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 ALEXICH, M. P. Indiana & Michigan Electric Co.  
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 DENTON, H. R. Office of Nuclear Reactor Regulation, Director (post 851125)

SUBJECT: Forwards fire hazards analysis to further justify 830331  
 request for deviation from 10CFR50, App R requirement for  
 review & approval. Use of encl methodology to perform other  
 evaluations requested. Fee paid.

SEE Repts.

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# INDIANA & MICHIGAN ELECTRIC COMPANY

P.O. BOX 16631  
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May 30, 1986  
AEP:NRC:0692AN

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2  
Docket Nos. 50-315 and 50-316  
License Nos. DPR-58 and DPR-74  
ANALYSIS METHODOLOGY FOR EVALUATIONS OF FIRE  
AREA BOUNDARIES AND APPENDIX R DEVIATION REQUEST

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Denton:

Pursuant to the request of your staff, we are transmitting a fire hazards analysis to provide further justification for our request for deviation from certain requirements of 10 CFR 50 Appendix R. This analysis, which is contained in Attachment 1 to this letter, supplements the justification for the request for deviation presented in our letter AEP:NRC:0692E (dated March 31, 1983). That request for deviation concerned a number of fire hatches.

As advised by members of your staff, we are also requesting permission to perform evaluations or reviews similar to those in Attachment 1. If the results of these evaluations indicate that no unreviewed safety questions are involved, and if it is found that we are in compliance with 10 CFR 50 Appendix R, we request permission to perform the evaluated actions based on our own reviews, without the need for further NRC approval. Such reviews would be conducted in accordance with the guidelines provided in Attachment 2, and the review process would adhere to the requirements of 10 CFR 50.59. Formal records would be maintained of all such reviews, which would be similar to safety reviews of design changes, and in accordance with 10 CFR 50.71(c), the design changes involved would be documented annually in the FSAR Update.

Pursuant to 10 CFR 170.12(c), we are enclosing with this letter a check for \$150.00 for review of our methodology statement. We believe that no additional fee is required for review of the material in Attachment 1, since it was paid in our letter of March 31, 1983.

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# 083-0277*


Mr. Harold R. Denton

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AEP:NRC:0692AN

This document has been prepared following Corporate procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours

  
M. P. Alexich  
Vice President

MPA/pm

cc: John E. Dolan (w/o attachments)  
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NRC Resident Inspector - Bridgman



0610909092 #1

Attachment 1 to AEP:NRC:0692AN

Fire Hazard Analysis

for

1. Essential Service Water Pump House Hatch and Fire Damper Evaluation
2. Fire Area 41 and Fire Area 55 Hatch Evaluation
3. Fire Area 54 and Fire Area 58 Hatch Evaluation
4. Fire Area 45 and Fire Area 60 Hatch Evaluation
5. Fire Area 53 and Fire Area 57 Hatch Evaluation
6. Fire Zone 40B and Fire Area 55 Hatch Evaluation
7. Fire Zone 43 and Fire Area 56 Hatch Evaluation
8. Fire Zone 47B and Fire Area 60 Hatch Evaluation
9. Fire Zone 52 and Fire Area 59 Hatch Evaluation
10. Fire Zones 70 and 73 Hatch Evaluation

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DONALD C. COOK NUCLEAR PLANT  
ESSENTIAL SERVICE WATER PUMP HOUSE HATCH AND  
FIRE DAMPER EVALUATION

Purpose

The purpose of this evaluation is to analyze the impact of (1) an unrated steel plate hatch located between the ceiling of the Circulating Water Pump Motor Control Room, Fire Zone 29G, and the floor of Unit 2 ESW Pump Cubicle, elevation 591 ft 0 in., Fire Zone 29C (a three-hour fire-rated hatch assembly is not commercially available for use in this location); (2) undampered ventilation ducts located in the ceiling of Fire Zones 29A, 29B, 29C and 29D; and (3) screen mesh access gates into the Unit 1 and Unit 2 ESW pump cubicles on either redundant safe shutdown capability or the full area suppression exemption requests in the Essential Service Water (ESW) Pump House.

Description

Fire Zone 29G is located directly below the Unit 1 Essential Service Water (ESW) Pump Cubicles (Fire Zones 29A and 29B), and the Unit 2 ESW Pump Cubicles (Fire Zones 29C and 29D). Fire Zones 29A and 29B are separated from Fire Zones 29C and 29D by a three-hour-rated barrier. Undampered HVAC supply air openings exist in the ceiling of all four fire zones, with unsealed piping penetrations through the ceiling of the Unit 1 cubicles and sealed penetrations through the ceiling of the Unit 2 cubicles. An open walkway connects Fire Zone 29A and Fire Zone 29B of



Unit 1, while a similar walkway connects Fire Zone 29C and Fire Zone 29D. An open curbed stairway from Fire Zone 29B provides access to Fire Zone 29G, while an unrated steel plate hatch in the ceiling of Fire Zone 29G provides access to Fire Zone 29C. The ESW Pump House is located within the larger screenhouse area. The roof of the ESW Pump House is at elevation 610 ft-0 in., while the high point of the roof of the Screen House is at elevation 635 ft-7 in.

#### Safe Shutdown Equipment

Fire Zones 29A and 29B contain the Unit 1 East and West ESW pumps, respectively. Fire Zones 29C and 29D contain the Unit 2 East and West ESW pumps, respectively. The Unit 1 ESW pumps provide alternate shutdown capability for a fire occurring in the Unit 2 ESW pump cubicles. Conversely, the Unit 2 ESW pumps provide alternate shutdown capability for a fire occurring in the Unit 1 ESW pump cubicles. Fire Zone 29G contains cables for the components of both Units 1 and 2 ESW systems. The cables are in conduit, which are protected by minimum one-hour fire-rated material.

#### Fire Protection Equipment

Automatic detection systems are provided in the Unit 1 ESW pump cubicles (Fire Zones 29A and 29B) and in the Circulating Water Pump Motor Control Room (Fire Zone 29G). Automatic detection systems are currently being installed in the Unit 2 ESW pump cubicles (Fire Zones 29C and 29D). Automatic suppression is



not provided in any of these fire zones. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in these zones.

#### Fire Hazards Analysis

For a fire to adversely impact on redundant safe shutdown capability, fire must involve Units 1 and 2 ESW pumps and cubicles. For a fire in Fire Zones 29A and 29B (Unit 1 ESW pump cubicles), alternate shutdown capability is provided by utilizing Unit 2 ESW pumps. For a fire in Fire Zones 29C and 29D (Unit 2 ESW pump cubicles), alternate shutdown capability is provided by utilizing Unit 1 ESW pumps.

The required safe shutdown cables in Fire Zone 29G have been protected by a minimum of one-hour fire-rated material, thus a fire in Fire Zone 29G will not affect safe shutdown.

Fire Zone 29G and Fire Zones 29A and 29B communicate by an open stairway. A fire can be postulated to involve these fire zones (29A, 29B and 29G). In this case, Unit 1 ESW pumps are potentially affected and Unit 2 ESW pumps, located in Fire Zones 29C and 29D, should be utilized to provide required cooling water for both units.

The steel plate hatch is located in the floor/ceiling assembly separating Fire Zone 29G from Fire Zone 29C. Undampered HVAC supply air openings exist in the ceiling of Fire Zones 29A, 29B, 29C, and 29D. Screen mesh access gates provide access into the Unit 1 and Unit 2 ESW pumps from the Screenhouse, Fire Zone



142. For fire to adversely impact on redundant safe shutdown capability, fire must either:

- (1) Spread from Fire Zone 29G up through the open stairway to Fire Zone 29B of Unit 1 and through the steel plate hatch to Fire Zone 29C of Unit 2;
- (2) Spread from the ESW pump cubicles of one unit (through the open stairway of Unit 1 or the steel plate hatch of Unit 2) down into Fire Zone 29G and then propagate up into the ESW pump cubicles of the opposite unit (through the open stairway of Unit 1 or the steel plate hatch of Unit 2);
- (3) Spread through the undampered HVAC supply air openings in the ceiling of Fire Zones 29A, 29B, 29C and 29D. Fire can spread in this manner should the fire originate in Fire Zones 29A, 29B, 29C or 29D or on the roof of the ESW pump house; or
- (4) Spread through Fire Zone 142 into Fire Zones 29A and 29B and Fire Zones 29C and 29D via the screen mesh access gates from a fire originating either in Fire Zone 142 or in the Unit 1 or Unit 2 ESW pump cubicles.

For the first two fires that are postulated, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch. The failure point of exposed structural steel is taken to be when its load carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate hatch located in the barrier separating Fire Zones 29C and 29G is not a load carrying structural component, the failure criteria of structural steel can be applied to the steel plate hatch to



establish a conservative base above which failure could be postulated.

For the third and fourth postulated fires, a fire would have to travel from the Unit 1 ESW pump cubicles to the Unit 2 ESW pump cubicles. The path of fire spread for the third postulated fire would have to be via the undampered HVAC supply air openings in the ceiling of each cubicle and the transient combustible loading on the roof of the ESW pump house. For the fourth postulated fire, a fire would have to spread into the Unit 1 and Unit 2 ESW pump cubicles through the Screenhouse, Fire Zone 142. Each is discussed separately below:

Postulated Fire No. 1

Fire Zone 29G has a fixed combustible loading of under 13,000 Btu/ft<sup>2</sup> for an equivalent fire severity of under ten minutes. (The actual combustible loading and equivalent fire severity existing at this time are under 3600 Btu/ft<sup>2</sup> and less than three minutes, respectively.) An equivalent fire severity of ten minutes would raise the temperature of the steel plate hatch up to 1000°F. Significant quantities of transient combustibles are not postulated in Fire Zone 29G due to its controlled access (via locked screen gate doors into Fire Zones 29A and 29B and Fire Zones 29C and 29D), and the lack of easy transport of combustibles down into the zone (the open stairway from Fire Zone 29B and the ladder from the hatch from Fire Zone 29C). The stairway is also provided with a 6 in. high curb that

will prevent spilled combustible liquids from flowing down into Fire Zone 29G from above. In conjunction with accessibility problems, over 200 lbs of wood (with a heat potential of 8000 Btu/lb) would be required to raise the equivalent fire severity in Fire Zone 29G by one minute. Since there are no pumps, sumps, or other similar equipment in the zone, lubricating oil is not postulated as a transient combustible as it is not required for maintenance purposes.

Automatic detection is provided in Fire Zone 29G. The combination of automatic detection, an equivalent fire severity of under ten minutes, the quantity of transient combustibles required to raise the equivalent fire severity by one minute, and the difficulty of access and transport of combustibles into Fire Zone 29G provide reasonable assurance that a fire in Fire Zone 29G would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. Therefore, while fire could spread from Fire Zone 29G up the open stairway to Fire Zones 29A and 29B, it will not simultaneously spread through the steel plate hatch into Fire Zones 29C and 29D.

#### Postulated Fire No. 2

Fire Zones 29A and 29B have a fixed combustible loading of approximately 7000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately five minutes. Transient combustibles would take the form of lubricating oil during change out of the ESW pumps. Each ESW pump contains five gallons of lube oil for a total of





ten gallons. Assuming that two five gallon cans (at a heat potential of 155,000 Btu/ft<sup>2</sup>) are brought in for maintenance purposes. The equivalent fire severity would be increased by less than five minutes, for a total equivalent fire severity from fixed and transient combustibles of approximately ten minutes.

A fire resulting from this quantity of fixed and transient combustibles could spread down through the stairway opening into Fire Zone 29G. However, due to the natural tendency for fire to spread upwards and outwards, this would only result from a spill of lubricating oil down the stairway. The potential for this to occur is limited by the 6 in. high curb around the perimeter of the stairway. Fire would then have to spread through Fire Zone 29G into Fire Zones 29C and 29D through the unrated hatch. This scenario was previously addressed and is not a credible event.

Fire Zones 29C and 29D have a fixed combustible loading of approximately 7000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately five minutes. Transient combustibles would take the form of lubricating oil during change-out of the ESW pumps. Each ESW pump contains five gallons of lube oil for a total of ten gallons. Assuming that two 5-gal cans (at a heat potential of 155,000 Btu/gal) are brought in for maintenance purposes, the equivalent fire severity would be increased by less than five minutes, for a total equivalent fire severity from fixed and transient combustibles of under ten minutes. An equivalent fire severity of under ten minutes would raise the temperature of the

steel hatch up to 1000°F. However, the hatch is located in the floor of Fire Zone 29C. The higher temperatures associated with a fire in either Fire Zone 29C or 29D would tend to be near ceiling level. Floor-based temperatures should be considerably lower than those at ceiling level. The floor hatch entrance is also raised above the rest of the floor by a 12 in. high curb. This curb will prevent spilled combustible liquids from burning directly on the hatch and flowing down through the hatch into Fire Zone 29G below. Automatic detection is provided in Fire Zones 29C and 29D. This combination of detection, an equivalent fire severity of under ten minutes, and curbed hatch provides reasonable assurance that a fire involving fixed and/or transient combustibles in Fire Zones 29C and 29D would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier.

#### Postulated Fire No. 3

For the third postulated fire, sufficient combustible material must be present on the roof of the ESW Pump Cubicles to allow fire to spread simultaneously down into Fire Zones 29A and 29B and Fire Zones 29C and 29D through the undampened HVAC supply air openings in the ceiling of each zone. Ignition of this material either independently or as the result of a fire in the Unit 1 or Unit 2 ESW Pump Cubicles could result in fire spread to redundant ESW pump cubicles and in loss of redundant safe shutdown capability. The roof of the cubicles is used for



temporary storage of significant amounts of wood, rubber hoses, and the like. Therefore, the postulated fires previously addressed in this evaluation could spread up through the undampered HVAC supply air openings and ignite the material on the roof. Ignition of the material on the roof in this manner, or ignition of the material independently, could result in fire being pulled through the supply air openings into redundant ESW pump cubicles simultaneously. As such, three-hour-rated dampers will be installed in the HVAC openings to the Unit 2 ESW Pump Cubicles. This will ensure that the Unit 2 ESW Pump Cubicles will be unaffected by a fire involving transient combustibles on the roof of the cubicles. Fire could spread down through the undampered openings into Fire Zones 29A and 29B. However, as previously demonstrated, a fire in Fire Zones 29A and 29B that spreads down into Fire Zone 29G will not result in a fire of sufficient duration that will challenge the steel plate hatch and spread up into Fire Zones 29C and 29D.

#### Postulated Fire No. 4

For the fourth postulated fire, sufficient combustible material must be present in the Screenhouse, Fire Zone 142, to allow fire to spread between the Unit 1 and Unit 2 ESW pump cubicles via the screen mesh access gates. This would involve fire spreading a linear distance of approximately 175 ft. Fire Zones 29A and 29B and Fire Zones 29C and 29D have fixed and transient combustible loadings of approximately 13,000 Btu/ft<sup>2</sup>



for equivalent fire severities of approximately 10 minutes. Fire Zone 142 has a negligible fixed combustible loading. With a floor area of approximately 18,608 ft<sup>2</sup>, it would take a transient combustible loading of 3100 lbs. of wood at 8000 Btu/lb. to result in a transient fire severity of one minute. Fires occurring in, or spreading into, Fire Zone 142 would tend to rise up to ceiling level. Fire Zone 142 has a ceiling height of approximately 45 ft, while that of the ESW pump cubicles is approximately 15 ft. Based on the low combustible loadings in the Unit 1 and Unit 2 ESW pump cubicles and in the Screenhouse, along with the 45 ft vs. 15 ft ceiling heights between the two, fire spreading through the Screenhouse to/from the ESW pump cubicles of both units is not a credible event.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire originating: (1) on the roof of ESW Pump House; (2) in Fire Zones 29A and 29B; (3) in Fire Zone 29G; (4) in Fire Zones 29C and 29D; or (5) in Fire Zone 142, would not impair safe shutdown capabilities of D.C. Cook Units 1 and 2. In addition, this evaluation does not impact on the bases of the full area suppression exemption requests in the ESW Pump House.

The bases that justify the conclusion. are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load carrying structural steel up to its failure point of 1000°F.

- (2) The steel plate hatch is not a load carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) In order to impact on redundant safe shutdown capability, fire would have to spread either through the hatch separating Fire Zones 29C and 29D from Fire Zone 29G, into the Unit 1 and Unit 2 ESW cubicles via the undampered HVAC supply air openings in the ceiling of all four cubicles, or through the screen mesh access gates into Fire Zones 29A, 29B, 29C, and 29D. The potential paths for fire spread through these openings are as follows:
- (a) From Fire Zones 29A and 29B down into Fire Zone 29G and then up through the unrated hatch into Fire Zones 29C and 29D;
  - (b) From Fire Zones 29A and 29B up to the roof of the ESW pump house through the undampered HVAC supply air openings and then down into Fire Zones 29C and 29D;
  - (c) From Fire Zones 29C and 29D down through the unrated hatch into Fire Zone 29G and then up into Fire Zones 29A and 29B;
  - (d) From Fire Zones 29C and 29D up to the roof of the ESW pump house through the undampered HVAC supply air openings and then down into Fire Zones 29A and 29B;
  - (e) From the roof of the ESW pump house down through the undampered HVAC supply air openings into Fire Zones 29A and 29B and Fire Zones 29C and 29D simultaneously;
  - (f) From Fire Zone 29G up the open stairway into Fire Zones 29A and 29B and through the unrated hatch into Fire Zones 29C and 29D simultaneously;
  - (g) From Fire Zones 29A and 29B (or Fire Zones 29C and 29D) out through the screen mesh access gate into Fire Zone 142 then into Fire Zones 29C and 29D (or Fire Zones 29A and 29B) through the screen mesh access gate from Fire Zone 142; or





- (h) Into Fire Zones 29A and 29B and Fire Zones 29C and 29D simultaneously through the screen mesh access gates from Fire Zone 142.
- (4) Fire Zone 29G has an equivalent fire severity of under ten minutes; over 200 lbs of wood or 11 gallons of lubricating oil would be required to raise the fire severity by one minute.
- (5) Access and transport of combustibles into Fire Zone 29G is restricted by the locked screen mesh access gates above, the stairway from Fire Zone 29B, and the ladder from Fire Zone 29C. In addition, the 6 in. high curb around the stairway opening and 12 in. high curb around the hatch entrance will prevent flow of spilled combustible liquids down into Fire Zone 29G from Fire Zones 29B and 29C respectively.
- (6) Fire Zones 29A and 29B and Fire Zones 29C and 29D have an equivalent fire severity of approximately five minutes; transient combustibles (lubricating oil) during maintenance activities could raise the fire severity to approximately ten minutes.
- (7) Due to the location of the steel plate hatch, in the floor of Fire Zone 29C, the only credible fire to impact on the hatch is one that occurs in Fire Zone 29G below. The combustible loading in Fire Zone 29G is not sufficient to challenge the capabilities of the hatch.
- (8) Three-hour-rated dampers will be installed in the HVAC openings in the ceiling of Fire Zones 29C and 29D.
- (9) Automatic detection is provided throughout the ESW Pump House (in Fire Zones 29A, 29B, 29C, 29D and 29G).
- (10) Replacing the steel plate hatch with one of rated construction would not significantly enhance the protection provided by the existing configuration and proposed modification.
- (11) The screen mesh access gates into Fire Zones 29A and 29B and into Fire Zones 29C and 29D are separated by a linear distance of approximately 175 ft. Due to the negligible combustible loading in Fire Zone 142, the fixed and transient combustible loadings of approximately 13,000 Btu/ft<sup>2</sup> in Fire Zones 29A and 29B and in Fire Zones 29C and 29D, and the 45 ft ceiling height of the Screenhouse, reasonable assurance is provided that fire will not spread between the Unit 1 and Unit 2 ESW pump cubicles via the Screenhouse.

## DONALD C. COOK NUCLEAR PLANT

### FIRE AREA 41 AND FIRE AREA 55 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate hatch located between the Unit 1 Engineering Safety System and MCC Room and the Unit 1 Switchgear Room Cable Vault (Fire Area 41 and Fire Area 55, respectively) on redundant safe shutdown capability. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Area 41 is located on the 609 ft-6 in. elevation of the Auxiliary Building. Fire Area 55 is located directly above Fire Area 41 on the 625 ft-10 in. elevation. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, a steel plate hatch in the ceiling of Fire Area 41 provides access into the Battery Room enclosure of Fire Area 55.

#### Safe Shutdown Equipment

Fire Area 41 and Fire Area 55 contain cables and equipment required for safe shutdown of D.C. Cook Unit 1. Should a fire occur in either Fire Area 41 or Fire Area 55, complete alternate shutdown capability outside of both fire areas is provided using Unit 2 equipment.

### Fire Protection Equipment

Automatic ionization and infrared detection systems are installed in Fire Area 41 and Fire Area 55. The CD Battery Room enclosure of Fire Area 55 is provided only with ionization detection. An automatic total flooding CO<sub>2</sub> suppression system is provided in Fire Area 41 and Fire Area 55. Automatic suppression capability is not provided in the CD Battery Room enclosure. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both Fire Area 41 and Fire Area 55, including the CD Battery Room enclosure.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Area 41 on the 609 ft-6 in. elevation and the CD Battery Room enclosure of Fire Area 55 on the 625 ft-10 in. elevation. For a fire to propagate between Fire Area 41 and Fire Area 55, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate



hatch is not a load-carrying structural component, the failure criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.

Fire Area 41 has a fixed combustible loading of under 23,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 17 minutes. An equivalent fire severity of 17 minutes would raise the temperature of the hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system actuated by ionization and infrared detectors is provided in Fire Area 41. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles in Fire Area 41 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 55 has a fixed combustible loading of approximately 40,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 30 minutes. An equivalent fire severity of 30 minutes would raise the temperature of the steel plate hatch to over 1000°F if the fire was not promptly detected and extinguished.

The fixed combustible materials in the CD Battery Room enclosure are the battery casings. Transient combustibles are not postulated in this location based on controlled access to the 4kV Room complex. Maintenance activities would require minimal amounts of combustible materials. Fire would have to spread into the CD Battery Room enclosure from the remainder of Fire Area 55 in order to ignite the casings. An automatic total flooding CO<sub>2</sub> suppression system (which does not protect the CD Battery Room) actuated by ionization and infrared detectors is provided in Fire Area 55. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles in Fire Area 55 would not spread into the CD Battery Room enclosure, ignite the battery casings, and adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. Increases in the fixed combustible loading or the presence of transient combustibles outside of the CD Battery Room enclosure in Fire Area 55 would be mitigated by the presence of the automatic detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression system.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Area 41 or Fire Area 55 would not impair safe shutdown capabilities of D.C. Cook Unit 1.





The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Area 41 has an equivalent fire severity of 17 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression should result in detection and suppression of a fire in Fire Area 41 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 41 would be mitigated by the presence of the automatic detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression systems.
- (4) Fire Area 55 has an equivalent fire severity of 30 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression (except for the CD Battery Room) should result in detection and suppression of a fire in Fire Area 55 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 55 (excluding the CD Battery Room) would be mitigated by the presence of the automatic detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression systems.
- (5) The only combustible materials in the Battery Room Enclosure are the battery casings. Fire would have to spread into the enclosure from the remainder of Fire Area 55.
- (6) Should a fire occur in either Fire Area 41 or Fire Area 55, complete alternate capability is provided outside of the fire areas using Unit 2 equipment.
- (7) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.



## DONALD C. COOK NUCLEAR PLANT

### FIRE AREA 54 AND FIRE AREA 58 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate hatch located between the Unit 2 Control Room and the Unit 2 Control Room Cable Vault (Fire Area 54 and Fire Area 58, respectively) on either redundant safe shutdown capability or the request for fixed suppression exemption in Fire Area 54. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Area 54 is located on the 633 ft elevation of the Auxiliary Building. Fire Area 58 is located directly below on the 624 ft-0 in. elevation. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, an unrated steel plate hatch in the floor of Fire Area 54 provides access to Fire Area 58.

#### Safe Shutdown Equipment

Fire Areas 54 and 58 contain all control and instrumentation cabling required for safe shutdown of D.C. Cook Unit 2. Should a fire occur in either fire area, complete alternate shutdown capability is provided outside of both fire areas using Unit 1 equipment.



### Fire Protection Equipment

Automatic ionization detection systems are installed in Fire Area 54 and Fire Area 58. Automatic suppression is not provided in Fire Area 54. Fire Area 58 is protected by an automatic total flooding Halon 1301 suppression system and by a manually actuated totally flooding CO<sub>2</sub> suppression system. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both fire areas.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Area 58 on the 624 ft-0 in. elevation from Fire Area 54 on the 633 ft elevation. For a fire to propagate between Fire Area 58 and Fire Area 54, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate hatch is not a load-carrying structural component, the failure criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.

Fire Area 58 has a fixed combustible loading of under 90,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 67 minutes. An equivalent fire severity of 67 minutes would raise the temperature of the steel plate hatch to well over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding Halon 1301 system actuated by ionization detectors is provided in Fire Area 58. Should the Halon 1301 system fail to extinguish the fire, the total flooding CO<sub>2</sub> system would be manually actuated. The combination of automatic detection, automatic total flooding Halon 1301 suppression, and manually actuated CO<sub>2</sub> as a backup provides reasonable assurance that a fire involving fixed combustibles in Fire Area 58 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 54 is a continuously-manned Control Room. It has a fixed combustible loading of under 20,000 Btu/ft<sup>2</sup> for an equivalent fire severity of under 15 minutes. (The actual combustible loading and equivalent fire severity existing at this time are under 13,000 Btu/ft<sup>2</sup> and less than 10 minutes, respectively.) The amount of transient combustibles in the Control Room is extremely low and will be controlled. An



equivalent fire severity of 15 minutes could raise the temperature of the hatch above 1000°F. Two considerations must be taken into account. First, the steel plate hatch is located in the floor of Fire Area 54. The higher temperatures associated with a fire in this area would tend to be near ceiling level. Floor-based temperatures should be considerably lower than those at the ceiling. Secondly, the fire area is continuously manned by trained operators. Manual fire fighting activities can be expected to take place almost immediately after detection of the fire. There is reasonable assurance, therefore, that a fire involving fixed and/or transient combustibles in Fire Area 54 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Area 54 or Fire Area 58 would not impair the safe shutdown capabilities of D.C. Cook Unit 2. In addition, this evaluation does not impact on the bases of the fixed suppression exemption request for Fire Area 54.

The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.





- (3) Fire Area 58 has an equivalent fire severity of 67 minutes; however, automatic detection, automatic Halon 1301 suppression and manually actuated CO<sub>2</sub> suppression should result in detection and suppression of a fire in this area in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 58 would tend to be mitigated by the presence of the automatic detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression system.
- (4) The equivalent fire severity of Fire Area 54 is under 15 minutes.
- (5) The hatch is located in the floor of Fire Area 54. For a fire in the area, floor-based temperatures can be expected to be significantly lower than those at ceiling level, thereby limiting the effect on the hatch.
- (6) An automatic detection system is provided in Fire Area 54.
- (7) Fire Area 54 is continuously manned. Manual fire fighting activities can be expected almost immediately after detection of the fire.
- (8) Should a fire occur in either Fire Area 54 or Fire Area 58, complete alternate shutdown capability outside of both fire areas is provided using Unit 1 equipment.
- (9) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.



DONALD C. COOK NUCLEAR PLANT  
FIRE AREA 45 AND FIRE AREA 60 HATCH EVALUATION

Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate hatch located between the Unit 2 Engineering Safety System and MCC Room and the Unit 2 Switchgear Room Cable Vault (Fire Area 45 and Fire Area 60, respectively) on redundant safe shutdown capability. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

Description

Fire Area 45 is located on the 609 ft-6 in. elevation of the Auxiliary Building. Fire Area 60 is located directly above Fire Area 45 on the 625 ft-10 in. elevation. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, a steel plate hatch in the ceiling of Fire Area 45 provides access into the CD Battery Room enclosure of Fire Area 60.

Safe Shutdown Equipment

Fire Area 45 and Fire Area 60 contain cables and equipment required for safe shutdown of D.C. Cook Unit 2. Should a fire occur in either Fire Area 45 or Fire Area 60, complete alternate shutdown capability outside of both fire areas is provided using Unit 1 equipment.



### Fire Protection Equipment

Automatic ionization and infrared detection systems are installed in Fire Area 45 and Fire Area 60. The CD Battery Room enclosure of Fire Area 60 is provided only with ionization detection. An automatic total flooding CO<sub>2</sub> suppression system is provided in Fire Area 45 and Fire Area 60. Automatic suppression capability is not provided in the CD Battery Room enclosure. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both Fire Area 45 and Fire Area 60, including the CD Battery Room enclosure.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Area 45 on the 609 ft-6 in. elevation and the CD Battery Room enclosure of Fire Area 60 on the 625 ft-10 in. elevation. For a fire to propagate between Fire Area 45 and Fire Area 60, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate



hatch is not a load-carrying structural component, the failure criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.

Fire Area 45 has a fixed combustible loading of under 18,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 14 minutes. An equivalent fire severity of 14 minutes would raise the temperature of the hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system actuated by ionization and infrared detectors is provided in Fire Area 45. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles in Fire Area 45 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 60 has a fixed combustible loading of approximately 33,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 24 minutes. An equivalent fire severity of 24 minutes would raise the temperature of the steel plate hatch to over 1000°F if the fire was not promptly detected and extinguished.





The only combustible materials in the CD Battery Room enclosure are the battery casings. Transient combustibles are not postulated in Fire Area 60, including the CD Battery Room, based on controlled access throughout the entire 4kV Room complex. Maintenance activities would require minimal amounts of combustible materials. Fire would have to spread into the enclosure from the remainder of Fire Area 60 in order to ignite the casings. An automatic total flooding CO<sub>2</sub> suppression system (which does not protect the CD Battery Room) actuated by ionization and infrared detectors is provided in Fire Area 60. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles in Fire Area 60 would not spread into the CD Battery Room enclosure, ignite the battery casings, and adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Area 45 or Fire Area 60 would not impair safe shutdown capabilities of D.C. Cook Unit 2.

The bases that justify the conclusion are summarized as follows:



- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Area 45 has an equivalent fire severity of 14 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression should result in detection and suppression of a fire in Fire Area 45 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 45 would be mitigated by the presence of automatic suppression systems, provided that the increases do not exceed the capabilities of the suppression systems.
- (4) Fire Area 60 has an equivalent fire severity of 24 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression (except for the CD Battery Room) should result in detection and suppression of a fire in Fire Area 60 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 60 (excluding the CD Battery Room) would be mitigated by the presence of automatic suppression systems, provided that the increases do not exceed the capabilities of the suppression systems.
- (5) The only combustible materials in the Battery Room enclosure are the battery casings. Fire would have to spread into the enclosure from the remainder of Fire Area 60.
- (6) Should a fire occur in either Fire Area 45 or Fire Area 60, complete alternate capability is provided outside of both fire areas using Unit 1 equipment.
- (7) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.

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## DONALD C. COOK NUCLEAR PLANT

### FIRE AREA 53 AND FIRE AREA 57 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate hatch located between the Unit 1 Control Room and the Unit 1 Control Room Cable Vault (Fire Area 53 and Fire Area 57, respectively) on either redundant safe shutdown capability or the request for a fixed suppression exemption in Fire Area 53. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Area 53 is located on the 633 ft elevation of the Auxiliary Building. Fire Area 57 is located directly below on the 624 ft-0 in. elevation. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, an unrated steel plate hatch in the floor of Fire Area 53 provides access to Fire Area 57.

#### Safe Shutdown Equipment

Fire Areas 53 and 57 contain all control and instrumentation cabling required for safe shutdown of D.C. Cook Unit 1. Should a fire occur in either fire area, complete alternate shutdown capability outside of both areas is provided using Unit 2 equipment.

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### Fire Protection Equipment

Automatic ionization detection systems are installed in Fire Area 53 and Fire Area 57. Automatic suppression is not provided in Fire Area 53. Fire Area 57 is protected by an automatic total flooding Halon 1301 suppression system and by a manually actuated total flooding CO<sub>2</sub> suppression system. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both fire areas.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Area 57 on the 624 ft-0 in. elevation from Fire Area 53 on the 633 ft elevation. For a fire to propagate between Fire Area 57 and Fire Area 53, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate hatch is not a load-carrying structural component, the failure criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.



Fire Area 57 has a fixed combustible loading of under 95,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 71 minutes. An equivalent fire severity of 71 minutes would raise the temperature of the steel plate hatch to well over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding Halon 1301 suppression system actuated by the detection system is provided in Fire Area 57. Should the Halon 1301 system fail to extinguish the fire, the total flooding CO<sub>2</sub> system would be manually actuated. The combination of automatic detection, automatic Halon 1301 suppression, and manually actuated CO<sub>2</sub> as a backup provides reasonable assurance that a fire involving fixed combustibles in Fire Area 57 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection system and the automatic Halon 1301 and manual CO<sub>2</sub> suppression systems will tend to mitigate the impact of increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 53 is the continuously manned Control Room. It has a fixed combustible loading of under 13,000 Btu/ft<sup>2</sup> for an equivalent fire severity of under ten minutes. (The actual combustible loading and equivalent fire severity existing at this time are under 9000 Btu/ft<sup>2</sup> and under seven minutes, respectively.) The amount of transient combustibles in the

Control Room is extremely low and will be controlled. An equivalent fire severity of ten minutes could raise the temperature of the hatch above 1000°F. Two considerations must be taken into account. First, the steel plate hatch is located in the floor of Fire Area 53. The higher temperatures associated with a fire in this area would tend to be near ceiling level. Floor-based temperatures should be considerably lower than those at the ceiling. Secondly, the fire area is continuously manned by trained operators. Manual fire fighting activities can be expected to take place almost immediately after detection of the fire. There is reasonable assurance, therefore, that a fire involving fixed and/or transient combustibles in Fire Area 53 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Area 53 or Fire Area 57 would not impair the safe shutdown capabilities of D.C. Cook Unit 1. In addition, this evaluation does not impact on the bases of the fixed suppression exemption request for Fire Area 53.

The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.



- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Area 57 has an equivalent fire severity of 71 minutes; however, automatic detection, automatic Halon 1301 suppression and manually actuated CO<sub>2</sub> suppression will result in detection and suppression of a fire in this area in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 57 should also be mitigated by the presence of the detection and suppression systems, provided that the increases do not exceed system capabilities.
- (4) The equivalent fire severity of Fire Area 53 is under ten minutes.
- (5) The hatch is located in the floor of Fire Area 53. For a fire in the area, floor-based temperatures can be expected to be significantly lower than those at ceiling level, thereby limiting the effect on the hatch.
- (6) An automatic detection system is provided in Fire Area 53.
- (7) Fire Area 53 is continuously manned. Manual fire fighting activities can be expected almost immediately after detection of the fire.
- (8) Should a fire occur in either Fire Area 53 or Fire Area 57, complete alternate shutdown capability outside of both fire areas is provided using Unit 2 equipment.
- (9) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.

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## DONALD C. COOK NUCLEAR PLANT

### FIRE ZONE 40B AND FIRE AREA 55 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate floor hatch located between the Unit 1 4kV Switchgear Room and the Unit 1 Switchgear Room Cable Vault (Fire Zone 40B and Fire Area 55, respectively) on redundant safe shutdown capability. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Zone 40B is located on the 609 ft-6 in. elevation of the Auxiliary Building. It is part of a larger fire area that includes Fire Zone 40A. Fire Area 55 is located directly above Fire Zone 40B on the 625 ft-10 in. elevation. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, an unrated steel plate hatch in the ceiling of Fire Zone 40B provides access into the cable spreading portion of Fire Area 55.

#### Safe Shutdown Equipment

Fire Zone 40B and Fire Area 55 contain cables and equipment required for safe shutdown of D.C. Cook Unit 1. Should a fire occur in either Fire Zone 40B or Fire Area 55, complete alternate shutdown capability outside of the fire area or zone is provided using Unit 2 equipment.



### Fire Protection Equipment

Automatic ionization and infrared detection systems are installed in Fire Zone 40B and Fire Area 55. An automatic total flooding CO<sub>2</sub> suppression system is provided in Fire Zone 40B. An automatic total flooding CO<sub>2</sub> suppression system is also provided in Fire Area 55, except that coverage does not extend into the CD Battery Room. (The hatch is not located in the CD Battery Room.) Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both Fire Zone 40B and Fire Area 55.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Zone 40B on the 609 ft-6 in. elevation from Fire Area 55 on the 625 ft-10 in. elevation. For a fire to propagate between Fire Zone 40B and Fire Area 55, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate hatch is not a load-carrying structural component, the failure





criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.

Fire Zone 40B has a fixed combustible loading of under 21,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 15 minutes. An equivalent fire severity of 15 minutes would raise the temperature of the hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system actuated by ionization and infrared detectors is provided in Fire Zone 40B. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles in Fire Zone 40B would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 55 has a fixed combustible loading of approximately 40,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 30 minutes. An equivalent fire severity of 30 minutes would raise the temperature of the steel plate hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system



(which does not protect the CD Battery Room) actuated by ionization and infrared detectors is provided in Fire Area 55. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles in Fire Area 55 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Zone 40B or Fire Area 55 would not impair safe shutdown capabilities of D.C. Cook Unit 1.

The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Zone 40B has an equivalent fire severity of 15 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression would result in detection and suppression of a fire in Fire Zone 40B in its incipient stages. Increases in the fixed and/or transient combustible

loading in Fire Zone 40B would be mitigated by the presence of the automatic detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression system.

- (4) Fire Area 55 has an equivalent fire severity of 30 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression (except for the CD Battery Room) would result in detection and suppression of a fire in Fire Area 55 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 55 (excluding the CD Battery Room) would be mitigated by the presence of the automatic detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression system.
- (5) Should a fire occur in either Fire Zone 40B or Fire Area 55, complete alternate capability is provided outside of the fire area or zone using Unit 2 equipment.
- (6) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.

## DONALD C. COOK NUCLEAR PLANT

### FIRE ZONE 43 AND FIRE AREA 56 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate floor hatch located between the Access Control Area and the Unit 1 Auxiliary Cable Vault (Fire Zone 43 and Fire Area 56, respectively) on redundant safe shutdown capability. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Zone 43 is located on the 609 ft-6 in. elevation of the Auxiliary Building. It is part of a larger fire area that includes Fire Zones 37, 44N, 44S, and 44A through 44H. Fire Area 56 is located directly above Fire Zone 43 on the 620 ft-6 in. elevation of the Auxiliary Building. The barrier separating the two zones is constructed of reinforced concrete with a three-hour fire rating; however, an unrated steel plate hatch in the ceiling of Fire Zone 43 provides access to Fire Area 56.

#### Safe Shutdown Equipment

Fire Zone 43 and Fire Area 56 contain cables required for safe shutdown of D.C. Cook Unit 1. Should a fire occur in either of these locations, complete alternate shutdown capability is provided outside of the fire area and fire zone using Unit 2 equipment.



### Fire Protection Equipment

Automatic ionization detection systems are installed in Fire Zone 43 below the suspended ceiling and in Fire Area 56. Fire Zone 43 is not protected by automatic suppression. Fire Area 56 is protected by an automatic CO<sub>2</sub> total flooding extinguishing system that is activated by the detection system. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both locations.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Zone 43 on the 609 ft-6 in. elevation from Fire Area 56 on the 620 ft-6 in. elevation. For a fire to propagate between Fire Zone 43 and Fire Area 56, a fire of sufficient duration and intensity would be required to challenge the inherent capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. The steel plate hatch is not a load-carrying structural component; however, the failure criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.



Fire Zone 43 is a normally manned location; however, during some back shift periods with reduced manning, the RP duties may require the zone to be unoccupied. A fixed combustible loading of under 13,000 Btu/ft<sup>2</sup> for an equivalent fire severity of under ten minutes exists in Fire Zone 43. (The actual combustible loading and equivalent fire severity existing at this time are under 4000 Btu/ft<sup>2</sup> and less than three minutes, respectively.) The equivalent fire severity (10 minutes) in Fire Zone 43 may raise the temperature of structural steel up to its failure point (5-10 minutes). However, a fire in this zone should be detected in its incipient stages by either the automatic detection system or the personnel normally manning the area. This combination of low fire loading, automatic detection and normal manning provides reasonable assurance that a fire involving fixed and/or transient combustibles in Fire Zone 43 would not adversely impact on the capability of the steel plate hatch to adequately protect the opening in the barrier.

Fire Area 56 has a fixed combustible loading of under 70,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 51 minutes. An equivalent fire severity of 51 minutes would raise the temperature of the steel plate hatch to over 1000°F if the fire was not promptly detected and extinguished. A total flooding automatic CO<sub>2</sub> system is provided in Fire Area 56. It is actuated by the ionization detection system. The combination of automatic detection and CO<sub>2</sub> suppression ensures detection and



suppression of a fire in Fire Area 56 in its incipient stages. This provides reasonable assurance that a fire involving fixed combustibles in Fire Area 56 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Zone 43 or Fire Area 56 would not impair the safe shutdown capabilities of D.C. Cook Unit 1.

The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Zone 43 has an equivalent fire severity of under ten minutes.
- (4) An automatic detection system is provided in Fire Zone 43 and is normally manned, thereby ensuring early detection of fire.
- (5) The equivalent fire severity of Fire Area 56 is 51 minutes; however, an automatically actuated, total flooding CO<sub>2</sub> system is provided.



- (6) The provision of the CO<sub>2</sub> system actuated by the ionization detection system ensures detection and suppression of a fire in Fire Area 56 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 56 should also be mitigated by the presence of the detection and suppression systems, provided that the increases do not exceed the capabilities of the suppression system.
- (7) Should a fire occur in either Fire Zone 43 or Fire Area 56, complete alternate shutdown capability using Unit 2 equipment is provided. Therefore, should fire spread between the two locations, the same alternate shutdown method would be utilized.
- (8) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.

## DONALD C. COOK NUCLEAR PLANT

### FIRE ZONE 47B AND FIRE AREA 60 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate hatch located between the Unit 2 4kV Switchgear Room and the Unit 2 Switchgear Room Cable Vault (Fire Zone 47B and Fire Area 60, respectively) on redundant safe shutdown capability. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Zone 47B is located on the 609 ft-6 in. elevation of the Auxiliary Building. It is part of a larger fire area that includes Fire Zone 47A. Fire Area 60 is located directly above Fire Zone 47B on the 625 ft-10 in. elevation. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, an unrated steel plate hatch in the ceiling of Fire Zone 47B provides access into the cable spreading portion of Fire Area 60.

#### Safe Shutdown Equipment

Fire Zone 47B and Fire Area 60 contain cables and equipment required for safe shutdown of D.C. Cook Unit 2. Should a fire occur in either Fire Zone 47B or Fire Area 60, complete alternate shutdown capability outside of the fire area or zone is provided using Unit 1 equipment.

### Fire Protection Equipment

Automatic ionization and infrared detection systems are installed in Fire Zone 47B and Fire Area 60. An automatic total flooding CO<sub>2</sub> suppression system is provided in Fire Zone 47B. An automatic total flooding CO<sub>2</sub> suppression system is also provided in Fire Area 60, except that coverage does not extend into the CD Battery Room. (The hatch is not located in the CD Battery Room.) Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both Fire Zone 47B and Fire Area 60.

### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Zone 47B on the 609 ft-6 in. elevation from Fire Area 60 on the 625 ft-10 in. elevation. For a fire to propagate between Fire Zone 47B and Fire Area 60, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate hatch is not a load-carrying structural component, the failure





criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.

Fire Zone 47B has a fixed combustible loading of under 20,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 15 minutes. An equivalent fire severity of 15 minutes would raise the temperature of the hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system actuated by ionization and infrared detectors is provided in Fire Zone 47B. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed and/or transient combustibles in Fire Zone 47B would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 60 has a fixed combustible loading of approximately 33,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 24 minutes. An equivalent fire severity of 24 minutes would raise the temperature of the steel plate hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system

(which does not protect the CD Battery Room) actuated by ionization and infrared detectors is provided in Fire Area 60. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed and/or transient combustibles in Fire Area 60 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Zone 47B or Fire Area 60 would not impair safe shutdown capabilities of D.C. Cook Unit 2.

The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Zone 47B has an equivalent fire severity of 15 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression would result in detection and suppression of a fire in Fire Zone 47B in its incipient stages. Increases in the fixed and/or transient combustible



loading would be mitigated by the presence of automatic detection and suppression systems in Fire Zone 47B, provided that the increases do not exceed the capabilities of the suppression system.

- (4) Fire Area 60 has an equivalent fire severity of 24 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression (except for the CD Battery Room) would result in detection and suppression of a fire in Fire Area 60 in its incipient stages. Increases in the fixed and/or transient combustible loadings would be mitigated by the presence of automatic detection and suppression systems in Fire Area 60 (excluding the CD Battery Room), provided that the increases do not exceed the capabilities of the suppression systems.
- (5) Should a fire occur in either Fire Zone 47B or Fire Area 60, complete alternate capability is provided outside of the fire area or zone using Unit 1 equipment.
- (6) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.



## DONALD C. COOK NUCLEAR PLANT

### FIRE ZONE 52 AND FIRE AREA 59 HATCH EVALUATION

#### Purpose

The purpose of this evaluation is to analyze the impact of an unrated steel plate floor hatch located between the 633 ft elevation of the Auxiliary Building and the Auxiliary Cable Vault (Fire Zone 52 and Fire Area 59, respectively) on redundant safe shutdown capability. A three-hour fire-rated hatch assembly is not commercially available for use in this location.

#### Description

Fire Zone 52 is located on the 633 ft elevation of the Auxiliary Building. It is part of a larger fire area that includes Fire Zones 49, 50, 51, 3, 32, 69, 36, and 48. Fire Area 59 is located directly below the southwest corner of Fire Zone 52 on the 622 ft-6 in. elevation of the Auxiliary Building. The barrier separating the two areas is constructed of reinforced concrete with a three-hour fire rating; however, an unrated steel plate hatch in the floor of Fire Zone 52 provides access to Fire Area 59.

#### Safe Shutdown Equipment

Fire Zone 52 contains cables required for safe shutdown of D.C. Cook Units 1 and 2. The March 1983 Appendix R Submittal identified methods of achieving compliance with Appendix R in this area (extending suppression coverage throughout the zone and alternate shutdown via local PORV control), which were reviewed and approved by the NRC. Fire Area 59 contains cables for safe

shutdown of D.C. Cook Unit 2. Should a fire occur in Fire Area 59, complete alternate shutdown capability is provided outside of the fire area using Unit 1 equipment.

#### Fire Protection Equipment

Automatic ionization detection systems are installed in Fire Zone 52 and Fire Area 59. A preaction sprinkler system, which requires actuation of the pilot line detector system to allow water to enter the sprinkler piping system, with heat then required to fuse individual sprinkler heads, is provided in Fire Zone 52. An automatic total flooding CO<sub>2</sub> suppression system that is actuated by the detection system is provided in Fire Area 59. Manual suppression capabilities in the form of portable extinguishers and hose stations are available for use in both locations.

#### Fire Hazards Analysis

The steel plate hatch is located in the floor/ceiling assembly separating Fire Zone 52 on the 633 ft elevation from Fire Area 59 on the 622 ft-6 in. elevation. For a fire to propagate between Fire Zone 52 and Fire Area 59, a fire of sufficient duration and intensity would be required to challenge the inherent fire protection capabilities of the steel plate hatch.

The failure point of exposed structural steel is taken to be when its load-carrying capability is reduced to 60% of its yield strength. This limit normally occurs when the temperature of the steel reaches 1000°F. Under the ASTM E119 Standard Time-Temperature curve, an equivalent fire severity of 5-10 minutes is required to achieve this temperature. Although the steel plate hatch is not a load-carrying structural component, the failure criteria of structural steel can be applied to the steel plate hatch to establish a conservative base above which failure could be postulated.

Fire Zone 52 is located in a fire area with an average fixed combustible loading of under 7000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately five minutes. On the level on which this zone is located (made up of Fire Zones 49, 50, 51 and 52), the average fixed combustible loading is under 14,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately ten minutes. The fixed combustible loading in Fire Zone 52 is under 5000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately three minutes. The equivalent fire severity of the entire fire area (five minutes) and that of only Fire Zone 52 (three minutes) should not raise the temperature of the steel plate hatch to over 1000°F. However, the equivalent fire severity of those zones (Fire Zones 49, 50, 51 and 52) on the 633 ft elevation (ten minutes) would raise the temperature to over 1000°F if the fire was not promptly detected and extinguished. An automatic dry pilot preaction



sprinkler system is provided in Fire Zone 52. This combination of automatic ionization detection and dry pilot preaction sprinklers provides reasonable assurance that a fire involving fixed combustibles in the fire area containing Fire Zone 52 would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.

Fire Area 59 has a fixed combustible loading of under 55,000 Btu/ft<sup>2</sup> for an equivalent fire severity of approximately 41 minutes. An equivalent fire severity of 41 minutes would raise the temperature of the steel plate hatch to over 1000°F if the fire was not promptly detected and extinguished. An automatic total flooding CO<sub>2</sub> suppression system actuated by the detection system is provided in Fire Area 59. The combination of automatic detection and automatic total flooding CO<sub>2</sub> suppression provides reasonable assurance that a fire involving fixed combustibles would not adversely impact on the capability of the steel plate hatch to protect the opening in the barrier. The existence of the automatic detection and suppression systems will tend to mitigate increases in the fixed combustible loading or the presence of transient combustibles, provided that the increases do not exceed the capabilities of the suppression system.



## Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Zone 52 or Fire Area 59 would not impair safe shutdown capabilities of D.C. Cook Units 1 and 2.

The bases that justify the conclusion are summarized as follows:

- (1) An equivalent fire severity of 5-10 minutes is required to raise the temperature of load-carrying structural steel up to its failure point of 1000°F.
- (2) The steel plate hatch is not a load-carrying structural component; however, a 5-10 minute fire severity can be used to establish a conservative base above which failure could be postulated without additional fire protection.
- (3) Fire Zone 52 has an equivalent fire severity of three minutes. The combination of fire zones making up the fire area in which Fire Zone 52 is located has an average fire severity of five minutes. The average combustible loading of those fire zones on the 633 ft elevation that are included in the fire area with Fire Zone 52 is ten minutes.
- (4) The automatic ionization detection and dry pilot preaction sprinkler systems installed in Fire Zone 52 would result in detection and suppression of a fire involving fixed combustibles in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Zone 52 will be mitigated by the presence of automatic suppression systems, provided that the increases do not exceed the capabilities of the suppression systems.
- (5) Fire Area 59 has an equivalent fire severity of 41 minutes; however, automatic detection and automatic CO<sub>2</sub> suppression should result in detection and suppression of a fire involving fixed combustibles in Fire Area 59 in its incipient stages. Increases in the fixed and/or transient combustible loadings in Fire Area 59 will be mitigated by the presence of automatic suppression systems, provided that the increases do not exceed the capabilities of the suppression systems.

- (6) Replacing the steel plate hatch with one of fire-rated construction would not significantly enhance the protection provided by the existing configuration.

DONALD C. COOK NUCLEAR PLANT  
FIRE ZONES 70 AND 73 HATCH EVALUATION

Purpose

The purpose of this evaluation is to analyze the impact of unrated floor hatches located between the HVAC Equipment Rooms (Fire Zones 70 and 73) and the Units' 1 and 2 Main Control Rooms (Fire Zones 53 and 54) on either redundant safe shutdown capability or the fixed suppression exemption requests for the Main Control Rooms. Three-hour fire-rated hatch assemblies are not commercially available for use in these locations.

Description

Fire Zones 70 and 73 are located on the 650 ft elevation of the Auxiliary Building. These fire zones are part of a larger fire area (which also includes Fire Zones 71 and 72 - Unit 1 and 2 Computer Rooms) directly above the Unit 1 and Unit 2 Control Rooms. The unrated floor hatches provide access from the Units' 1 and 2 Control Rooms to the HVAC Equipment Rooms. All other penetrations of the barrier to the Control Rooms are protected with fire-rated material. The HVAC ducts passing through the floor are provided with fire-rated dampers.

Safe Shutdown Equipment

The fire area defined by Fire Zones 70, 71, 72 and 73 contains no safe shutdown equipment, components or cables.



### Fire Protection Equipment

Automatic area detection is provided in Fire Zones 70 and 73, with automatic thermistor detection and manual deluge water spray systems for the charcoal filter units. Fire Zones 71 and 72 have full area detection and automatic Halon suppression systems. Fire Areas 53 and 54 are not provided with automatic or fixed suppression system, but ionization type smoke detectors are installed above and below the suspended ceiling and manual fire fighting equipment is available.

### Fire Hazards Analysis

Fire Zones 70, 71, 72, and 73 have a low fire severity. The combustible loading for the entire area is 11,040 Btu/ft<sup>2</sup>. The area contains automatic area detection in all four fire zones and automatic Halon suppression systems in Fire Zones 71 and 72. Manual deluge water spray systems are provided for charcoal filter units in fire zones 70 and 73. The probability of fire involving both hatches simultaneously is low. As a consequence, the probability of fire spreading down into one or both units' Control Rooms is also low. Should fire spread down into one Control Room, alternate safe shutdown capability exists.

Another concern is the probability of a fire occurring in one Control Room and spreading up through the unrated hatches into Fire Zones 70 or 73 and traverse down through the hatch on the other side to the Control Room of the opposite unit.

Fire Areas 53 and 54 (Units 1 and 2 Control Rooms) have a low fire severity. The combustible loading for Fire Area 53 is 9,085 Btu/ft<sup>2</sup> and for Fire Area 54 is 12,783 Btu/ft<sup>2</sup>. There is no other communication path between the Control Rooms and HVAC Rooms. The HVAC ducts passing through the floor have rated fire dampers. Furthermore, the Control Rooms are constantly manned and have area detection above and below the suspended ceiling. The HVAC Rooms above have automatic area detection and manual suppression systems for the charcoal filter units.

It is unlikely that a fire could propagate through such a tortuous path undetected and involve both units' Control Rooms simultaneously.

#### Conclusion

Based on the above evaluation, reasonable assurance is provided that a fire in Fire Zones 70, 71, 72 and 73 would not impair the safe shutdown capabilities in either unit. In addition, this evaluation does not impact on the bases of the fixed suppression exemptions requests for the Main Control Room.

The bases which justify the conclusion are summarized as follows:

- (1) Fire Zones 70, 71, 72 and 73 contain no safe shutdown components or cables.
- (2) Fire Zones 70, 71, 72 and 73 are provided with detection systems. Fire Zones 71 and 72 have automatic Halon suppression systems. Fire Zones 70 and 73 have manual deluge water spray systems for the charcoal filter units.



- (3) The combustible loadings in Fire Zones 70, 71, 72 and 73 are very low.
- (4) The hatches, although not fire-rated, would limit the potential involvement of fire areas at the 633 ft elevation.
- (5) The Control Rooms are constantly manned; the probability of fire in one Control Room resulting in damage in the other Control Room is low.
- (6) A hypothesized fire in either unit's Control Room will be detected immediately, and it could be extinguished by manual fire fighting equipment.
- (7) A complete alternate safe shutdown capability for the Control Rooms exists. Therefore, fire involving either unit's Control Room would not impair the safe shutdown capability.

Attachment 2 to AEP:NRC:0692AN

The methodology used for fire area boundary evaluations summarized here is in accordance with the appropriate NRC guidelines. A structure similar to that used in the exemption requests contained in Section 7 of the report "Safe Shutdown Capability Assessment and Proposed Modifications" is described. There are five major subheadings used for each evaluation. They are identified as follows:

- (1) Purpose, which identifies why the evaluation is being performed;
- (2) Description, which identifies the zone(s) of concern and describes the unrated portion of the fire area boundaries;
- (3) Safe Shutdown Equipment, which identifies safe shutdown capabilities in the zone(s) of concern;
- (4) Fire Protection Equipment, which identifies the automatic and manual detection and suppression capabilities in the zone(s) of concern; and
- (5) Fire Hazards Analysis, which identifies and evaluates the impact of the unrated portion of the fire area boundary on safe shutdown capabilities in the zones(s) of concern; and
- (6) Conclusions, which summarize the reasons why the unrated portion of the fire area boundaries does not impact redundant safe shutdown capabilities. Additionally, any required modifications necessary to support this position are given.

The result is a technical evaluation that addresses the impact of unrated components of fire area boundaries on redundant safe shutdown capabilities located on either side of the fire area boundaries.

