

ARKANSAS NUCLEAR ONE

UNITS 1 AND 2

10 CFR 50 APPENDIX R FIRE PROTECTION REVIEW

UNIT 1

MODIFICATIONS DETAILS

FIRE ZONE: 1MH09 AND 1MH-10, YARD MANHOLES

Both of these fire zones contain the redundant cables associated with the ANO-1 diesel generator fuel oil transfer pumps. These pumps are required to transfer oil from the ANO-1 fuel oil storage tank to each of the diesel generator day tanks. Modifications will be made involving crossties to the ANO-2 fuel transfer pumps so that the ANO-2 pumps can be used if a fire in either of these zones were to cause loss of both ANO-1 diesel fuel transfer pumps. ~~Such pumps will not be required to function for at least 1 hour of shutdown operation allowing sufficient time for transfer to ANO-2 pumps.~~ These modifications are described in more detail in Appendix B to this report. Since these modifications are in effect providing an alternate shutdown capability for this zone, as well as other zones, Appendix B also provides the pertinent information in response to the NRC request for certain details related to alternate shutdown means.

With these modifications this zone will comply with Appendix R.

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UNIT 1

EXEMPTION DETAILS

FIRE ZONE: 1MH04 and 1MH06, YARD AREA MANHOLES

A. AREA DESCRIPTION

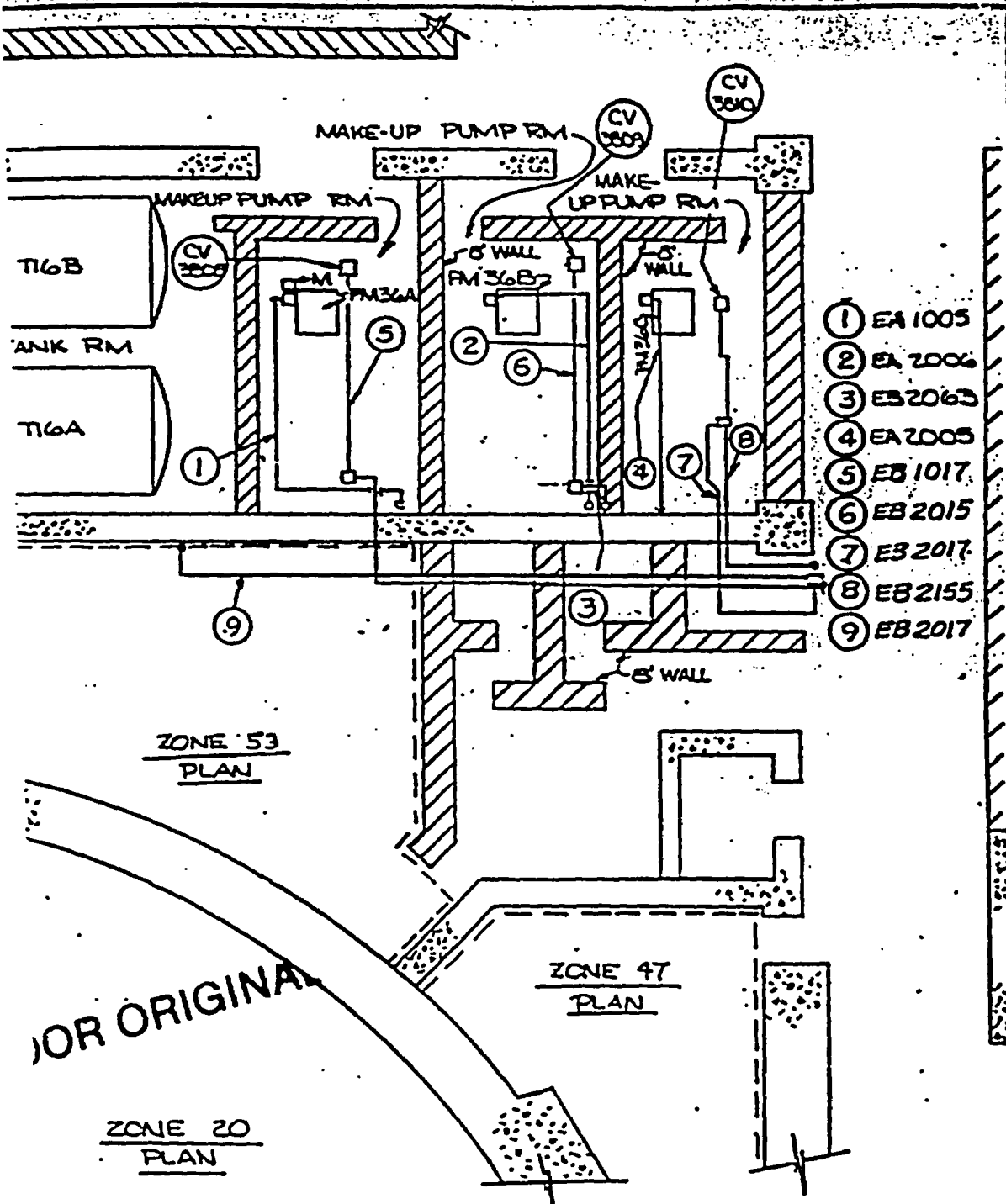
The manholes are poured concrete construction bunkers that are approximately 5 feet by 5 feet by 5 feet. The manholes contain exposed cables as cabling passes from conduit in one duct bank to the next duct bank. These manholes are located as shown in Figure MH0. The manhole bunker is elevated approximately 6 inches above the surrounding grade. The manholes are not ventilated and are not normally accessed. During plant operations there is normally no reason to access these areas. Access to the areas requires lifting the large concrete cover with a crane.

B. SAFE SHUTDOWN CAPABILITY

1MH04 and 1MH06 contain the power cables for the red and swing service water pumps. If the green service water pump were out of service for an extended period as allowed by the Technical Specifications, either the red or swing service water pump would be required to achieve and maintain hot shutdown as well as cold shutdown. The service water pump power cables are a type using neoprene jacketing.

C. FIRE HAZARD ANALYSIS

These zones contain no combustibles other than cable insulation. 1MH04 has 61,000 btu's of cable insulation (approximately 5 pounds); and zone 1MH06 has 937,000 btu's of cable insulation (approximately 78 pounds). These zones contain no ignition sources. Since the cabling has been flame tested as described in Appendix C, it is therefore difficult to ignite without a large exposure source. Introduction of transient combustibles into this area is extremely remote due to the lack of the need for such access during plant operations and the difficulty of access.



- ① EA 1005
- ② EA 2006
- ③ EB 2063
- ④ EA 2005
- ⑤ EB 1017
- ⑥ EB 2015
- ⑦ EB 2017
- ⑧ EB 2155
- ⑨ EB 2017

ZONE 53
PLAN

ZONE 47
PLAN

ZONE 20
PLAN

FOR ORIGINAL

| | | | | | |
|----------------------------|--|----------------------------|------|-------|--------|
| REVISION | | BY | CH'K | ENG'R | SUP'VR |
| AS POWER AND LIGHT COMPANY | | SCALE : | | | |
| KANSAS NUCLEAR ONE | | | | | |
| UNIT 1 | | DRAWN : <i>[Signature]</i> | | | |
| | | DESIGN : | | | |
| DRAWING NO. | | | | REV. | |
| 20-1 | | | | | |

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TABLE 1.0
STATUS OF FIRE ZONES

UNIT 1 (continued)

| <u>ZONE</u> | <u>MEETS</u> <u>APPENDIX R</u> <u>(Section 2)</u> | <u>NEEDS MOD</u> <u>(Section 3 or 4)</u> | <u>ALTERNATE</u> <u>SHUTDOWN</u> <u>(Section 3 or</u> <u>App A or B)</u> | <u>EXEMPTION</u> <u>(Section 4)</u> |
|-------------|---------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------|
| 12EE | X | | | |
| 120E | X | | | |
| 125E | X | | | |
| 128E | X | | | |
| 129F | | | X | |
| 14EE | X | | | |
| 144D | X | | | |
| 149E | X | | | |
| 157B | X | | | |
| 159B | X | | | |
| 16Y | X | | | |
| 160B | X | | | |
| 161B | X | | | |
| 162A | X | | | |
| 163B | X | | | |
| 167B | X | | | |

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UNIT 1

DOOR ORIGINAL

| <u>ZONE NUMBER</u> | <u>NAME</u> | <u>BASIS FOR COMPLIANCE</u> |
|--------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1E | North Emergency Diesel Generator Exhaust Fans (EL 385) | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 1M403 | Manhole between Auxiliary Building and intake structure | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 1M405 | Manhole between Auxiliary Building and intake structure | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 10EE | East Decay Heat Removal Pump Room (EL 317) | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 104S | Electrical Equipment Room (EL 368) | Redundant safety system in zone not required for hot/cold shutdown. |
| 105T | South Lower Electrical Penetration Room (EL 374'-6") | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 110L | South Battery Room (EL 372) | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 115C | Lube Oil Tank Room (EL 354) | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 12EE | Tendon Gallery Access Area (EL 317) | Contains no redundant safety equipment or cables nor associated circuit concerns. |
| 120E | Boric Acid Addition Tank and Pump Room (EL 385) | Contains no redundant safety equipment or cables nor associated circuit concerns. |

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SECTION 3

ZONES THAT WILL SATISFY APPENDIX R
FOLLOWING MODIFICATIONS

The evaluation that was performed to determine the compliance of Arkansas Nuclear One, Units 1 and 2 with the requirements of 10 CFR 50 Appendix R identified several fire zones that did not fully comply with the requirements of Appendix R. For certain of these fire zones, exemptions are being requested as described in Section 4.0 of this report. For the remaining zones that do not presently comply with Appendix R, modifications can be made to bring the zones into compliance with the requirements of Appendix R. The following provides a brief description of modifications that will be made to those fire zones. Where alternate shutdown capability is being relied upon to bring the zone into compliance with 10 CFR 50 Appendix R, the modifications and plant features to provide this alternate shutdown capability are described in Appendices A & B.

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SECTION 4

ZONES REQUIRING EXEMPTION

As a result of the evaluation performed to determine compliance of Arkansas Nuclear One, Units 1 and 2, with the requirements of 10CFR50 Appendix R, several fire zones have been identified which do not fully comply with Appendix R requirements. For each of these zones an exemption is requested herein, and a description of the specific exemption including justification for the fire protection features available is provided. For some of these fire zones, significant modifications have been made to enhance fire protection features in order to bring these zones into partial compliance with Appendix R requirement yet provide a commensurate level of fire protection.

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UNIT 1

EXEMPTION DETAILS

FIRE ZONE: 20Y, RADWASTE PROCESSING AREA

A. AREA DESCRIPTION

This zone generally is a large area (over 9,000 square feet) at elevation 335' of the Auxiliary Building that contains primarily radwaste processing components and equipment (see attached photographs). Most locations in this zone do not contain safe shutdown components; however, there are two areas where safe shutdown components are located in this fire zone. One is in the area of the makeup pump rooms and an adjacent corridor where cables associated with the makeup pumps are located. Figures 20-1 provide a sketch of the makeup pump room area and adjacent corridor. This area has a 17 foot ceiling; certain walls are only partial 8 foot high walls while the remainder are full height.

The pump cubicles are approximately 10 feet by 20 feet each. The walls are reinforced concrete construction, except as noted in Figure 20-1.

The other area in this fire zone containing safe shutdown equipment is in the Treated Waste Monitor Tanks Room, which contains the two redundant borated water storage tank dropline valves (See Figure 20-2). This room is approximately 37 feet by 34 feet with a 17 foot ceiling.

The two areas containing safe shutdown components are generally open and uncongested (See photographs).

B. SAFE SHUTDOWN CAPABILITY

Makeup Pump Area:

Figure 20-1 illustrates the makeup pump location, and routing and separation makeup pump cables. No cable trays are located in the makeup pump rooms or in the adjacent corridor areas. At least one makeup pump is required in order to achieve and maintain safe

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shutdown. Since one of the three makeup pumps may be out of service for an extended period, separation must be provided so that fire damage is limited to only one makeup pump.

Treated Waste Monitor Tank Room:

Figure 20-2 illustrates the location of the BWST dropline valves, and the routing and separation of cabling for these valves. All cables in this room are routed in conduit; no in-situ combustibles are located in this room. At least one of these BWST dropline valves is required in order to provide a source of water for charging and boration with the makeup pumps to achieve and maintain hot shutdown with loss of offsite power.

C. FIRE HAZARD ANALYSIS

Makeup Pump Area:

The makeup pumps each contain approximately 10 gallons of lube oil. In order to assure that the contents of an oil spill are contained within a makeup pump cubicle, floor drains are provided. There are no combustibles in the east corridor outside the makeup pump rooms where the makeup pump cables are located in conduit. The transient combustible that must be considered for this corridor is 10 gallons of lube oil used for servicing the makeup pumps.

The makeup pump cables in this corridor are for the A and C makeup pump suction valves and are separated by less than one inch.

Since the cables are well off the floor, damage due to a fire in transient combustibles is unlikely. To assure that a fire does not cause loss of both the A and C makeup pumps, a 1-hour fire-barrier will be provided to enclose cables required for the A and C makeup pumps.

The storage cabinet in this corridor used for storage of small amounts of flammable liquids will be moved to a fire zone that does not contain redundant safe shutdown components. Transient combustibles would be introduced into the makeup pump cubicles or in the east corridor to support maintenance operations; however, the maximum amount of transient combustible that could reasonably be introduced into this zone is 10 gallons of lube oil. The partial height (8 feet) walls separating the pump cubicles will

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serve as a radiant energy shield for adjacent components, and allow heat generated by a fire in a pump cubicle to be dissipated into the larger volume of zone 20Y.

The makeup pump room contamination levels and health physics requirements restrict the access to these areas and results in minimal personnel entry during operations. However, the fire brigade would be able to enter these cubicles within 5 minutes of a fire alarm in the control room.

Treated Waste Monitor Tank Room:

There are no in-situ combustibles located in this tank room. The only combustible that could be considered for a fire in this room is a small amount of transient material used for maintenance. The BWST valves are actually located below an opening into zone 67U. Zone 67U does not contain any redundancies required for safe shutdown. The only exposure fire would be from transient combustibles. Due to the proximity of the BWST valve cable conduit to each other, a 1-hour fire barrier will be installed to protect one of the conduits. Due to the height off the floor and the separation between these valves, it is not judged that these valves would be damaged by an exposure fire below them. However, sprinkler protection will be provided for these valves.

D. FIRE PROTECTION - EXISTING OR COMMITTED

Makeup Pump Rooms:

The makeup pump rooms each contain 6 ionization type smoke detectors. Portable extinguishers and hose stations are located outside of the pump rooms providing ready access for fire fighting. As noted above, the walls separating the pump rooms will act as a radiant heat shield.

The corridor east of the pump rooms contains a hose station and several extinguishers. In addition ionization type smoke detectors are located in this corridor. As noted above, a 1-hour fire barrier will be provided to enclose cables required for operation of one of the two makeup pumps that have cables located in this corridor.

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Treated Waste Monitor Tank Room:

This room contains 4 ionization type smoke detectors, and has portable extinguishers and hose stations nearby outside of the room as well as in zone 67U, for use in promptly suppressing any fires that may occur in transient combustibles.

E. SUMMARY OF AND BASIS FOR EXEMPTIONS

For this fire zone, three types of exemptions are requested:

1. Omission of a 1-hour fire barrier and automatic suppression system for the makeup pump rooms; these rooms contain redundant components separated by less than 20 feet;
2. Omission of a sprinkler system for the corridor east of the makeup pump rooms, this corridor contains redundant components separated by less than 20 feet but with a 1-hour barrier to be installed enclosing cables for two makeup pumps; and
3. Omission of a 1-hour fire barrier for the BWST valves in the Treated Waste Monitor Tank Room; cables and valves are separated by less than 20 feet but with a 1-hour barrier to be installed enclosing the conduit for one of the valves. Sprinkler protection will be provided to protect these valves.

With the existing floor drains, the walls separating makeup pump cubicles that serve as radiant heat shields, the large size of zone 20Y, the ability for heat from a makeup pump fire to be dissipated into the general open area of zone 20Y, and the capability to promptly detect and suppress fires in the pump rooms, 1-hour fire barriers and an automatic suppression system are not deemed to be required to preserve at least one makeup pump for a fire in one makeup pump cubicle.

Due to the lack of in-situ combustibles in the corridor east of the makeup pump rooms, the height of the makeup pump conduit off of the floor, the ceiling height above the conduit, the ventilation flow through the corridor, the addition of an 1-hour fire barrier to the two channels of makeup pump conduit in the

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corridor and the capability to promptly detect and suppress fires that could occur, the addition of a sprinkler system to this corridor is not judged to be required to preserve at least one makeup pump.

Based on the separation of the BWST valves, their height off the floor, the lack of in-situ combustibles, the minimal need for the introduction of transients into the area, and the low potential for damage to a valve or operator for such small fires, the addition of a 1-hour fire barrier to separate the redundant BWST valves is not required to preserve the function of one of these valves. However, sprinkler protection will be provided to protect these valves.

With the changes and modifications proposed for this zone and the present configuration and protection, at least one train of safe shutdown equipment will be available to achieve and maintain safe shutdown. Modifications to fully comply with Appendix R will not enhance fire protection safety for this zone.

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