ENCLOSURE 3
Letter #1

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Department of Nuclear Energy

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Mr. Robert L. Ferguson
Plant Systems Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

NOROGPS

RE: Duane Arnold, Fire Protection Review, Items 3.2.4, 3.1.13, and 3.1.5

Dear Bob:

Enclosed is the Brookhaven National Laboratory input for Item 3.2.4, Control Room Fire Hazards, Item 3.1.13, Portable Smoke Venting Equipment, and Item 3.1.5, Hose Cart, for the Duane Arnold Energy Center.

Respectfully yours,

Robert E. Hall, Group Leader
Reactor Engineering Analysis

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DUANE ARNOLD

Fire Protection Review

Item 3.2.4 - Control Room Fire Hazards

Item 3.2.4 of the SER states that a study will be made to reduce the fire exposure hazard in the control room due to the cable spreading area, computer area and support areas. Proposed modifications will be provided for those areas.

The control room at Duane Arnold contains the controls for normal station operation and for shutdown of the plant under abnormal conditions. Operating indicators, controls, and alarms are mounted on an L-shaped walk-through control board. The areas behind the control board contains auxiliary electrical equipment cabinets and the cable spreading area for one division of safety-related cables. The cable spreading area is open to, and extends into, the concealed space above the suspended ceiling over the operators area in front of the control board. The cables are routed in stacked open ladder trays. The plant computer, kitchen and office areas are separated from the control room by a glass partition wall and glass doors.

Appendix A to BTP 9.5-1, in Section D.1.(a), regarding building design for operating plants, states:

"Plant Layouts should be arranged to:

(1) Isolate safety related systems from unacceptable fire hazards, and

(2) Separate redundant safety related systems from each other so that both are not subject to damage from a single fire hazard.

ATternatives:

(a) Redundant safety related systems that are subject to damage from a single fire hazard should be protected by a combination of fire retardant coatings and fire detection and suppression systems, or

(b) a separate system to perform the safety function should be provided."

Section D.1.(f) of Appendix A states: "Suspended ceilings and their supports should be of non-combustible construction. Concealed spaces should be devoid of combustibles. Adequate fire detection and suppression systems should be provided where full implementation is not practicable."

Section F.2 of Appendix A requires that the control room "be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls and roofs having minimum fire resistance ratings of three hours." It also states that "Cables should not be located in concealed floor and ceiling spaces," and that "if such concealed spaces are used, however, they should have fixed automatic total flooding halon protection."

Appendix R to 10 CFR Part 50, in Section III.G. and Table 1, indicates that an automatic suppression system is required in the area containing the cables. Section III.M. of Appendix R allows fire barrier ratings to be less than 3 hours if justified by the fire hazards analysis.

In their letter dated August 29, 1978, the licensee responded to SER item 3.2.4 by stating that they found application of a fire retardant coating on the cables was the most acceptable means for reducing the fire exposure hazard from the cables in the control room cable spreading area, and that such a design change was being prepared.

In their letter dated October 30, 1978, the licensee responded in more detail to this item. Their analysis consisted of a brief list of proposed modifications to the control room area.

They again stated that they are still planning to coat all cables in trays in the cable spreading area of the control room with a flame retardant coating. However, they also stated that other means of preventing tray-to-tray fire propagation, such as installation of marinite board or fiberglass wool, are still being considered.

Other proposed modifications for the control room area include: upgrading the wall between the computer room and the control room to a minimum one-hour fire-rated design; the installation of ionization detectors in the control room panels, the control room air intake, and the computer room; the addition of hose stations at the two entranced to the control room; the addition of portable extinguishers to the computer room and control room; and development of an administrative control procedure to minimize the accumulation of transient combustibles in the control room and other safety-related areas.

The licensee's proposed modifications concerning the fire exposure hazard in the control room does not adequately meet the requirements in Appendix A or Appendix R stated above. This criteria requires that the control room be separated from other areas of the plant. The licensee's proposed modifications indicate only that the computer room will be separated from the control room by a one-hour fire rated barrier, and thus that the cable spreading area and other support areas will not be adequately separated from the control room.

We recommend that the staff require that the licensee separate all the support areas in the control room area from the control room by a minimum one-hour rated non-combustible wall. As an alternate, a noncombustible wall built as a smoke barrier will be considered adequate separation if the support areas are protected by an automatic suppression system.

Since it is impractical to separate the cable spreading area from the remainder of the control room with a wall, we recommend that all cables in the cable spreading area should be covered with a flame retardant coating as proposed. In addition, we recommend an automatic suppression system should be installed in the control room area. The suppression system should provide coverage for the cable spreading area behind the control board and for the area above the suspended ceiling which is open to the cable spreading area. If a Halon suppression system is used, the design concentration should be at least 7% for a duration of at least 20 minutes. The suppression system should meet the criteria of the NFPA standard 12A.

Item 3.1.13 - Portable Smoke Venting Equipment

The SER states that portable smoke ejectors will be provided for fire brigade use.

The licensee's letter of August 29, 1978 states that the following portable smoke ejector units and accessories will be provided:

1. One electric motor driven smoke ejector fan with air flow capacity of 5200 cfm.

2. One gasoline engine driven smoke ejector fan with air flow capacity of 5500 cfm.

3. One adaptor to attach 16 inch diameter flexible duct to fan.

4. Forty feet of 16 inch diameter flexible duct.

5. Two smoke ejector covers.

This equipment will be centrally located for ready access by the fire brigade.

We have concluded that the best way to ventilate smoke from a plant is by a properly designed fixed ventilation system with smoke removal as one of its prime design parameters. However, we have found from field experience that this is not obtainable without extensive plant modification. Therefore, we typically recommend portable ventilation with a minimum of 3 portable smoke ejectors with a combined 17,500 CFM capacity.

Our manual fire protection consultant had previously visited this plant and has reviewed the licensee's proposal. He wrote a report dated December 29, 1979 in which he recommended that 3 units with a combined capacity of 17,000 - 20,000 CFM be used. He accepted the use of a gasoline driven fan.

We recommend that the staff accept the type of smoke ejectors and ducting proposed. However, we also recommend that the staff request the licensee to have three portable smoke ejectors with a combined capacity of at least 17,500 CFM, or to justify their proposal of a reduced volumetric flow rate analysis.

Item 3.1.5 - Hose Cart

The licensee's submittal for the fire protection equipment on the hose cart is satisfactory. This confirms previous verbal approval given by Brookhaven National Laboratory.