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February 8, 1983
File 8271-2

Mr. Frank Nolan, Project Officer
Cehmical Engineering, NRR
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Nolan:

In accordance with Contract #NRC-03-82-118, Task 2 of Article 1, Section C, enclosed is the Draft Technical Evaluation Report (DTER) for Shearon Harris.

Very truly yours,

James D. Behn

James D. Behn

Encl.

cc: w/o Encl.
Director, Div. of Engineering, NRR
Contracting Officer, Div. of Contracts

Draft Technical Evaluation Report
DTER
Shearon Harris Nuclear Power Plant
Units Nos. 1 and 2
Docket Nos. 50-400 and 50-401

The applicant states in the FSAR that for the units fire alarm system the main loop cables connecting local panels with annunciator panel are carried in separate non-safety cable trays with connections to devices, panels or loop cross overs carried in conduit. Interconnecting cable to system devices generally are carried in conduit.

Fire detection systems (heat, smoke, or flame) are provided in all safety-related areas, or in areas that present potential fire exposure to safety related systems or equipment. Annunciators and alarms are transmitted to the MFDCP, located in the Unit 1 Communications Room, which in turn, alerts the affected Unit Control Room.

Each local panel displays local alarm, trouble, normal and actuation signals. When a fire condition is sensed by a detector, a white zone light is energized on the detector's respective LFDCP. Whenever there is a fire condition indicated at a LFDCP, an audible alarm, which produces a sound operate in conjunction with the LFDCP. This unit gives the layout of the fire zone and the exact arrangement and location of fire detection therein. The unit operates on a "first-out" annunciation basis by lighting an indicating lamp representing the initially activated detector.

A supervisory system is provided for each detection, actuation and alarm circuit. The supervisory system is designed to actuate an audible alarm distinct from the fire alarm and an amber light at the LFDCP as well as an amber light on the MFDCP on the occurrence of any of the following:

1) Loss of electrical integrity in any detection circuit.
2) Loss of electrical integrity in any actuation circuit.
3) Loss of electrical integrity in any alarm circuit.
4) Failure of water to flow within five seconds after any deluge valve release is activated.
5) Operation of any isolation of sectionalizing valve in the Fire Protection System, upstream from deluge, pre-action, multi-cycle alarm valves and strainers away from their normal active position.
6) Availability of operational power to fire pumps.
7) Loss of air pressure in supervised suppression system (pre-action and multi-cycle sprinkler systems).
8) Operation of waterflow detection devices.
9) Changes in distribution system water pressure.

The applicant states that the supervisory system for each detecton, actuation and alarm circuit is in accordance with NFPA No. 26. NFPA 26 is the Supervision of Valves Controlling Water Supplies for Fire Protection. We will require that the supervision of the entire system meet NFPA 72D, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems."

The Fire Detection System satisfies the following general design requirements:

(a) All detection and transmission circuits are Class A as defined in NFPA Std. 72D and 72E.

(b) All fire detection devices and associated quipment are either UL listed and/or FM approved and so labeled. They are installed in accordance with manufacturer's specification and applicable NFPA standards.

(c) The system consists of a main signaling loop used to carry all fire and trouble alarms from the local fire detection control panels (LFDCP) to the main fire detection control panel (MFDCP). The alarm signals are transmitted by a solid state digital multiplexing technique. The signal transmission system is completely supervised by automatic built-in-test-equipment and alarmed on the MFDCP when a trouble condition exists. The system power is nominal 24V DC.

Power for operation of fire detection systems and for actuation of fire suppression system is supplied from the balance of plant static uninterruptible power supply. The MFDCP located in the Communications Room of Unit 1 supervises the Fire Detection System of plant Units 1 and 2 including their directly associated supported buildings. Each fire zone is displayed on the MFDCP as a mimic of each of the LFDCP's. Included on the MFDCP are indicating lights for the operational status of the fire pumps, various suppression systems, and the fire detection signal transmission system. The MFDCP initiates a visual and audible alarm in the Control Room of the affected Unit.

The fire detection alarm panels are supplied from Uninterruptible Power Supply (UPS) Bus #1, which is supplied from the 60 kVa static UPS system. The UPS system in turn is supplied from non-Class IE motor control centers (MCC). In the event of loss of offsite power, the station 250 volt DC battery which is capable of supplying the 60 kVa inverter for 4 hours, is connected via the 250 volt Bus DP-1-250 to the 60 kVa static UPS system. Bus DP-1-250 is also connected via battery chargers to the Class IE emergency diesel generator manual load block.

The applicant uses a hand wired standby battery for the entire system. As required by NFPA 72D each individual FACP should have its own standby battery source so that a fault, open or ground in a hard wired system will not eliminate multi FACP on the same circuit.

The applicant should meet BTP CMEB 9.5-1 and provide the following:

Primary and secondary power supplies should be provided for the fire detection system and for electrically operated control valves for automatic suppression systems. Such primary and secondard power supplies should satisfy provisions

of Section 2220 of NFPA 72D. This can be accomplished by using normal offsite power as the primary supply with a 4 hr. battery supply as secondary supply; and by providing capability for manual connection to Class IE emergency power bus within 4 hours of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.

The applicant states on 9.5.1-7 of the FSAR that the storage and use of flammable and combustible liquids meet the intent and basic criteria of NFPA 30. "Flammable and Combustible Liquids Code." In order to meet Section C.5.d of BTP ASB 9.5-1, we will require that all deviations from NFPA 30 be identified and justified.

The applicant states that the bulk storage of compressed or cryogenic gases is not permitted within structures housing safety-related equipment. The applicant does not state if hydrogen lines are routed through safety-related areas. In order to prevent a hydrogen explosion in safety-related areas of the plant, any hydrogen line in safety-related areas should be relocated outside such areas or be sleeved such that the water pipe is directly vented to the outside.

The applicant states in the FSAR that with regard to NRC criteria, the SHNPP fire protection program meets the intent of the guidelines outlined in Appendix A to Branch Technical Position APCSB 9.5-1 dated August 23, 1976. It also states that the information on various aspects of the fire protection program are detailed as required to show conformance with the guidelines or to demonstrate the equivalency of alternative approaches as previously described in the SHNPP PSAR Section 9.10, "Fire Protection System" submitted to the NRC as Amendment 54, dated May 1, 1977.

The applicant's fire protection program is only acceptable if it is in accordance with the following criteria:

1. 10 CFR Part 50 50.48, and General Design Criterion 3, as related to fire prevention, the design and operation of fire detection and protection systems, and administrative controls provided to protect safety-related structures, systems, and components of the reactor facility.

2. General Design Criterion 5, as related to fire protection for shared safety-related structures, systems, and components to assure the ability to perform their intended safety function.

The following specific criteria provide information, recommendations, and guidance and in general describe a basis acceptable to the staff that may be used to meet the requirements of 50.48, GDC 3 and 5:

a. Branch Technical Position (BTP) CMEB 9.5-1 as it relates to the design provisions given to implement the fire protection program. The fire protection program will be reviewed to the guidelines of BTP CMEB 9.5-1 (NUREG-0800), July 1981. The applicant should provide a comparison that shows conformance of the plant fire protection program to these guidelines. Deviations from the guidelines should be specifically identified. A technical basis should be provided for each deviation.

b. Regulatory Guide 1.78 as it relates to habitable areas such as the control room and to the use of specific fire extinguishing agents.

c. Regulatory Guide 1.101, as it relates to fire protection emergency planning.

Three-hour fire separations can be incorporated into the design of new plants but are often difficult to achieve in plant already constructed. Initially, in the reviews of plant fire hazard evaluations, engineering judgment was employed to decide what additional protection, if any, was required in situations where 3 hr. separations were not feasible. Because of variations in arrangements as well as differences in judgment, apparent inconsistencies in approach were noted. To attempt to standardize on the approach, a policy was developed for situations where the fire hazard is not severe to allow automatic sprinklers plus a minimum amount (1 hr.) of fire resistance on exposed safety related systems.

In normal U.S. practice, it is common to allow lesser fire resistance for structural systems or fire barriers where the building is sprinklered. Typically, a reduction of 1 hr. of fire resistance is allowed, although it is not uncommon to find larger reductions, particularly where the life hazard is low. A study of failure modes due to fire in high-rise buildings showed that it would not be unreasonable to equate a construction type that requires 3 hr. floors and beams without sprinklers to one that requires only 1 hr. floors and beams but with sprinklers.

This is similar to the guidance developed by NRC. Providing an automatic sprinkler system in areas allows the use of 1 hr. fire barriers rather than the normally required 3 hr. barriers. Without sprinklers, 1 hr. barriers alone would not provide the desired degree of safety, even in areas with light fire loadings. This is consistent with normal fire protection practice as well as the codes commonly used today as indicated above. Also, because of the normal time lag in the operation of sprinklers, the less-than-perfect reliability of sprinklers, and the high susceptibility of electrical cables to damage from fire, deletion of all fire resistance to separate closely-spaced redundant divisions in sprinklered areas cannot be justified.

If the intent is to avoid concurrent damage to both trains of redundant safety systems from the same fire incident, obviously the two trains can be separated by sufficient distance so that no fire that can reasonably be envisioned is likely to affect both. In a typical building fire, fire, heat and products of combustion often travel for several hundred feet, but in most parts of a nuclear power plant, there is insufficient continuity of combustibles to cause extension of a fire very far from the area of origin. Particularly in spaces where under normal conditions the combustibles are limited to the insulation on electrical cables and there is no storage and no combustible construction, the most severe fire that can reasonably be envisioned is one that occurs in transient materials.

However, a fire in transient combustibles can be of sufficient magnitude to cause concurrent damage of redundant safety systems if they are in close proximity to each other. (A fire that has been postulated as being likely solely from transient combustibles is a 25 sq. ft. flammable liquid pool fire, with sufficient fuel for 15 min. of burning.) Except in spaces with very high

ceilings, temperatures exceeding 1000°F are reached very rapidly directly above and for some distance horizontally from the fire. Temperatures drop off as the distance from the fire is increased, and as a generalization for the conditions likely to be encountered, it appeared reasonable to assume that temperatures which could affect the reliability of control wiring would not be reached in at least one division if the cables are at least 20 ft. apart with no intervening combustibles.

At separations of less than 20 ft, with no intervening barrier, there is sufficient likelihood that an exposure fire will damage both divisions that relaiable protection is necessary. Automatic sprinkler protection will provide an adequate level of safety in such situations, where the hazard is light and principally from transient combustibles. However, as indicated earlier, automatic sprinklers cannot be relied on as the sole means of protection where redundant divisions are in close proximity to each other. It was felt that at least a 20 ft separation should be provided to obtain sufficient reliability in suppressing a fire before failure due to excessive temperatures is likely in both divisions.

In the FSAR the applicant also states that where redundant systems could not be separated by fire barriers, as in Containment, the Control Room as well as other areas, other measures were employed in order to prevent a fire-caused loss of function of safety related systems. Utilization of fire-resistive construction, provision of fire breaks and/or fire retardant coatings in cable trays, and installation of fire detection systems and automatic fire extinguishing systems were also used.

The applicant should verify that fire protection has been provided for safe shutdown so that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage and that system necessary to achieve and maintain cold shutdown from either the control room or the emergency control station(s) can be repaired within 72 hours.

The applicant should provide an analysis which shows that one redundant train of equipment structures, systems, and cables necessary for safe shutdown can be maintained free of fire damage by either:

(a) Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3 hr. rating. Structural steel forming a part of or supporting such fire barriers should be protected to provide fire resistance equivalent to that required of the barrier;

(b) Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 ft. with no interventing combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area; or

(c) Enclosure of cable and equipment and associated circuits of one redundant train in a fire barrier having a 1 hr. rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.

The applicant should identify those areas of the plant that will not meet the guidelines of Section C.5.b of BTP CMEB 9.5-1 and, thus alternative shutdown will be provided. Additionally provide a statement that all other areas of the plant will be in compliance with Section C.5.b of BTP CMEB 9.5-1.

a) List the system(s) or portions thereof used to provide the shutdown capability with the loss of offside power.

b) For those systems identified in "a" for which alternative or dedicated shutdown capability must be provided, list the equipment and components of the normal shutdown system in the fire area and identify the functions of the circuits of the normal shutdown system in the fire area (power to what equipment, control of what components and instrumentation). Describe the system(s) or portions thereof used to provide the alternative shutdown capability for the fire area and provide a table that lists the equipment and components of the alternative shutdown system for the fire area. For each alternative system identify the function of the new circuits being provided. Identify the location (fire zone) of the alternative shutdown equipment and/or circuits that bypass the fire area and verify that the alternative shutdown equipmend and /or circuits are separated from the fire area in accordance with Section III.G.2.

c) Provide drawings of the alternative shutdown system(s) which highlight any connections to the normal shutdown systems (P&IDs for piping and components, elementary wiring diagrams of electrical cabling). Show the electrical location of all breakers for power cables, and isolation devices for control and instrumentation circuits for the alternative shutdown systems for that fire area.

d) Verify that procedures have been or will be developed which describe tasks to be performed to effect the shutdown method. Provide a summary of these procedures outlining operator actions.

e) Verify that the manpower required to perform the shutdown functions using the procedures of d) as well as to provide fire brigade members to fight the fire is available as required by the fire brigade technical specifications.

f) Provide a commitment to perform adequate acceptance tests of the alternative shutdown capability. These tests should verify that: equipment operates from the local control station when the transfer or isolation switch is placed in the "local" position and that the equipment cannot be operated from the control room; and that equipment operates from the control but cannot be operated at the local control station when the transfer isolation switch is is the "remote" position.

g) Verify that repair procedures for cold shutdown systems are developed and material for repairs is maintained on site. Provide a summary of these procedures and a list of the material needed for repairs.

The applicant states in this Fire Protection Hazards Analysis that a circumferential section of the reactor vessel mirror insulation between Elevation 246.6 ft. and Elevation 251.2 ft. was modified to incorporate neutron shielding. The neutron streaming shield is a composite of approximately 3 in. thick, consisting of 1-1/2 in. of "Microtherm" high-temperature insulation manufactured by Micropore Insulation Limited bonded to a varying thickness layer of "Ricorad" neutron shielding material manufactured by the Richardson Company. The applicant states that each component of the composite is indicated by its manufacturer to have "Excellent Fire Resistance Properties." Furthermore, the neutron streaming shield is encapsulated in stainless steel which will provide an adequate barrier. Since the "shield assembly" is encased and isolated inside the reactor vessel cavity, it is not considered to have a significant combustible loading and no fire will be postulated for this feature.

The applicant states that the neutron shielding material has excellent fire resistive properties as well as being encapsulated in stainless steel; it is not considered a significant combustible loading. The applicant should provide technical justification on the preceding material to demonstrate the properties of the material are as stated.

The applicant states in the fire hazards analysis that structural barriers, partial or full height, are provided between redundant safety-related components within the containment fire area. In addition, suitable fire barriers are provided at points of close proximity between safety and non-safety related cable trays where Regulatory Guide 1.75 criteria cannot be fully met.

The fire suppression system provided in the containment area is an automatic multi-cycle sprinkler system hydraulically designed to provide a density of 0.3 gpm/sq.ft. for either reactor coolant pump surface, airborne radioactivity removal unit housing top area, or cable tray run area. The system is actuated automatically by the thermal detectors located around each reactor coolant pump, over airborne radioactivity removal unit housing top, or over cable tray run area, when the area temperature reaches 200 F. The sprinkler heads open when area temperature reaches 225 F. The system water flow is shut off automatically from the control valve when the area temperature drops below 200 F. The multicycle control valve for the system is located outside this fire area, in the RAB, Elevation 236 ft. Sprinkler System piping is seismically supported inside the Containment, and in areas containing safety related quipment inside the RAB.

Manual actuation of the system is provided from the multi-cycle control valve emergency mechanical release. Remote manual actuation of the multi-cycle system is provided from any manual alarm station strategically located throughout the Containment Building. Electrical supervision of this suppression system includes control valve position, system valve position supervisory air pressure and lack of water flow through the control valve. Hose stations and portable fire extinguishers are also provided.

The applicant has not provided for the containment area (as well as all other areas of the plant), assurance through a defense in-depth design, that a fire will not prevent the performance of necessary safe plant shutdown functions and will not significantly increase the risk of radioactive releases to the environment in accordance with General Design Criteria 3 and 5. The fire hazards analysis does not provide a list of systems and components needed to provide safe shutdown capability as well as lack of identification of locations where redundant trains or division of safe shutdown systems are separated by less than 20 ft. The following fire protection should be provided for the containment fire area:

Inside noninerted containment one of the fire protection means stated in BTP-CMEB 9.5-1 Section C.5.b.1 and C.5.b.2 or the following fire protection means should be provided: separation of cables and equipment and associated nonsafety circuits of redundant trains by a noncombustible radiant energy shield having a minimum fire rating of one-half hour.

In primary containment, fire detection systems should be provided for each fire hazard. The type of detection used and the location of the detectors should be the most suitable for the particular type of fire hazard identified by the fire hazard analysis.

A general area fire detection capability should be provided in the primary containment as backup for the above described hazard detection. To accomplish this, suitable smoke or heat detectors compatible with the radiation environment should be installed.

Standpipe and host stations should be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire main supply inside containment. For BWR drywells, standpipe and hose stations should be placed outside the drywell with adequate lengths of hose, no longer than 100 ft, to reach any location inside the drywell with an effective hose stream.

The reactor coolant pumps should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the safe shutdown earthquake.

Such collection systems should be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage should be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected should include lift pump and piping overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line should be large

The applicant states in the FSAR that for safety related charcoal filter assemblies, a low-flow air bleed cooling system is provided. This consists of air circulated through the charcoal adsorbers removing the decay heat, thus maintaining the charcoal below combustion temperature. The control room operator will be alerted to any charcoal heating by the high-adsorber temperature instrumentation alarm. In the event of fire in the adsorbers, the fire will be controlled by closing the isolation dampers to the pressure-tight filter cabinet, thus restricting the fire's oxygen supply.

Further means of protection of safety related equipment located adjacent to the charcoal filters is provided by automatic fire suppression systems over the charcoal filter housings for limitation of the extent or damage from possible fires.

It is our position that engineered safety feature filters be protected in accordance with the guidelines of Regulatory Guide 1.52 as required by BTP CMEB 9.5-1.

The applicant also states in the FSAR that cable, cable tray and conduit penetrations of fire barriers (vertical and horizontal) are sealed (fire stops) to give protection at least equivalent to that required for the fire barriers. Fire stops at penetrations of cable trays through fire barriers and all floors are designed to meet the requirements of NFPA 803-1978, Section 6-3, "Protection of Openings in Fire Walls and Subdivisions."

Also the applicant stated in the response to NRC question #280.8 that the specification for the design and installation of penetration seals through fire barriers requires that the seals be constructed, tested and installed per the applicable fire protection codes, standards and guidelines listed in FSAR section 9.5_1.2.1.

According to Section 6-3.1.1(c) of NFPA 803-1978, the penetration seal (fire stop) shall be determined acceptable provided that:

(1) Fire does not propagate to the unexposed side of the test assembly nor shall there be any visible flaming on the unexposed side.

(2) Temperature readings on the unexposed side shall not be high enough to ignite combustible material as evaluated in the fire hazard analysis.

(3) Penetration seal does not permit projection of water from hose stream test.

According to NFPA 251-1979 Section 7-2 for nonbearing walls and partitions, the test shall be regarded as successful if the following conditions are met:

(a) The wall or partition shall have withstood the fire endurance test without passage of flame or gases hot enough to ignite cotton waste, for a period equal to that for which classification is desired.

(b) The wall or partition shall have withstood the fire and hose stream tests without passage of flame, of gases hot enough to ignite cotton waste, or of the hose stream. The assembly shall be considered to have failed the hose stream test if an opening develops that permits a projection of water from the stream beyond the unexposed surface during the time of the hose stream test.

(c) Transmission of heat through the wall or partition during the fire endurance test shall not have been such as to raise the temperature on its unexposed surface more than 250°F (121°C) above its initial temperature.

There is a direct conflict on the utility's criteria as to what is or is not acceptable cable trays penetration through a fire-rated barrier. The fire hazards does not analyze combustible materials in the fire area on the unexposed side and its ignition temperature. The criteria of BTP CMEB 9.5-1 should be used (which includes NFPA 251) as the acceptance criteria since this criteria is also similar to UL 1479, Fire Tests of Through-Penetration Firestops. These standards are based on protection of redundant safety systems and not on property protection. The following criteria should apply:

Penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, "Fire Test of Building Construction and Materials." The acceptance criteria for the test should require that:

(a) The fire barrier penetration has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier.

(b) The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature does not exceed 325°F.

(c) The fire barrier penetration remains intact and does not allow projection of water betond the unexposed surface during the hose stream test. The stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 30% with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 5 ft from the exposed face; or the stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 15% with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 10 ft from the exposed face; or the stream shall be delivered through a 2-1/2-inch national standard playpipe equipped with 1-1/8-inch tip, nozzle pressure of 30 psi, located 20 ft from the exposed face.

The applicant states in the FSAR that for early warning of fire conditions in the cables, ionization type smoke detectors are provided along major cable trays runs throughout the plant. This is not acceptable. Smoke detection shall be

provided in all areas containing safety-related equipment and/or cable trays/ conduit regardless of the number or function as required in BTP CMEB 9.5-1 to ensure early warning.

The applicant states that fire protection system water will not be used for any non-fire related purposes, except limited use on intermittent bases to provide makeup water for isolated HVAC chillers in RAB and WPB. The applicant should verify that when water is taken from the fire system, the capacity should be limited so that the electric fire pump does not start on low pressure. Also the applicant should verify that failure of the makeup water system will not degrade the fire water system.

The applicant states that each vertical fire pump i rated at 2500 gpm and 125 psi. The motor driven fire pump starts automatically when the pressure in the fire main drops to 90 psi with the diesel fire pump starting automatically at [illegible] psi. The water pressure in the distribution system is maintained at approximately 100 psi by the jockey pump. In order to prevent unacceptable damage to the underground from water surges, the pressure on the system should be maintained at 175 psi which is the churn pressure of each fire pump. The pressure should not exceed the pressure rating of the system.

In the FSAR, the applicant states that emergency DC lighting feed from the 125V station battery provides lighting in the Control Room, remote shutdown and computer rooms in the event that either train of the AC normal/emergency lighting is lost. Fixed self-contained lighting consisting of fluorescent or sealbeam units with individual 8 hr. minimum battery power supplies should be provided for the Control Room and the remote shutdown panel as required by BTP-CMEB 9.5-1, Section C.5.g.

The applicant states that a cast-in-place concrete trench of approximately 11 ft long, 2 ft wide and 8 in. deep is provided under the HVAC control board located in each Unit Control Room. Covers are not provided for the trench, because of its small size and location, internal to the HVAC.

The applicant should provide smoke detection internal to the HVAC control board such that early detection is provided should an electrical malfunction develop in the trench. Also if manual fire suppression is difficult, an automatic gas fire suppression system should be provided to limit the development of smoke and toxic gases in the control room.

Ionization type smoke detectors are only provided at the ceiling level of the control room. The applicant states that the control room cabinets, panels and consoles are of the self-ventilating type permitting smoke to quickly migrate to the ceiling of the room. Since control room cabinets, panels and consoles are of critical importance, the delayed time for the ceiling detectors to go into an alarm condition, cannot be tolerated. Since the combustion products are deluted into the room, smoke detectors should be installed within the cabinets. This would insure prompt detection within the enclosure itself.

The applicant states in the FSAR that one and on-half inch hose connections, equipped with 100 ft. of hose and water spray nozzles, approved for use on energized electrical equipment and on combustible liquid fires, are permanently

provided in the Containment Building as standby fire extinguishing equipment for use during refueling and maintenance. Water supplies for the hose connections are shut off during normal operation by means of shutoff valves located outside the Containment Building. Therefore, during normal operation the standpipe and hose system piping remain drained.

The applicant should verify that the containment penetration of the standpipe system should meet the isolation requirements of General Design Criterion 56 and should be seismic Category I and Quality Group B.

The applicant states that each turbine generator section of the plant is cut off from safety-related areas of the plant by 3 hr. rated fire walls, with Class A fire doors. The applicant should verify that the turbine building is separated from adjacent structures containing safety-related equipment by a fire barrier with a minimum rating of 3 hrs. The fire barriers should be designed so as to maintain structural integrity even in the event of a complete collapse of the turbine structure. Openings and penetrations in the fire barrier should be minimized and should not be located where the turbine oil system or generator hydrogen cooling system creates a direct fire exposure hazard to the barrier. The applicant should identify such areas.

In the FSAR it states that due to spatial separation of the diesel generator building from the main structure and to the fire barrier separations between redundant equipment, which precludes safet shutdown capability impairment from a single fire incident, interior standpipe hose stations, operable post SSE, have not been provided in these areas.

The applicant states that interior hose stations have not been provided for the diesel generator building and that secondary protection is provided by yard hydrants and hoselines. On Fig. 9.5.1-5, the piping layout for the building shows 2 fire hose rack and hose stations in the corridor. The applicant should clarify this discrepancy. Since this is a critical area with a significant fuel load, provision should be made to provide additional protection in the event of a safe shutdown earthquake since the only present protection are portable fire extinguishers.

The diesel fuel oil storage tank and transfer pump building is protected by an automatic multi-cycle sprinkler system provided in the pump and piping areas with yard hydrants and hoselines used for backup protection. A break in the underground on the west end of the building will leave only one hydrant on the east end that is a considerable distance from the building. The applicant should provide an additional sectional control valve such that protection is provided on the west end of the building should a break occur. Also an additional hydrant should be provided on the underground or the east side of the building to provide closer coverage of the of the building.

The applicant states that for the fuel handling building operations in the building are not related to safe shutdown of the reactor but safety related equipment is present in the building. The applicant should verify if redundant systems (equipment, conduit, cable trays) needed for either hot or cold shutdown are located in the new fuel area for both Unit 1 & 2.

Also for any location in which safety related equipment and/or conduit/cable trays are located, smoke detection should be provided in the general area. This applies to the new fuel unloading, new fuel storage, and spent fuel pool areas.

For fire area 1-A-ACP (9.5A-21), the Auxiliary Control (Panel) Room, the applicant states that the fuel loading for the room is approximately 3 hr. duration. Protection fot the area consists of ionization type detectors, portable fire extinguishers and 1-1/2 in. hose stations.

The applicant also states that full height, 3 hr. rated fire barriers are provided between SA and SB safety related cable trays within the fire area at E-39. Also supplemental barriers are provided where safety and non-safety related cable trays are at close proximity and Regulatory Guide 1.75 criteria cannot be met fully.

A detailed fire hazards analysis should be done for fire area 1-A-ACP incorporating the design criteria as stated previously to specific measures for fire prevention, fire detection, fire suppression and fire containment and alternative shutdown capability as required. The applicant should also consider the consequences of an exposure fire in the room even though administrative controls are established to ensure that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire in the room.

Figure 9.5A-7, fire zone 1-A-3-COMB, and 1-A-3-COME, elevation 236'. The applicant should verify that the 10' x 10' removable metal panels in the east wall between C and D and G and H at column line 43 are fire rated for 3 hrs. per ASTM E-119 fire test. These panels were also noted in the following fire zones:

Fire Zone 1-A-3-COR at H-15 and G-13
Fire Zone 1-A-COMB, elevation 261 between C and D at column 43
Fire Zone 1-A-COME, elevation 261 at H-43
Fire Zone 1-A-COMI, elevation 261 at H-15 and between H and G at 13

On figure 9.5A-7, fire zone 1-A-3-COMI, elevation 236', the applicant is taking credit for a horizontal 3 hr. fire rated wall along column line 43 except a 1-1/2 hr. B labeled door is being provided. The applicant should provide a A labeled fire door to properly protect the opening to assure a 3 hr. fire rating.

On figure 9.5A-8, fire zone 1-A-4-CHFB, elevation 261' at L-31, a personnel door is shown in the 3 hr. fire rated door, however, no fire rating of the door is given. This door should be a Class A, 3 hr. fire rated door.

On page 9.5A-31 of the applicant's fire hazards analysis between columns 41 to 43 and E to H, the fire zone has two designations, 1-A-4-COMB and 1-A-4 COME. The applicant should correct this error.

Figure 9.5A-8, fire zone 1-A-4-COMI, elevation 261', the applicant is taking credit for a horizontal 3 hr. fire-rated wall between I and J at Column line 43 except a 1-1/2 hr. B labeled door is being provided. The applicant should provide an A labeled fire door to properly protect the opening to assure a 3 hr. fire rating.

Fire area 12-A-CRCI on page 9.5A-117 of the FHA contains the visitors gallery within the 3 hr. fire barrier of the control room. The applicant should provide an automatic water suppression for the room in addition to providing a 1 hr. noncombustible fire rated cutoff for the room to meet BTP CMEB 9.5-1, Section C.7.b.

On figure 9.5A-10, elevation 305', fire zone 12-A-6-CR, the computer room and fire zone 12-A-C-ARPI, the Auxiliary Relay Panels room share a common wall. Safety-related equipment is located in the relay room. Although the applicant does not consider Class A material in the room, a significant amount may be stored there. The applicant should provide a 3 hr. fire wall to separate these two areas from each other. All penetrations in this wall should also be properly protected. Also the computer room communicates with fire zone 12-A-6-PICRI, the process instruments and control racks which are also safety related through a portion of an unrated wall and door. The applicant should provide a 3 hr. fire rated wall and door for this portion of the wall. This would effectively cut off the computer room from any safety-related room of the control room complex.

On page 9.5A-32 of the applicant's Fire Hazards Analysis, fire zone 1-A-5 HVA, HVAC Room 1A, elevation 286', floor area 2700 sq.ft. is described. An examination of figure 9.5A-9, elevation 286', revealed that the preceding fire area could not be found. The applicant should clarify this discrepancy.

The preceding problem also applies to fire zone 1-A-5-HUB, HVAC Room 1B.

Also on page 9.5A-33 of the applicant's Fire Hazards Analysis, fire zone 1-A-5-BATN, Battery Room Neutral, elevation 286', is shown; however, on figure 9.5A-9, this zone is listed on the drawing but the location is not shown. The applicant should clarify this discrepancy.

The applicant states that mechanical piping penetrations through fire barrier walls are anchored or sealed with flexible or semi-rigid fire stop assemblies.

Penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, "Fire Test of Building Construction and Materials." The acceptance criteria for the test should be as required in BTP-CMEM 9.5-1, Section C.5.a(3).

On page 9.5A-43 of the applicant's Fire Hazards Analysis, it states, "Should the oil fire (55 gal. drum) prove to be more severe than anticipated, the heat released will actuate the multi-cycle sprinkler, as described under Item 8 of this analysis." This will control the fire a prevent <u>possible</u> damage to the redundant cable trays prior to the arrival of the fire brigade.

A malfunction of the pre-action system, according to the applicant's own criteria, could cause the malfunction of redundant cable trays necessary for safe shutdown. For this reason the criteria as stated previously should be used by the applicant to determine adequate and acceptable separation distance.

On page 9.5A-135 of the applicant's Fire Hazards Analysis for Fire Area 5-F-BAL, fuel handling building, it states that only manual fire alarm stations are provided for the fuel building. In order to provide early indication of a fire condition, automatic fire detection should be provided for all new fuel areas in the building which give audible and visual alarm and annunciation in the control room. Local audible alarms should sound in the fire area.

The applicant states on page 9.5A-179 of the Fire Hazards Analysis that for fire areas 1-D-DTA and 1-D-DTB, diesel generator fuel oil day tank enclosure, a watertight door is provided in the 3 hr. fire-rated wall to prevent the spread of combustible liquids beyond the fire area. A watertight door is not a 3 hr. fire rated door due to the gasket material around the perimeter of the door which when burns off in a short period of time allows flames to propagate to the opposite side. A sliding 3 hr. fire-rated door should be installed on the outside of the tank storage room. This will prevent the spread of any fire in the tank storage area to the adjacent area.

The applicant also states that a floor drain valve located in the valve pit adjacent to fire zone 1-D-1-DGA-ASU or 1-D-1-DGB-ASU is normally closed and connects the day tank room to the diesel generator room. If this valve remained open, a fire in the storage tank room would spread into the diesel generator room. The applicant should supervise this valve on the fire alarm system with alarm and indication in the control room. The applicant should also verify that this drain system is not interconnected between the redundant trains of the diesel generators.

The applicant states that on page 9.5A-192 of the Fire Hazards Analysis for fire areas 12-I-ESWPA and 12-I-ESWPB, the intake structure-emergency service water pumps, a fire detection system is not being provided. Both trains B pumps are located on one side separated by 3 hr. fire barrier floor train A, located on the other side. The applicant should provide automatic fire detectors for the entire building to enable control room personnel to provide early response should a fire situation develop. The detection system should alarm and annunciate in the control room.

On page 9.5A-203, fire zone 5-W-2-RPOR, Relay and Process Instrument Room, elevation 236 ft., the applicant describes the contents of this room. The fuel loading for this room is 130,000 Btu/ft^2 or approximately a 2 hr. fire duration. The applicant has provided ionization smoke detection for the room. Due to the heavy loading in this room, the applicant should provide a 2 hr. fire barrier (walls, ceiling and floor) such that any fire will be contained in the room. Also an automatic fire suppression system should be installed to control and/or extinguish any fire that should develop. The applicant should also clasify the typo error on page 9.5A-203 from 5-W-2RPOR to 5-W-2RPIR.

Fire zone 5-W-2-LCHTK-1, Low Conductivity Holding Tanks for Units 1 and 2, elevation 236', cannct be found on figure 9.5A-26. The applicant should correct this discrepancy.

On page 9.5A-215 of the applicant's Fire Hazards Analysis for fire zone 5-W-4-HL, 5-W-5-SLD and 5-W-5-FA, the only detection provided are manual pull station. The applicant should provide automatic fire detection for these areas to provide early alarm should a fire situation develop. The detection should alarm and annunciate in the control room.

Box 2901
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12 January 1984

Joseph Felton
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USNRC
Washington, DC 20555

FREEDOM OF INFORMATION ACT REQUEST
FOIA-84-35
Rec'd 1-16-84

Dear Joseph Felton,

Under the Freedom of Information Act, NC Public Interest Research Group, a nonprofit organization, hereby requests copies of all extant drafts of sections or portions of the Safety Evaluation Report (SER) for the Shearon Harris Nuclear Power Plant, and any documents by or in the possession of Staff reviewers which show dissenting opinions as to any contents or conclusions of the Harris SER.

NC PIRG is a research and advocacy organization with over 3,000 members and publishes reports on various matters affecting the public interest, e.g. generic drugs, tenant rights, rape awareness, utility rates, toxic chemicals, and nuclear waste transportation. NC PIRG is fully qualified to present information from this request to be used by the public, and therefore requests a waiver of fees since we do not have sufficient funds to pay for extensive copying which may be required, given that the drafts could exceed the 2 inch thick SER in extent. Please feel free to contact me at 919-286-2275 (work) or 919-286-3076 (home) concerning this request.

Wells Eddleman
Staff Scientist

919-286-2275

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