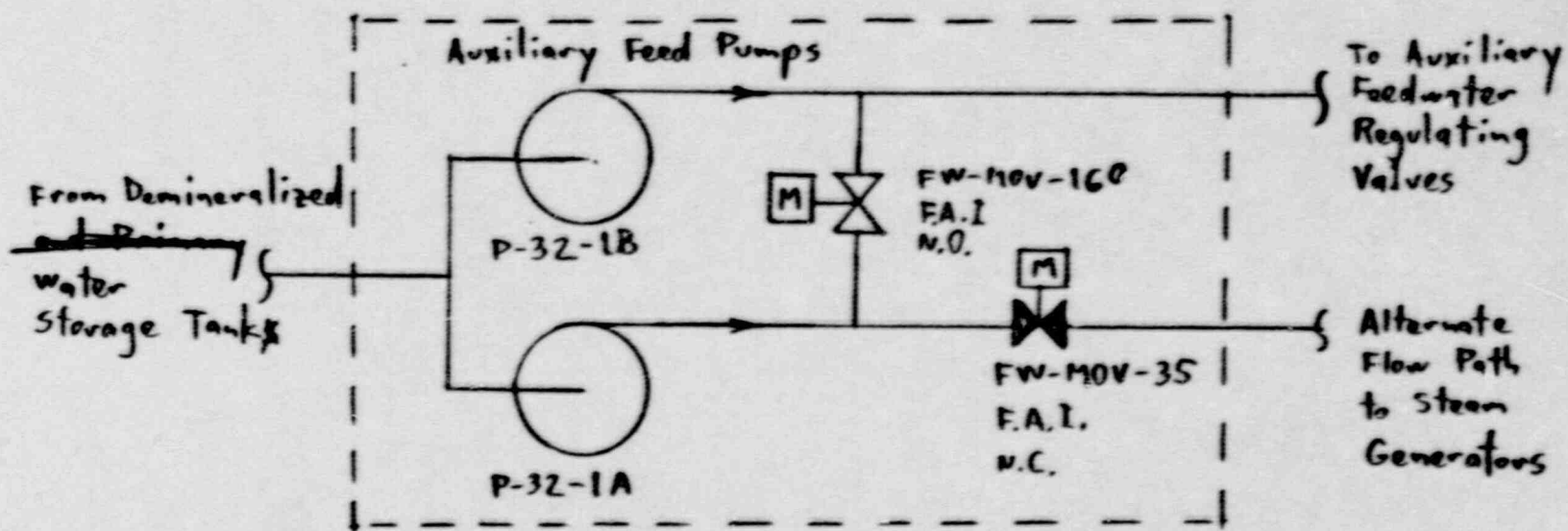
Technical Justification

1. Valves FW-MOV-35 and FW-MOV-160 are aligned in their desired hot shutdown position during normal plant power operation. Changing the position of these valves is not required to achieve hot shutdown following a fire in Fire Area R-2.
2. Fire damage to the valve motor operators will cause the valves to fail as is in their required position.
3. The control cables for Valves FW-MOV-35 and FW-MOV-160 do not run through Fire Area R-2. An associated circuit analysis has been conducted for these valves. The results of this analysis indicate that these valves are not subject to spurious valve actuation as a result of a fire in Fire Area R-2.



Conclusion

Damage to Valves FW-MOV-35 and FW-MOV-160 during an auxiliary feed pump room (Fire Area R-2) exposure fire will not result in the inability to achieve hot shutdown in a safe and timely manner. The underlying purpose of 10CFR50 Appendix R is met in that despite fire damage to these valves, safe shutdown can be achieved and maintained. Therefore, it can be concluded that an exemption from the requirement of 10CFR50 Appendix R, Section III.G(1)(a) for systems necessary to achieve safe shutdown to remain "free from fire damage" is technically justifiable in this case.



AUXILIARY FEEDWATER PUMP ROOM  
(FIRE AREA R-2)

Fire Protection Exemption No. 2 (Supplemental)  
Men's Locker Room Service Water Cables  
Fire Area S-3, Zone B

Existing Exemption, Area of Concern

Originally, CYAPCO submitted an exemption concerning the lack of a 3-hour rated boundary construction of a cable chase in the men's locker room (old fire area S-9) which contained all four service water cables and cables associated with the electric and diesel fire pumps. The exemption requested relief from Section III.G.2 of Appendix R in that separation of cables didn't exist and that smoke detection was not installed. Based upon cable chase construction, the use of flammastic on the cables in the chase, and the fact that the area around the cable chase is protected by a sprinkler system, the NRC granted the exemption (SER dated 11/27/87).

At this time, due to modifications associated with construction of the New Switchgear Building, the configuration described in the old exemption will be altered. The new configuration will enhance the previously approved configuration.

Discussion and Justification

With the construction of a new switchgear building, the power supply for Service Water Pump D will be moved from the old switchgear room to the new switchgear building. Accordingly, the cables for Pump D will be re-routed. Pump D cables will now pass beneath the service building floor before entering the old duct bank.

The cables will join in a new concrete junction box located below the floor within manhole #3. In this junction box, a new service water pump cable will be spliced on to the existing "D" service water pump and travel out to the intake structure in its own conduit (in the duct bank). The only separation at this point to the intake structure will be the conduits in a concrete duct bank which is considered a new junction box (the new cable/conduit, at the bend into the junction box, will be the only exposed section of cables. The others will be covered by existing concrete). This new route will eliminate the need to have all four service water cables in the same vertical cable chase. Refer to the attached sketch for routing details.

Conclusion

Based on the above, CYAPCO concludes that the proposed cable routing will enhance the existing cable routing by removing one service water cable run from the vertical cable chase, and that this change does not degrade the basis for the original exemption. In addition, the separation of cable by physical distance (also located below the concrete floor), the lack of combustibles in

the area and the existence of the suppression system will enhance the fire protection capabilities beyond what was previously approved.

Rerouting of the power cable for service water pump D will maintain the ability to achieve and maintain safe shutdown in the event of a fire. An exemption from Section III.G.2 of Appendix R is still needed in that adequate separation (i.e., 20 feet) is still not possible in order to comply with Appendix R. The new configuration will enhance the previously approved configuration and will not alter the detection and suppression capabilities discussed in the basis of the existing exemption. Therefore, it can be concluded that the basis for the existing exemption has not been substantially revised and the justification for originally granting the exemption remains valid.



# MEN'S LOCKER ROOM

Direct Rooms  
←

Cable Chose  
1 hr RATED

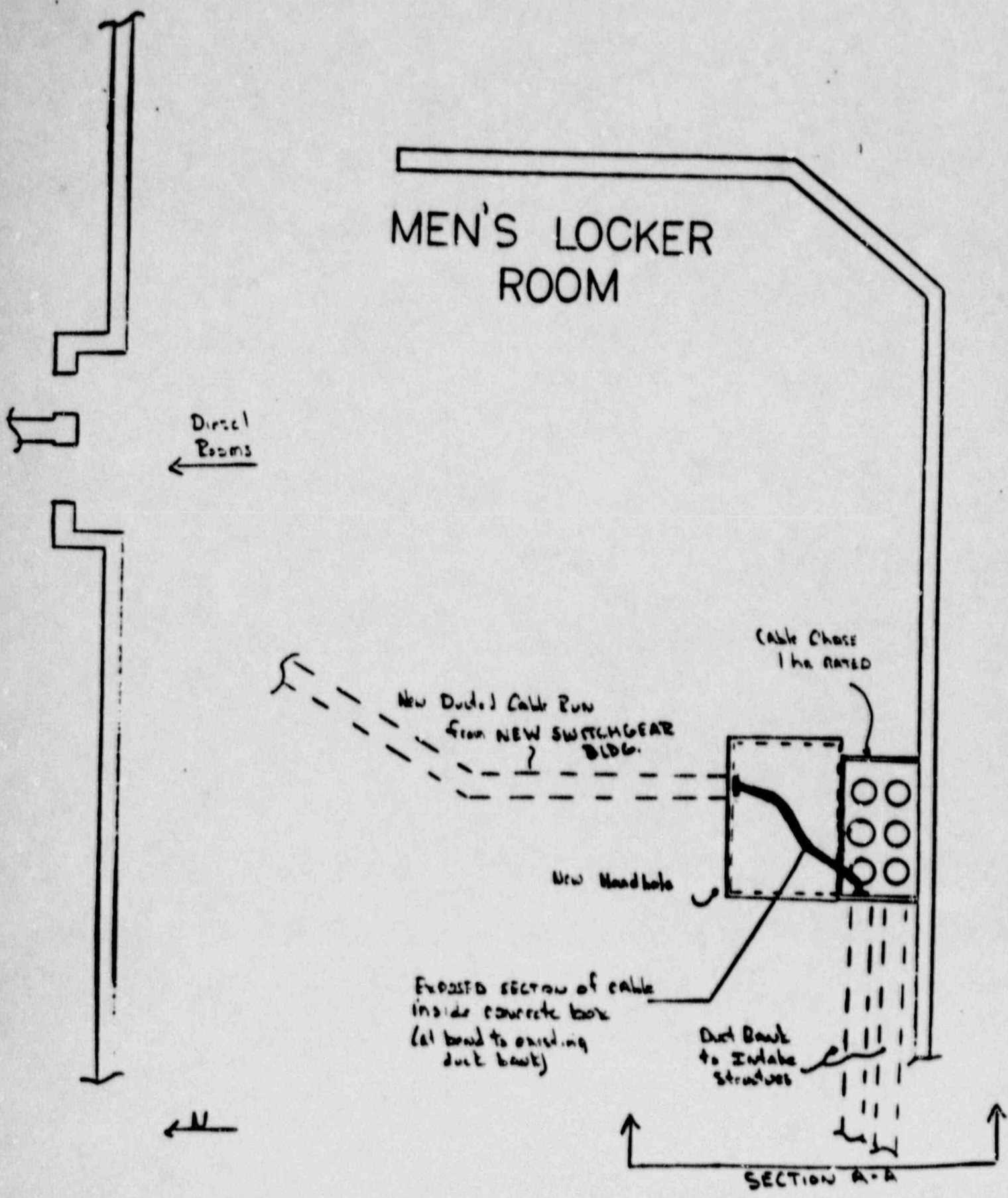
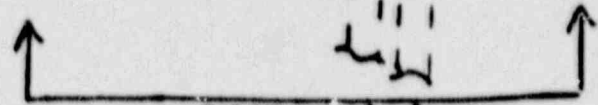
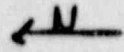
New Ducted Cable Run  
from NEW SWITCHGEAR  
BLDG.

New Handhole

EXPOSED SECTION of cable  
inside concrete box  
(at bond to existing  
duct bank)

Duct Bank  
to Intake  
Structures

SECTION A-A



SECTION A-A

MEN'S LOCKER ROOM

AREA Protected By  
Automatic Sprinklers

LG Room

Floor EL 21'6"

CONDUIT DUCT FROM NEW  
Switchgear Bldg

CONCRETE Junction Box

Removable concrete  
PLUG

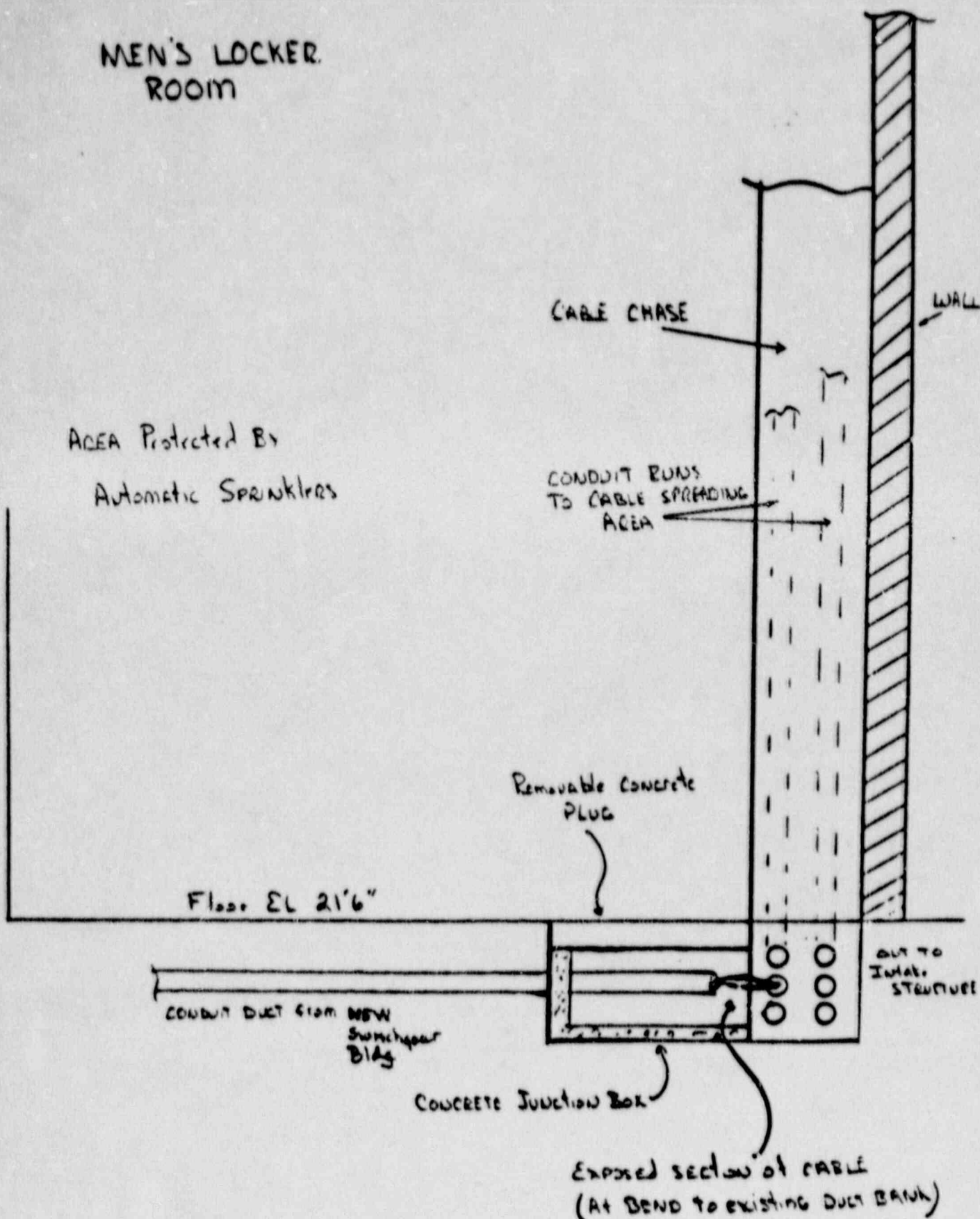
Exposed section of CABLE  
(At BEND TO EXISTING DUCT BANK)

CABLE CHASE

CONDUIT RUNS  
TO CABLE SPREADING  
AREA

WALL

DUCT TO  
INTAKE  
STRUCTURE



Fire Protection Exemption No. 3 (Supplemental)  
Primary Auxiliary Building  
Fire Zone Nos. A-1E/A-2F

Existing Exemption, Area of Concern

Originally, CYAPCO submitted an exemption concerning the lack of separation of redundant RHR cables with a 3-hour fire rated boundary in the RHR pump pit area, Fire Zone Nos. A-1E and A-1F. This exemption was granted by the NRC in an SER dated November 14, 1984.

The original exemption proposed to credit a partial height wall as adequate separation to that required by Section III.G.2.A of Appendix R and to provide physical separation of redundant cables. This exemption modifies the original in that one (1) division of RHR cables will be protected by 3-hour cable wrap from where the redundant cables enter the "A" pump cubicle to the "B" junction box located in the "B" cubicle adjacent to the RHR pump (instead of re-routing outside of zone.)

Proposed Modification

1. Install curbing at access to RHR pump rooms. Keeps spilled lube oil from affecting both pump cubicles (completed). Refer to attached sketch.
2. Seal access hatchway from operating floor, elevation 21'6" (completed).
3. Wrap cables associated with Pump B in 3-hour rated cable wrap as they pass by the "A" RHR pump cubicle (will be completed as part of the new switchgear building upgrade).

Discussion and Justification

Fire zone A-1E contains residual heat removal (RHR) pump A and RHR heat exchanger A. The redundant components (division B) are located in fire zone A-1F adjacent to zone A-1E (see attached sketch). Fire zones A-1E and A-1F are surrounded by 24-inch reinforced concrete walls. Zone A-1E is separated from zone A-1F by a 10-foot high 24-inch thick reinforced concrete wall. A 16-foot high 24-inch thick concrete wall exists between the pumps and their heat exchangers.

Although not totally enclosed from each other, the fire boundary design separating zone A-1E from zone A-1F provides a significant level of protection for the RHR system components located in the areas in question from a fire in any one of the two zones.

Combustible materials consist of one gallon of lube oil in each fire zone for the RHR pumps. All cabling in fire zones A-1E and A-1F are enclosed in

conduit, thereby negating the associated fire hazard. Early warning ionization detection exists in the return airduct which would alert the plant fire brigade to any fire related event.

CYAPCO's proposed modification is to curb the access to the RHR pump rooms. The curb will prevent the spread of oil between areas as well as divert any spill into a trench located along the west wall, which will contain and dispense any spill away from the immediate area. In addition, the access from the operating floor (elevation 21'6") will be sealed in order to prevent a flammable liquid spill from above from affecting both fire zones at the same time. The use of 3-hour rated cable wrap on cables associated with Pump B assures that a fire in the "A" pit area would not affect safe shutdown capability of the "B" RHR pump.

### Fire Zone Analysis

#### 1. Design Features

- o This area is a pit located at elevation - 19'.
- o This area is normally unoccupied.

2. <u>Combustible Material</u>	<u>Quantity</u>	<u>(BTU/ft<sup>2</sup>)</u>
Oil	1.0 gal	400

#### 3. Assumed Fire Duration

- o Less than one (1) minute.

#### 4. Fire Protection

- o 20-lb. carbon dioxide extinguisher in the pit near pump 1A.
- o Early warning ionization detection located in air-return duct.
- o Hose station exists in zone A-1A.

### Conclusion

CYAPCO concludes that the construction separating fire zones A-1E and A-1F provides an equivalent level of protection to that of Section III.G.2.A of Appendix R. This is based on the extremely low combustible loading, fire protection features provided (curbs, sealing, cable wrap, etc.) within the two zones as well as the inherent capability of the RHR system components to resist the products of combustion, namely heat, which would be generated by a fire in the adjacent zone. The forty-foot ceiling affords significant volume in which heat generated by a pump lube oil fire could collect/vent prior to

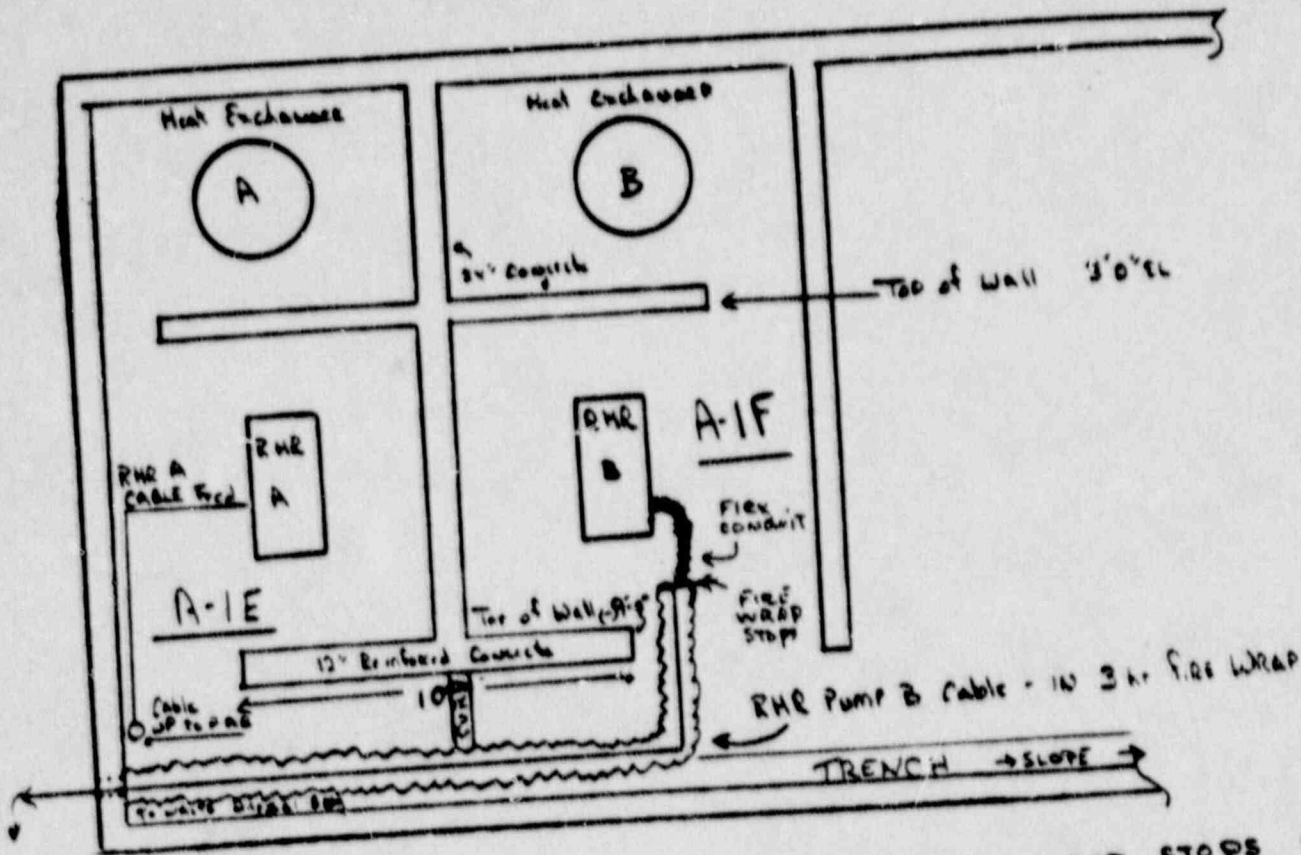


impacting the adjacent fire zones. Either RHR pump A or B can be manually aligned to either heat exchanger A or B providing increased assurance that the RHR function will be available following a fire in any one of these fire zones.

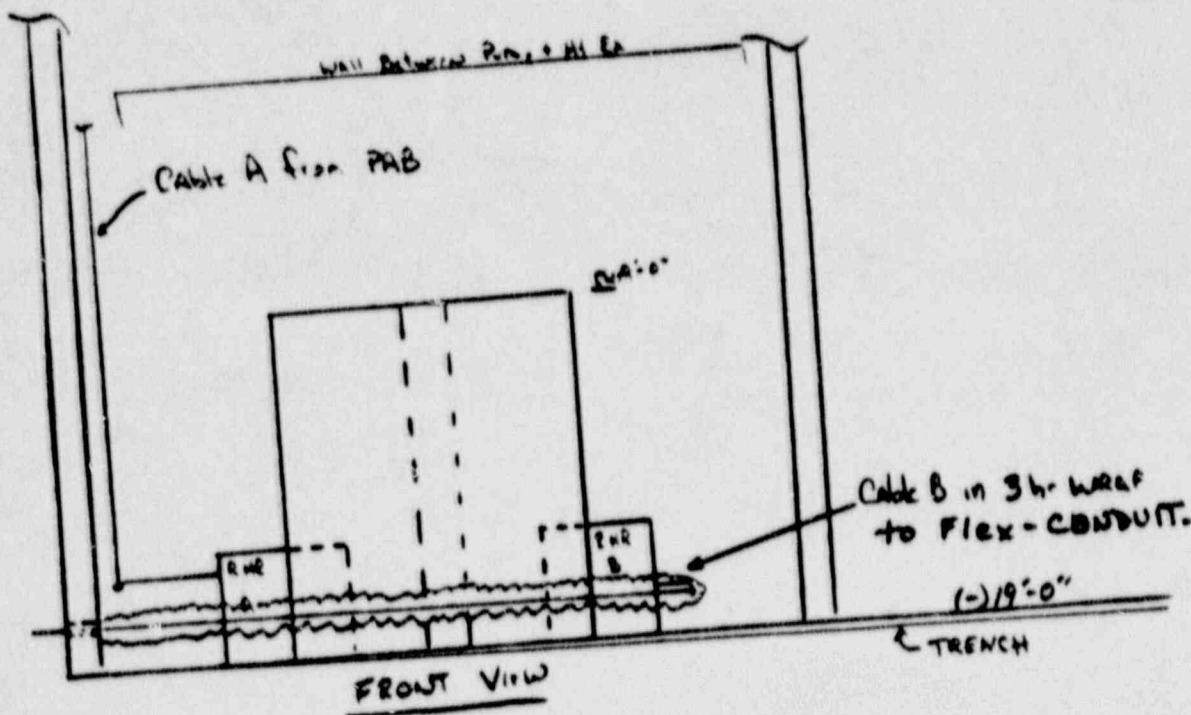
The installation of 3-hour rated cable wrap, the sealing of the access hatchway, and the installation of curbing at the access to the RHR pump rooms will ensure the ability to achieve and maintain safe shutdown in the event of a fire. An exemption from Section III.G.2.A is still required in that the required separation (i.e., 20-feet) is still not achieved. The new configuration will enhance the previously approved configuration and will not invalidate the basis of the existing exemption. Therefore, it can be concluded that the basis for the existing exemption has not been substantially revised and the justification for originally granting the exemption remains valid.

# RHR PUMPS

A-IE/A-IF



NOTE: FIRE WRAP STOPS AT  
CHANGEOVER TO Flex-Conduit



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Fire Protection Exemption No. 4 (Supplemental)  
Containment Cable Vault  
Fire Area No. R-1

Existing Exemption, Area of Concern

Originally, CYAPCO requested an exemption from the requirements of 10CFR50, Appendix R, Section III.G.(2)(b), that requires cables and equipment of redundant trains to be separated by a horizontal distance of more than 20 feet with no intervening combustibles, for the safe shutdown required cables located inside the containment cable vault. The NRC Staff approval of this exemption was based in part on the fact that some of the shutdown cabling which could not be rerouted was separated by a one-hour fire rated barrier that conforms with the technical requirements of Section III.G.(2)(c) of Appendix R. Specifically this was to be accomplished utilizing a one-hour fire rated cable wrap. CYAPCO is now proposing to utilize fire rated cables in lieu of fire rated cable wrap for these safe shutdown required cables, which may not literally comply with the specific technical requirements of Section III.G.(2)(c).

CYAPCO is requesting an exemption from the requirements of 10CFR50, Appendix R, Section III.G.(2)(c), that requires enclosures of cables and equipment of one redundant train in a fire barrier having a 1-hour rating for the safe shutdown required cables located inside the containment cable vault. Originally, CYAPCO submitted an exemption concerning the configuration of these cables, that was granted by the NRC (SER dated 11/14/84) based on a proposed modification to reroute two divisions of instrumentation to provide 20 feet of separation, the use of cable wrap for cables that could not be rerouted, and the fact that a CO<sub>2</sub> suppression system and detection system was installed in the area.

Proposed Modifications

CYAPCO is proposing to use 3-hour rated mineral insulated (MI) cable for certain cable runs inside the cable vault. These cables, which are being credited with a 1-hour fire rating only, will be utilized for the following cable runs in the cable vault:

PT 401-3	Pressurizer pressure
LT 401-3	Pressurizer level
LT 1302-1B	Wide Range Steam Generator Level
LT 1302-2B	Wide Range Steam Generator Level
TE 433A	Wide Range RCS Temp.
TE 433B	Wide Range RCS Temp.
WR-4 (Power)	Source Range Nuclear Inst.
WR-4R (Inst.)	Source Range Nuclear Inst.
PT 404	Wide Range RCS Pressure

LT 1302-3B	Wide Range Steam Generator Level
LT 1302-4B	Wide Range Steam Generator Level
TE 443A	Wide Range RCS Temp
TE 443B	Wide Range RCS Temp
CET (N6)	Core Exit Thermocouple
CET (L10)	Core Exit Thermocouple
CET (N10)	Core Exit Thermocouple
CET (N12)	Core Exit Thermocouple
PT 1201-1B	Steam Generator Pressure
PT 1201-2B	Steam Generator Pressure
PT 1201-3B	Steam Generator Pressure
PT 1201-4B	Steam Generator Pressure

In addition, CYAPCO proposes to use 1-hour fire rated "Fire Zone R" cable manufactured by Rockbestos for (2) of the (4) CAR fan power circuits which also run through the cable vault (CAR Fans #3 and #4).

#### Discussion and Justification

Originally, CYAPCO submitted an exemption concerning the configuration of safety-related and nonsafety-related cables in the Containment Cable Vault. The exemption concerned the fact that in certain areas of the cable vault, nonsafety-related cables within the overhead trays represented intervening combustibles to the safety-related cable (conduit) system located against the lower sections of the outer walls. It was noted that a total flooding automatic CO<sub>2</sub> system and smoke detection system protected the area. Based upon proposed modifications to reroute 2 divisions of instrumentation to provide 20 feet of separation, the use of cable wrap for cables which couldn't be moved and the fact that a CO<sub>2</sub> suppression system and detection system is installed, the NRC granted the exemption (SER dated 11/14/84).

At this time, due to modifications associated with construction of the New Switchgear Building, and the acceptance by the NRC to use fire rated cable in certain configurations, the configuration described in the previously approved exemption will be modified.

MI cables will be used to transmit one set (Train B) of Appendix R safe shutdown process monitoring parameters through the cable vault. This set of safe shutdown parameters will be utilized during cable vault fires. The MI cable has been successfully UL tested in accordance with ASTM Standard E119 for a three-hour fire rating, however, the cable will be credited with a rating of only one hour for this fire. The cable will be provided by Combustion Engineering and is the same type used for the in-containment fire protected safe shutdown instrumentation (train A). This MI cable was previously approved by the NRC for use outside of containment at our Millstone Unit No. 1 plant.



The transition from containment to the cable vault will be made via special welded penetrations which incorporate the fire qualified MI cable.

The MI cable will be routed from the penetration, up the cable vault containment wall, across the cable vault ceiling, and down the facing wall to the new duct bank. MI cable will also be routed from the Auxiliary Feed Pump room through the cable vault ceiling through approved fire stops to the new duct bank. The routing of the cable will be such that falling debris resulting from the cable vault fire will not affect the integrity of the MI cable. The MI cable will be fastened to the cable vault surfaces using unistrut and tubing clips. This fastening method has been qualified as part of the MI cable fire qualification.

The transition from MI cable to organic cable will take place within a one-hour fire rated enclosure. This enclosure and the conduit transition to the duct bank will have a one-hour wrap and will carry the Appendix R, Train B instrument cables from the cable vault. This enclosure and the cable runs from the duct bank to the enclosure will be fire protected to meet Appendix R, Section III.G.2.c. This enclosure and cable run has also been evaluated with respect to falling debris resulting from a cable vault fire and has been determined not to be a concern.

Attached sketches #1 and #2 are provided to illustrate this scheme.

Presently, the four CAR fan power cables enter the Cable Vault through the same ductbank (Duct bank #23). From the duct bank, two CAR fan cables (Fan #1 and 2) travel in conduit to the left around the cable vault outer walls into their respective penetrations. The second two fan cables (Fan #3 and #4) travel in conduit to the right (See Sketch #4). In the vicinity of the duct bank, Appendix R separation is not maintained.

To address this concern, two new "alternate" circuits will be run from the new switchgear room through a new duct bank to the cable vault. Within the cable vault, two new transfer switches will be installed against the south wall. From the transfer switches to the penetration, the circuit will consist of "Fire Zone R" cable.

The transfer switches will allow the two CAR Fans (Fans #3 and #4) to be aligned to either Bus 6 and 7 in the old switchgear room or Bus 11 in the new switchgear room. This capability will resolve the concerns over switchgear room fires where all four CAR fan power supplies could be lost due to fire. For the worst case containment cable vault fire (a fire in duct bank #23), the transfer switches will provide a manual means of transferring power feeds to the car fans after the fire is extinguished in the area. The "Fire Zone R" cables are being proposed for the runs between the transfer switches and the containment penetrations because a short section of these two cables pass within the twenty foot area where duct bank 23 enters the cable vault. (See

Sketch #5). The use of Fire Zone R cable assures the cables/ circuits will survive a postulated fire and eliminates the concern over maintaining cable wrap as was originally proposed.

Detection in the area would provide early warning of a fire condition and cause the total flooding CO<sub>2</sub> to discharge. As stated in the previous exemption, combustibles are limited to the penetration area and the nonsafety-related cable tray system in the overhead; neither of which represent a significant fire load or direct exposure.

### Fire Zone Analysis

#### 1. Design Features

- o The cable vault has reinforced concrete walls.
- o Roof construction is Class 1.
- o Safety-related cables are located low to the floor in a rigid steel conduit system which runs around the external walls of the vault.
- o Nonsafety-related cables are located in the overhead.

2. <u>Combustible Material</u>	<u>Quantity (ft 3)</u>	<u>Fire Load (Btu/ft<sup>2</sup>)</u>
Cables	24	14,906

#### 3. Assumed Fire Duration

14 minutes

#### 4. Fire Protection

- o An automatic total flooding carbon dioxide system.
- o Smoke detection provided for both levels with alarms to the control room.
- o The supply and exhaust fans shutdown and the automatic air damper in the intake duct closes on actuation of the carbon dioxide total flooding system.
- o A 20-pound dry chemical extinguisher is located near the door in the upper level.
- o A hose station in the service building can be used in this area.

### Conclusion

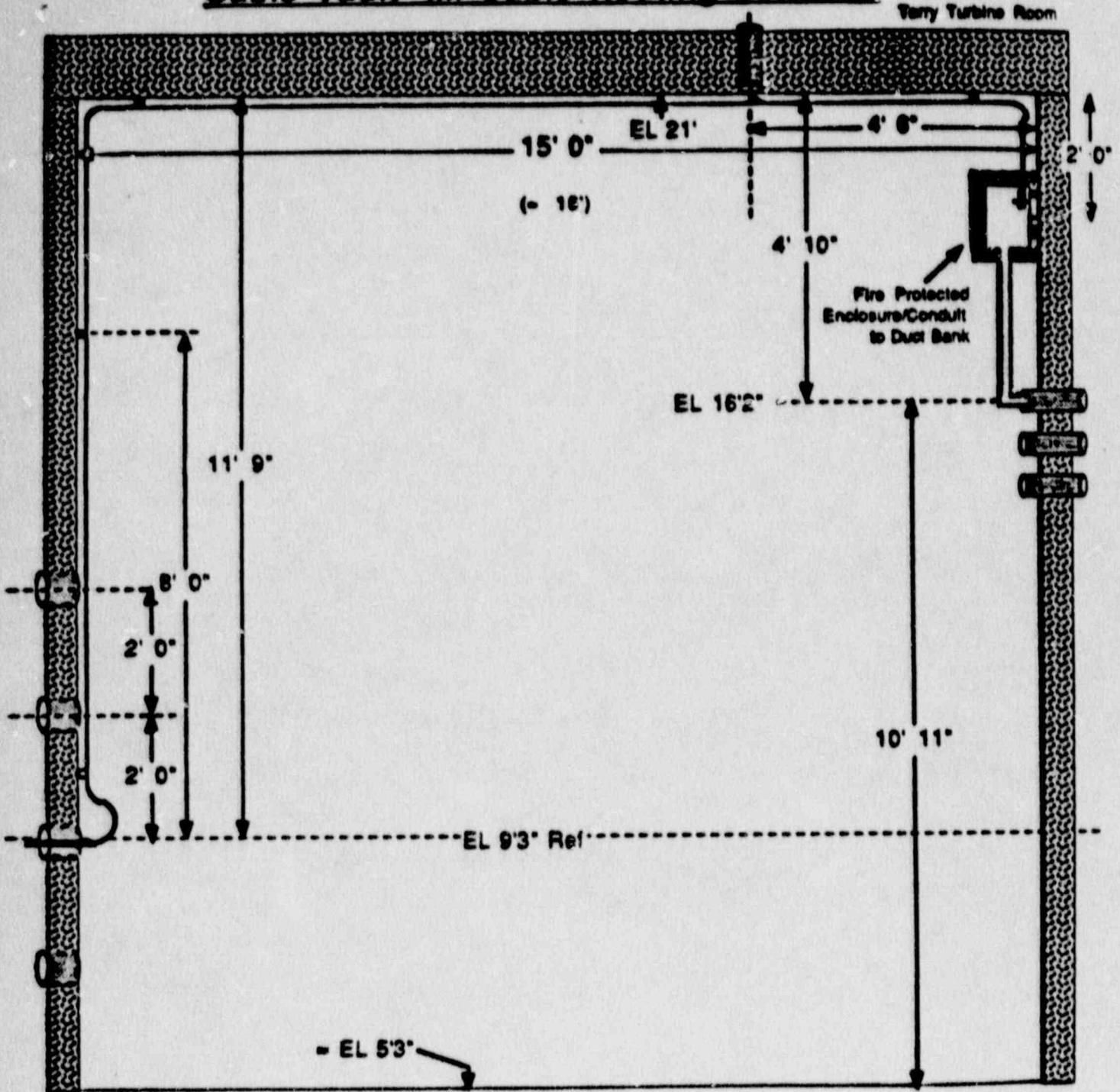
CYAPCO concludes that the use of MI cable for instrumentation and Fire Zone R cable for power cables in this instance provides an equivalent level of protection to that of Section III.G.2.c of Appendix R and to what was approved in the original exemption, based on the low combustible loading, the tested

Attachment 1  
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fire rating of the MI and Fire Zone R cables, and the total flooding CO<sub>2</sub> suppression system and detection system located in the area. Consequently, this arrangement provides an acceptable level of fire protection for the area and equipment of concern.

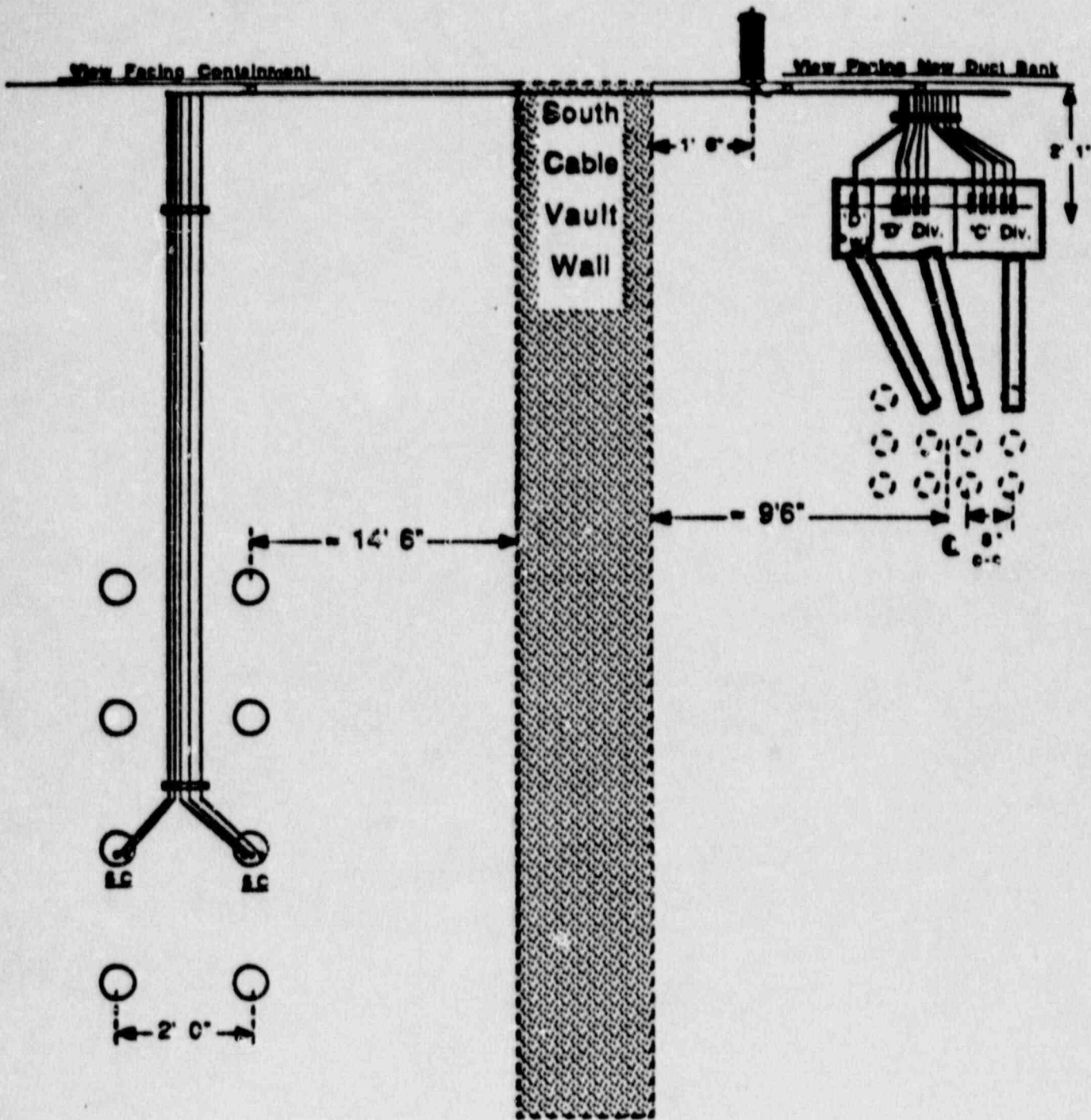


**CY - Appendix R Effort**  
**Cable Vault- MI Cable Routing Scheme**

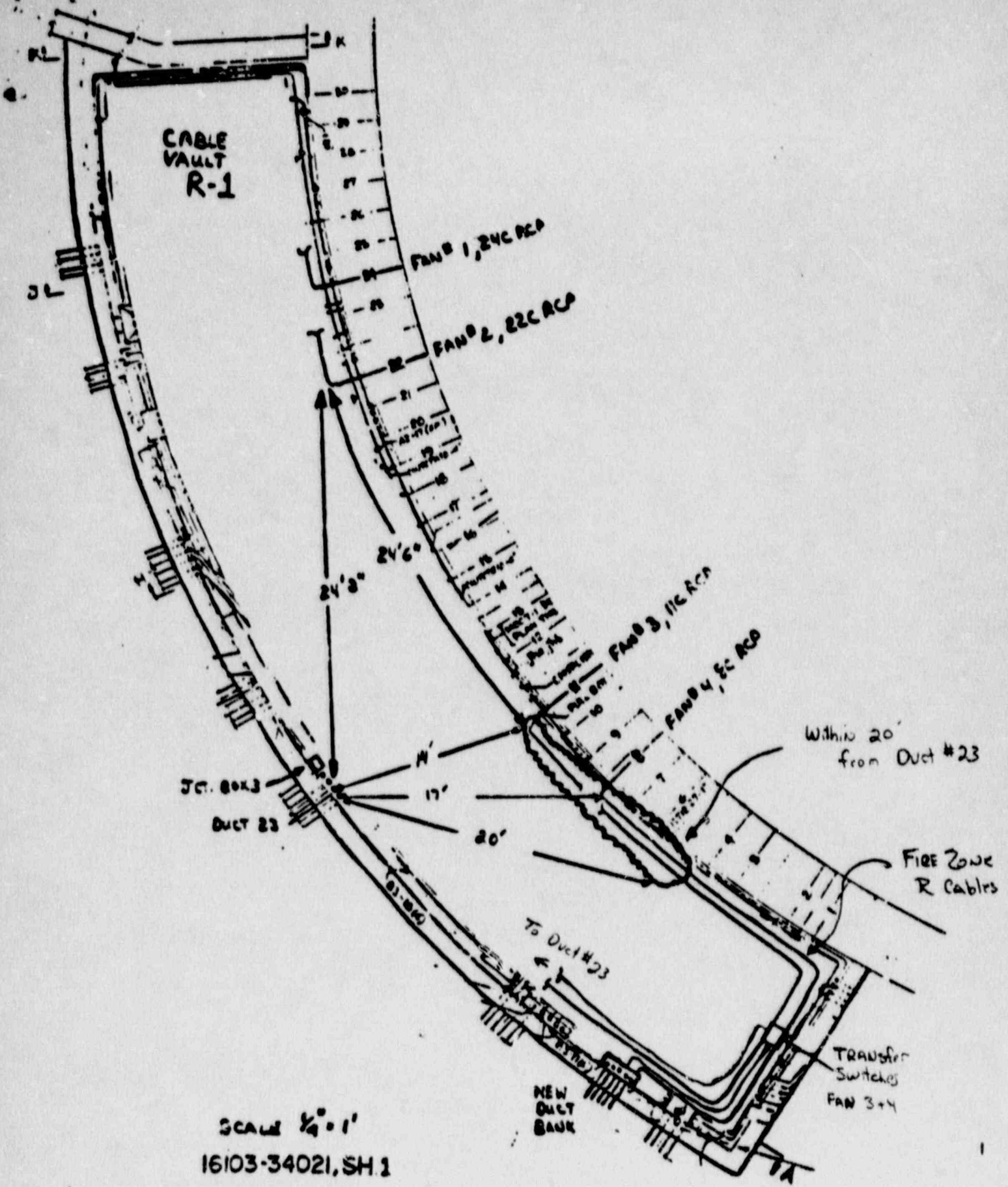


SKETCH I





SKETCH 2



SCALE  $\frac{1}{4}'' = 1'$   
 16103-34021, SH 1

SKETCH 3





