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SUBJECT:
FORWARDING ADDL RESPONSES IN ADDITION TO THOSE CONTAINED IN APPLICANT"S LTRS OF 08/30/77, 09/21/77 AND 10/26/77 TO STAFF QUESTIONS ON FIRE PROTECTION CONCERNING BOTH ANO-1 AND ANO-2.

PLANT NAME: ~~COOK - UNIT 2~~ ARKANSAS #1
~~COOK - UNIT 1~~ ARKANSAS #2

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March 31, 1978

1-038-18
2-038-36

Director of Nuclear Reactor Regulation
ATTN: Mr. J. F. Stolz, Chief
Light Water Reactors Branch #1
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Director of Nuclear Reactor Regulation
ATTN: Mr. R. W. Reid, Chief
Operating Reactor Branch #4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Arkansas Nuclear One-Units 1 & 2
License No. DPR-51
Docket Nos. 50-313/50-368
Fire Protection Questions
(File: 2040, 1510, 2-2040, 2-1510)

Gentlemen:

Enclosed please find additional responses to staff questions on Fire Protection concerning both ANO-1 and ANO-2. These are in addition to those provided in our August 30, September 21, and October 26, 1977, letters. Responses to the few remaining questions are being prepared and will be forwarded to you shortly.

Very truly yours,

Daniel H. Williams

Daniel H. Williams
Manager, Licensing

DHW:DAV:nf

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ITEM 2

Describe the separation of redundant safety-related cables, cable trays, and conduits. Identify areas where redundant safety-related cables, cable trays, and conduits have non-safety-related cables interposed between these redundant groups in such a manner as to jeopardize both redundant groups by the same fire. Describe what means will be provided to prevent a fire from involving both redundant groups.

RESPONSE: (ANO-1 & 2)

A complete description of both physical and electrical separation criteria for safe-related cables, cable trays, and conduits within ANO-1 is provided in Section 8.2.2.8 of the ANO-1 FSAR. Information concerning the physical separation criteria, regarding Fire Protection, is detailed in Section 8.3.1.4.2.2.2 of the ANO-2 FSAR. The remaining information requested has been provided as part of our ANO-1 and ANO-2 Fire Hazard Analysis Studies.

Item 4a

Provide information that establishes the fire resistance rating of the fire barrier penetration seals to prevent the spread of smoke and fire through the barrier. The information should show the effectiveness of pipe penetrations, fire doors with metal panels above the door frames, and ventilation ducts and dampers in preventing the spread of smoke and fire through the barrier. Describe the manner in which fire and smoke are prevented from spreading from area to area via the normal and emergency ventilation systems in all parts of the auxiliary building, fuel storage building and reactor building. Describe the location, actuation method and fire rating of dampers used for fire and smoke control in both air supply and return air systems. Describe the details of interlocks for ventilation system shutdown or mode change that can be utilized for fire and smoke control.

Response: (ANO-1)

Materials used in fire barrier penetration seals are cellular concrete, Flamemastic 71A, Marinite 36, or Flamastic 71A mixed with Kaowool. Cellular concrete has been approved by NEL-PIA (1973) for use in sealing penetrations in 3-hour fire barriers. Flamemastic 71A has undergone extensive testing and manufacturer's published information indicates that it has "...passed Factory Mutual requirements and is approved for the protection of grouped insulated cables against self-spreading fire originating within the cables or from exposure to an external ignition source of moderate intensity." Marinite-36 carries the Underwriters Laboratories Label (Service Guide No. 40 U8.13) with the following Fire Hazard Classification (based on 100 for untreated Red Oak): Flame Spread... 0; Fuel Contributed... negligible; Smoke Developed... 0. Per the Interim Summary of "Interim Report, Materials Flammability Testing for Nuclear Regulatory Commission" dated April 10, 1975, Marinite-36 has also passed the specific fire tests to which it was subjected. Kaowool is a ceramic fiber material and is used as a furnace refractory material. Its melting point is 3200°F and it has been demonstrated to have excellent fire retardant characteristics.

The transom panel above the door frame is a sandwich panel constructed of 2-18 gauge steel face sheets with 1/4" asbestos mill board between the face sheets and was furnished as an integral part of the fire door assembly which along with the fire door bears the Class A label of Underwriters Laboratories, Inc.

All ventilation ducts penetrating any fire barrier in the plant are equipped with UL listed fire dampers of the same fire rating as the fire barrier. The fire dampers are either curtain, guillotine or trap door type actuated by fusible links that are designed to melt at 165°F. On closure of the fire dampers, fire and smoke will be contained in the areas where the fire occurs and prevented from spreading to other areas via the ventilation system.

All fire dampers are located in the ducts at the penetrations through the fire barriers.

The fuel handling floor is served by its own ventilation system consisting of supply and exhaust fans. This ventilation system maintains a preferred direction of air flow into the fuel handling area thus preventing the spread of smoke to other areas.

The reactor building is normally isolated with limited accessibility. Smoke spreading from one area to another within the building is not considered hazardous once the fire is put out. The smoke may be purged out of the building by operating the purge supply and exhaust fans.

In some areas in the auxiliary building, e.g. the control room, battery room, and diesel generator rooms, exhaust systems are provided which can be used to remove smoke generated in the space to the outside of the building. The control room smoke removal is actuated by interlocks with the smoke detectors in the ventilation ducts. The battery room exhaust fans are operating continuously during normal operation. The other exhaust systems are actuated manually upon alarms by smoke detectors within the rooms.

Response: (ANO-2)

Penetration seal materials include only those materials that have been previously tested to meet the requirements of the NEL-PIA/MAERP standard method of fire tests of cable and pipe penetration fire stops. Materials are exposed to the standard time-temperature curve found in ASTM E-119 for a minimum of three hours. Tests included the hose stream and Materials Hazard Analysis Test. Attached are copies of NEL-PIA letters of approval and Southwest Research Institute fire test reports which establish the three hour fire resistance rating of the seals and shows the effectiveness of the pipe penetration seals. Penetration seal materials are installed in NEL-PIA approved typical configurations using NEL-PIA approved procedures.

The transom panel above the door frame is a sandwich panel constructed of 2-18 gauge steel face sheets with 1/4" asbestos mill board between the face sheets and was furnished as an integral part of the fire door assembly which along with the fire door bears the Class A label of Underwriters Laboratories, Inc.

All ventilation ducts penetrating any fire barrier in the plant are equipped with UL listed fire dampers of the same fire rating as the fire barrier. The fire dampers are either curtain, guillotine or trap door type actuated by fusible links that are designed to melt at 165°F. On closure of the fire dampers, fire and smoke will be contained in the areas where the fire occurs and prevented from spreading to other areas via the ventilation system. All fire dampers are located in the ducts at the penetrations through the fire barriers.

The fuel handling floor is served by its own ventilation system consisting of supply and exhaust fans. This ventilation system maintains a preferred direction of air flow into the fuel handling area thus preventing the spread of smoke to other areas.

Item 4b

Describe the methods which would be employed for heat and smoke removal using either fixed or portable air handling equipment for each area. Describe how exhaust and make-up air would be provided to achieve adequate air movement. Where portable ducts are utilized, describe the route that would be used to reach the outside, the reduction in rated fan capacity because of the duct length, time required to place units in operation, and the ability of the equipment to handle high temperature gases and particulates.

Response: (ANO-1)

Smoke exhaust fans are provided to purge smoke from the control room and computer room with ample fresh air supplied from adjacent areas.

The ESF pump rooms are provided with a permanent air purge damper arrangement to exhaust radioactive air borne particulate or smoke via the building ventilation exhaust system.

Automatic smoke and heat vents are provided in the turbine building roof with a minimum ratio of 1 sq. ft. of venting area to each 100 sq. ft. of floor area in compliance with NEL-PIA recommendations.

The emergency diesel generator rooms ventilation system as described in FSAR Section 9.7.2.1 is designed such that rapid heat and smoke removal capabilities are provided without degrading the equipment involved.

The containment building air purge, radwaste and auxiliary building, fuel handling areas, and auxiliary building extention ventilation .haust systems remove ventilation air from all of their respective essential building areas. These filtered exhaust systems consisting of PRE-, HEPA, and charcoal filter banks are provided primarily to remove airborne radioactive particulate and also to provide adequate heat and smoke removal capabilities. The PRE- and HEPA filters are of a high temperature non combustible quality and prevent airborne sparks from reaching the charcoal filters. Any smoke or heat generated in any one area of the plant would be mixed with sufficient air from other areas to preclude a temperature condition at the filters in excess of their rating. In the unlikely event that enough smoke is generated such that the filters would load up with enough combustion particulate to prevent complete smoke removal, the system can be shut down momentarily and filter modules removed to provide an open path for continued smoke exhaust. Fresh air is supplied via the building's ventilation supply air system.

RESPONSE (ANO-2)

Smoke exhaust fans are provided to purge smoke from the control room and computer room with ample fresh air supplied from adjacent areas.

The cable spreading room is provided with a separate smoke exhaust fan system with an equivalent capability of 300 cfm per sq. ft. of gravity venting area in accordance with NEL-PIA requirements.

The ESF pump rooms are provided with a permanent air purge damper arrangement to exhaust radioactive air borne particulate or smoke via the building ventilation exhaust system.

Automatic smoke and heat vents are provided in the turbine building roof with a minimum ratio of 1 sq. ft. of venting area to each 100 sq. ft. of floor area in compliance with NEL-PIA recommendations.

The emergency diesel generator rooms ventilation system, as described in FSAR Section 9.4.2.4 is designed such that rapid heat and smoke removal capabilities are provided without degrading the equipment involved.

The containment building air purge, radwaste and auxiliary building, fuel handling areas, and auxiliary building extention ventilation exhaust systems remove ventilation air from all of their respective essential building areas. These filtered exhaust systems consisting of PRE , HEPA, and charcoal filter banks are provided primarily to remove airborne radioactive particulate and also to provide adequate heat and smoke removal capabilities. The PRE and HEPA filters are of a high temperature non combustible quality and prevent airbone sparks from reaching the charcoal filters. Any smoke or heat generated in any one area of the plant would be mixed with sufficient air from other areas to preclude a temperature condition at the filters in excess of their rating. In the unlikely event that enough smoke is generated such that the filters would load up with enough combustion particulate to prevent complete smoke removal, the system can be shut down momentarily and filter modules removed to provide an open path for continued smoke exhaust. Fresh air is supplied via the building's ventilation supply air system.

Item 4c

Discuss the potential fire hazard for all types of air filters including charcoal, pre-filter, high efficiency and HEPA, and describe the fire detection and suppression capability and fire prevention measures. Analyze the effects of a filter fire in terms of heat, smoke generation, radiation release, and damage to safety-related equipment. For filters inside containment, analyze the potential effects of complete combustion on containment atmosphere and resultant effects on safety-related equipment.

Response: (ANO-1)

A detailed description of the ANO-1 plant ventilation filtration systems consisting of pre-filters, HEPA filters, and charcoal filters is contained in FSAR sections 6.5 and 9.7. Pre-filters are qualified as U.L. Class I. All HEPA filters are of non-combustible construction. Each HEPA filter is fabricated by pleating a continuous sheet of molded glass medium back and forth over itself and enclosing it in a steel frame. The filter medium is a fire resistant glass fiber which meets the requirements of Military Specification MIL-F-51079A.

The charcoal filters are housed in heavy gauge metal enclosures. During normal operation of any of the filter trains, the air flow is sufficient to dissipate decay heat and prevent the charcoal from reaching the ignition temperature (approximately 680°F).

The ventilation air from the fuel handling, radwaste, and other potentially contaminated areas in the auxiliary building is exhausted through multi-filter units comprising two vane axial type fans each, one of which serves as standby, a visual temperature indication, and motor operated isolation dampers at each end of the filter train. The standby exhaust fan provides reliability by ensuring continuous ventilation of the areas, and air flow through the filters to prevent overheating of the charcoal.

The ventilation exhaust air from the fuel handling and radwaste areas is monitored for gaseous and particulate radioactivity as described in FSAR section 11.24.6. The radiation levels are indicated, recorded and alarmed in the control room. In the event of high radiation the operator can stop the respective ventilation system and isolate the multifilter unit by means of control switches located in the control room. Any radioactivity products of combustion can then be contained within the filter housing.

Additional multi-filter units are used in the containment purge system, in the control room emergency air filter system, in the penetration room ventilation system and in the hydrogen purge exhaust system.

The purge system (for containment accessibility) is similar to that of the fuel handling and radwaste areas except that it has only one exhaust fan and is not normally in operation.

Filtration of the air inside the control room is accomplished by an emergency air filtering system consisting of two redundant filter trains with Alison Controls line type thermal detectors as an integral component of the charcoal filter. Line type thermal detectors are dual set point alarming at abnormal temperature and also excessive temperature rise prior to reaching the ignition temperature of the charcoal. Upon alarm indicating abnormal temperature, the operator can stop the respective filter system and isolate the multi-filter unit by means of control switches located in the control room. Under these conditions the standby emergency filtering system will be started.

Air leakage into each of the penetration rooms is discharged to the containment flute (vent) through a pair of multi-filter units (one standby) containing Alison Controls line type thermal detectors as an integral component of the charcoal filter. Line type thermal detectors are dual set point alarming at abnormal temperature and also excessive temperature rise prior to reaching the ignition temperature of the charcoal. Upon alarm indicating abnormal temperature, the operating system can be shut down and isolation valves on the inlet and outlet of the filter unit closed. The standby system will then be started and a normally closed valve opened to allow adequate cooling air from the operating unit to bypass through the idle filter unit to prevent reaching the ignition temperature of 680°F.

The hydrogen purge system exhausts the containment building atmosphere 3 days after a LOCA through a non-combustible HEPA filter and an impregnated charcoal adsorber via a Nash water ring vacuum pump. Any heat and/or smoke generation is absorbed in the vacuum pump water seal ring to minimize radiation release. These multifilter units are isolated by shutoff valves during normal plant operation.

In the event of a power failure to any of the air filter system fans, the associated filter train will be isolated automatically. In the unlikely event of a fire resulting from charcoal ignition, the affected air filter system can be isolated, thus confining the fire to within the housing. However, the fire propagation within the charcoal filter will be extremely slow if not retarded since charcoal has rather poor thermal conductivity, and is tightly packed in the filter beds. Additionally, those streams from the wet stand pipe fire protection systems can be used to control propagation of the fire and to provide ultimate extinguishment.

Inside the containment, the containment cooling systems are equipped with pre-filters. There are no other air filters in the containment. The pre-filters are UL Class I qualified and will not support combustion. The potential effects of combustion on containment atmosphere or resultant effects on safety-related equipment are therefore negligible.

Response: (ANO-2)

A detailed description of the ANO-2 plant ventilation filtration system consisting of a pre-filter, a HEPA filter, and a charcoal filter is contained in FSAR sections 6.5 and 9.4. All pre-filters are qualified as UL Class I. All HEPA filters are of non-combustible construction. Each HEPA filter is fabricated by pleating a continuous sheet of molded glass medium back and forth over itself and enclosing it in a steel frame. The filter medium is a fire resistant glass fiber which meets the requirements of Military Specification MIL-F-51079A.

The charcoal filters are housed in heavy gauge metal enclosures. During normal operation of any of the filter trains, the air flow is sufficient to dissipate decay heat and prevent the charcoal from reaching the ignition temperature (approximately 680°F).

The ventilation air from the fuel handling, radwaste, and other potentially contaminated areas in the auxiliary building is exhausted through multifilter units comprising two vane axial type fans each, one of which serves as standby, a visual temperature indication, and motor operated isolation dampers at each end of the filter train. The standby exhaust fan provides reliability by ensuring continuous ventilation of the areas and air flow through the filters to prevent any overheating of the charcoal.

The ventilation exhaust air from the fuel handling and radwaste areas is monitored for gaseous and particulate radioactivity as discussed in FSAR Section 11.4. The radiation levels are indicated, recorded and alarmed in the control room. In the event of high radiation, the operator can stop the respective ventilation system and isolate the multi-filter unit by means of control switches located in the control room. Any radioactive products of combustion can then be contained within the filter housing.

Additional multi-filter units are used in the containment purge system, in the control room emergency air filter system, in the penetration room ventilation system and in the hydrogen purge exhaust system.

The purge system or containment accessibility is similar to that of the fuel handling and radwaste areas except that it has only one exhaust fan and is not normally in operation.

Filtration of the air inside the control room is accomplished by an emergency air filtering system consisting of two redundant filter drains with Alison Controls line type thermal detectors as an integral component of the charcoal filter. Line type thermal detectors are dual set point, alarming at abnormal temperature and also excessive temperature rise prior to reaching the ignition temperature of the charcoal. Upon alarm indicating abnormal temperature, the operator can stop the respective filter system and isolate the multi-filter unit by means of control switches located in the control room. Under these conditions the standby emergency filtering system will be started.

Air leakage into each of the penetration rooms is discharged to the containment flute (vent) through a pair of multi-filter units (one standby) containing Alison Controls line type thermal detectors as an integral component of the charcoal filter. Line type thermal detectors are dual set point alarming at abnormal temperature and also excessive temperature rise prior to reaching the ignition temperature of the charcoal. Upon alarm indicating abnormal temperature, the operating system can be shut down and isolation valves on the inlet and outlet of the filter unit closed. The standby system will then be started and a normally closed valve opened to allow adequate cooling air from the operating unit to bypass through the idle filter unit to prevent reaching the ignition temperature of 680°F.

The hydrogen purge system exhausts the containment building atmosphere 3 days after a LOCA. These multi-filter units are isolated by shutoff valves during normal plant operation. The ANO-Unit 2 hydrogen purge system utilizes a non-combustible HEPA filter and a non-combustible Silver Zeolite adsorber to remove radioactive contaminants.

In the event of a power failure to any of the filter system fans, the associated filter train will be isolated automatically. In the unlikely event of a fire resulting from charcoal ignition, the affected filter system can be isolated, thus confining the fire to within the housing. However, the fire propagation within the charcoal filter will be extremely slow if not retarded since charcoal has rather poor thermal conductivity, and is tightly packed in the filter beds. Additionally, those streams from the wet stand pipe fire protection systems can be used to control propagation of the fire and to provide ultimate extinguishment.

Inside the containment, the containment cooling systems are equipped with pre-filters. There are no other air filters in the containment. The pre-filters are UL Class I qualified and will not support combustion. The potential effects of combustion on containment atmosphere or resultant effects on safety-related equipment is therefore negligible.

Item 9b

Describe the location of detectors in the control room ceiling space and the air flow patterns to show the adequacy of these detectors to detect fires in the control cabinets open to the ceiling space.

Response: (ANO-1)

There are five ionization and two heat actuated detectors equally spaced above the suspended ceiling to detect any fire in that space. A fire barrier is located just above the suspended ceiling which isolates the cable area from the control room below. The ceiling space is not ventilated. However, for control cabinets that are opened to the ceiling, exhaust ducts are connected directly to the cabinets for normal cooling. A smoke detector is located in the exhaust duct to detect any fire that may occur in the cabinets.

Response: (ANO-2)

There are six ionization type detectors located in the space above the suspended ceiling, three on the west side and three on the east side, to detect electrical fire in that space. All electrical cables located in the space are run through covered cable trays and enclosed conduits. No ventilation is provided in the ceiling space. For control cabinets that are opened to the ceiling, exhaust ducts are connected directly to the cabinets for normal cooling. Two smoke detectors are located in the exhaust duct to detect any fire that may occur in the cabinets.

ITEM 10 A

Identify all areas not provided with detection and automatic sprinkler protection: 1) where both safety related equipment and open cable trays exist, or 2) where there are safety related cables in open cable trays. In these areas, justify the lack of detection and automatic sprinkler suppression.

RESPONSE ANO-1 & 2

These areas are identified in the Fire Hazards Analysis Supporting Information submitted on February 28, 1978. The justification for the lack of detection and/or automatic sprinkler protection is based on the acceptability criteria applied to the redundancies involved or the total lack of redundant circuits.

ITEM 10(b)

Justify the lack of automatic fixed sprinkler suppression in the switchgear rooms to protect exposed safety related cables and cables of both redundant divisions.

RESPONSE ANO-1

North and South switchgear room - Zone 99-M, 100-N

The heat load in these zones is low and most all circuits are in conduit. The possibility of a fire damaging redundant circuits is remote, however, due to the consequences of loss, from an equipment protection standpoint, modifications have been proposed for these zones.

ITEM 12(a)

Describe the routing of all piping containing flammable or combustible liquids or gases and evaluate the potential hazard to safety related equipment.

RESPONSE ANO-1

The following are the types of combustible liquids and gases at ANO-1: hydrogen, lube oil, and diesel fuel oil. Hydrogen and lube oil are used in the turbine and turbine auxiliary buildings. In these areas there are no potential hazards to safety related equipment.

Inside the reactor auxiliary building, the pipe routing of hydrogen to the reactor coolant makeup tank is through areas containing the emergency feedwater pumps and the primary makeup pumps. The only potential hazard will be when the hydrogen supply line is being pressurized. An operator will be available to isolate the line if the pressure were to change indicating a line rupture. Normally once a day hydrogen is supplied on a batch basis at 20 to 50 psi and when the desired pressure is reached, the hydrogen manifold is isolated. Due to the small amount of hydrogen that would be in the supply line and the ventilation in the area, the probability of an explosion is very small.

Although the primary makeup pumps are in the vicinity of the waste gas decay tanks which normally contain some amount of hydrogen, the tanks are regularly monitored to control the amount of oxygen to prevent an explosive mixture from developing.

The diesel fuel oil supply to the emergency diesel generators is routed underground to the diesel generator rooms. The lines do not pass through other areas of the plant. If one of the fuel oil supply lines were to rupture neither, the redundant diesel generator nor any other safety related equipment would be affected.

RESPONSE ANO-2

The following are the types of combustible liquids and gases at ANO-2; hydrogen, lube oil, and diesel fuel oil. Hydrogen and lube oil are used in the turbine building. Lube oil is also used in the turbine auxiliary building. In these areas there are no potential hazards to safety related equipment.

Hydrogen is piped into the reactor auxiliary buidling for use in the volume control tank. The hydrogen is not of a potential hazard to safety related equipment where it is piped.

There is a possibility of hydrogen buildup in the waste gas decay tanks. The tanks are monitored to prevent the accumulation of oxygen that could cause an explosive mixture.

The diesel fuel oil supply to the emergency diesel generators is routed underground to the diesel generator rooms. The lines do not pass through other areas of the plant. If one of the fuel oil supply lines were to rupture, the redundant diesel generator would not be affected nor would any other safety related equipment be affected.

ITEM 12(b)

Describe the hydrogen system used to scavenge oxygen from the main coolant. Also, describe: (1) frequency of use; (2) provisions for inerting; (3) alarms or indications on loss of flow or pressure; (4) hydrogen detection or a ventilation monitoring system for the make-up tank room; (5) the routing and protection of hydrogen lines to minimize susceptibility to damage; and (6) the provisions to cut off hydrogen flow.

RESPONSE ANO-1 & 2

Hydrogen bottles feed into a header which is piped to the Reactor Coolant Makeup Tank (on Unit 2 named the Volume Control Tank) for a hydrogen blanket on the primary coolant system. The blanket is maintained by a batch basis of hydrogen supply when the pressure becomes low. Usually, this occurs up to once a day. A removable spool must be inserted to allow nitrogen supply to the makeup tank (or VCT) for inerting of the tank blanket space. This is required to prevent inadvertant nitrogen addition rather than hydrogen during operation of the plant. The hydrogen piping is generally routed well above the floor to prevent damage from passing traffic.

With the hydrogen being supplied on a batch basis, an operator opens a valve at the hydrogen bottle manifold and allows the pressure to the makeup tank (or VCT) to reach a desired pressure (usually 20 to 50 psi). Once this pressure is reached, the hydrogen bottle manifold is isolated. Check valves are provided at the makeup tank (and VCT) which will prevent the flow of hydrogen away from the tank if the supply line were to rupture. Therefore, due to the small volume of hydrogen that would be released from the hydrogen supply line if it ruptured, there is no potential hazard to safety related equipment.

ITEM 17a

a) Provide an analysis of the potential for a fire to disable both service water systems. The analysis should include postulated fires in the following area: (1) inside the intake structure where pumps, valves and cables are located; (2) in the cable tunnels leading to the intake structure (these tunnels contain cable in PVC conduit); and (3) in the auxiliary building where the cable runs from the tunnel to the switchgear rooms.

RESPONSE (ANO-1)

The analysis requested was performed in the Fire Hazards Analysis. The results indicated the possibility of loss of both SW trains in the mentioned areas to be small.

ITEM 17b

b) Drawings indicate a cross-over between the two tunnels at the intake structure. Provide an analysis of the potential for a single fire to damage cables in both tunnels at this cross-over.

RESPONSE (ANO-1)

To our knowledge, there is no cross over between the two tunnels at the intake structure.

ITEM 20a

a) Describe the routing of redundant safety-related electrical wiring between the cable spreading room and the switchgear rooms. Provide an evaluation of the potential for a fire in one switchgear room cabling to both redundant safety divisions.

RESPONSE (ANO-1)

The routing of redundant safety-related electrical wiring between the cable spreading room and the switchgear rooms is shown on the attached electrical drawing E669. The requested analysis has been performed and submitted with the Fire Hazards Information.

ITEM 23

Provide a list of all areas containing equipment essential for safe shutdown which do not have fire detection and justify the lack of fire detection.

RESPONSE ANO-1 & 2

All areas of ANO have been analysed as requested and the results of that analysis has been submitted as part of our Fire Hazards Information. For these areas acceptable without fire detection, the lack of detection is justifable by the acceptance criteria applied to each zone and the extremely low probability of fire destroying redundant trains.

ITEM 24

The air compressor room adjacent to the turbine building contains some cables of both redundant divisions; no fire detection or automatic suppression means have been provided. Describe the effect on safe shutdown capability of a fire in this room.

RESPONSE (ANO-1)

An analysis has been performed in this area and results and justification have been submitted with our fire hazards information.

ITEM 26

Provide the basis for your statement in IV b.1(d) of your submittal that insulation, shielding and sound-proofing materials are non-combustible.

RESPONSE: (ANO-1)

All insulating, shielding and sound-proofing materials used within ANO-1 have been fabricated from non-combustible materials as detailed below. Pipe insulation is either calcium silicate or fiberglass with an aluminum or stainless steel protective jacket. Shielding materials are either lead, concrete or steel. All sound-proofing materials within the plant consist of either gypsum board or epithermal mineral fiber.

Item 34

Item IV.C.2(a) states that NFPA 24 was used as a guide in designing and installing the fire protection water supply system. Identify NFPA requirements which are not met by the fire protection water supply system, and justify not meeting these requirements.

Response: (ANO 1 & 2)

An underground yard fire main loop consisting of 12" cast iron pipe internally lined (in accordance with ANSI A21.4), with approved sectional valves, hydrants and hose houses was put in service after it had been tested and met the applicable requirements of NFPA 24, "Standard for Outside Protection", and was accepted by the Nuclear Energy Liability - Property Insurance Agency.

ITEM 35a

a) State whether inside hydrants, hose couplings and stand pipe risers are compatible with those of local fire departments.

RESPONSE ANO-1 & 2

Inside hydrants, hose couplings and stand pipes are compatible with the equipment used by the Russellville Fire Department.

ITEM 35b

b) Describe the provisions for equipping the hose houses on the plant yard loop with 2-½ inch lined fire hose.

RESPONSE ANO-1 & 2

All hose houses on the ANO-1 plant yard loop are equiped with 2½ inch fire hoses. All hose houses on the ANO-2 plant yard loop are or will be equiped with 2½ inch fire hoses.

ITEM 44

Assuming a fire at the penetration areas inside of the Reactor Building, identify the potential consequences on safe shutdown, decay heat removal, and containment.

RESPONSE: ANO- 1 & 2

The requested analysis was performed in the Fire Hazards Analysis. The consequences were determined to be acceptable. In addition, each of the areas is protected by an automatic sprinkler system.

ITEM 46

Provide a specific analysis of the potential for and consequences of a fire in the safety-related pump, reactor fuel storage, and radwaste areas. You may reference specific portions of your response to the NRC letter of 10/21/76 if the areas above have been discussed in detail in that resonse.

RESPONSE ANO-1 & 2

The requested analysis was performed in our Fire Hazards Analysis and has been submitted. The potential and consequences of a fire was determined acceptable.

ITEM 60

Identify areas containing significant quantities of combustibles in which a fire could affect safety-related equipment and also cause the manual hose stations for these areas to be inaccessible due to smoke and heat. Show that these areas can be reached with an alternate hose.

RESPONSE: ANO-2

The combustibles located in each fire zone have been identified in the Fire Hazards Analysis and have been submitted. No credit was taken in the Fire Hazards Analysis for use of a manual hose stations.

ITEM 63

Describe the potential for a fire in the Core Protection Calculators causing the loss of capability to trip the reactor manually or from other automatic input than the Core Protection Calculators.

RESPONSE ANO-2

The manual initiation of a reactor trip via the Reactor Protective System (RPS) is independent of the Core Protection Calculators (CPC's). Therefore, a fire in the 2C15 cabinets (Core Protection Calculators) would not degrade the manual trip capabilities of the Reactor Protective System (RPS).

ITEM 71

Identify the quantity of emergency breathing units, number of spare air bottles, and capacity of the recharge capability to be available onsite.

RESPONSE: (ANO-2)

There are normally 29 emergency breathing units and 18 spare air bottles onsite at all times. Recharge capability is provided by ten 300 cubic foot breathing air cylinders. Additionally, a portable breathing air compressor with a capacity of 7.5 cubic feet per minute at 2200 psi is available to charge the spare air cylinders.

This portable compressor is capable of being moved to the Emergency Control Center where power will be available to it should it's normal power source not be available.

ITEM 72

Verify that fire dampers will be located in all ventilation duct penetrations of fire barriers.

RESPONSE: (ANO-2)

A study has been conducted for ANO-2 to verify that fire dampers are provided for all ventilation ducts penetrating a fire barrier. The results indicated a small number of cases where fire dampers had not been specified. In each case, a fire damper will be provided prior to fuel load so that every ventilation duct penetrating a fire barrier will be provided with a fire damper.