

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
LONG ISLAND LIGHTING COMPANY)
(Shoreham Nuclear Power Station,)
Unit 1))

4/12/82

Docket Number 50-322

NRC STAFF TESTIMONY OF RANDALL EBERLY
REGARDING FIRE PROTECTION

(SC CONTENTION 17)

OUTLINE OF TESTIMONY

Suffolk County contends that Applicant has failed to meet the fire protection requirements of 10 C.F.R. 50, Appendix A, General Design Criterion (GDC) 3 by; a) not installing a toxic gas detection and warning system in the control room; and b) not installing manual fire alarms in the machine shop area. Contrary to these allegations, Applicant's fire protection program does meet the requirements of GDC 3. The alleged inadequacies specified in the contention do not materially affect Applicant's capability to respond in a timely manner in the event of a fire in either the control room or the machine shop area.

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(a) LILCO has not demonstrated that Shoreham meets 10 C.F.R. 50, Appendix A, GDC 3 and 19, due to the lack of a toxic gas detection and warning system in the control room. The Shoreham control room contains many items, especially cable and ventilation-duct insulation material, which present a potential toxic gas hazard. Because one of the largest problems during the Browns Ferry fire was the toxic gas given off by burning cable materials, and because Shoreham has no detection or warning

equipment for toxic gas in the control room, GDC's 3 and 19 have not been met.

(b) Shoreham's Fire Protection Program does not meet 10 C.F.R. 50, Appendix A, GDC 3 due to the lack of manual fire alarms in the machine shop area at elevation 15 feet. In this area, it is expected that flammable, toxic and hazardous materials will be stored and used. While automatic detectors are provided in the ventilation systems, a significant number of all BWR fires to date have been detected by plant personnel rather than automatic detection systems. Lack of manual alarms may impede rapid personnel notification of a fire.

Q. Please describe General Design Criterion (GDC) 3 of Appendix A to 10 C.F.R. Part 50?

A. General Design Criterion 3, "Fire Protection", of Appendix A, "General Design Criteria for Nuclear Power Plants", to 10 C.F.R. Part 50, "Licensing of Production and Utilization Facilities," requires that structures, systems, and components important to safety be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat-resistant materials are required to be used wherever practical throughout the unit, particularly in locations such as the containment and control room. GDC 3 also requires that fire detection and suppression systems of appropriate capacity and capability be provided and designed to minimize the adverse effect of fires on structures, systems, and components important to safety and that firefighting systems be designed to ensure that their failure, rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.

Q. Does General Design Criterion 19 impose any additional fire protection or fire detection and warning requirements for the control room beyond the requirements imposed by GDC 3?

A. No, it does not.

Q. Has the NRC Staff reviewed the Shoreham Facility's compliance with the requirements of GDC 3?

A. Yes. The Staff's conclusions in this regard are set forth in Section 9.5 of the Shoreham Safety Evaluation Report (NUREG-0420), Supplements 1 and 2. The Staff concluded that Shoreham's fire protection system does meet the requirements of GDC 3.

Q. Suffolk County contends that the lack of a toxic gas detection and warning system in the control room violates GDC 3. Please describe the fire protection features in the control room?

A. The Shoreham control room is separated from other plant areas by 3-hour rated fire barriers. To promptly detect smoke or toxic fire gases, thirty-two ionization type, early warning smoke detectors are provided for the protection of the control room and all cabinets and consoles. Additionally, duct detectors are provided for the control room ventilation system. Manual fire suppression in the form of portable fire extinguishers and carbon dioxide hose reels are readily available in the control room for promptly extinguishing local fires, and thereby reducing the amount of smoke and toxic gases produced by such a fire. Self contained breathing apparatus is available for personnel to use during fire suppression activities. Following fire extinguishment, the control room ventilation system can be manually operated to purge the control room of smoke or carbon dioxide. In the event that the control room

cannot be maintained tenable during a fire in the control room, an alternate means to safely shut down the plant is provided remote and independent from the control room.

Q. Would the smoke detectors installed in the control room provide adequate warning if a fire involving cable and ventilation duct insulation material were to occur?

A. Yes they would. In general, there are four stages of fire growth. The first stage is called the incipient stage. During this stage, invisible products of combustion are given off and no visible smoke, flame, or appreciable heat is yet present. Ionization detectors of the type installed at Shoreham are capable of detecting a fire under these conditions. The second stage, called the smouldering stage, begins when visible smoke is present. At this stage, there are no visible flames or appreciable amount of heat. The next stage is called the open flaming stage. It is during this stage that visible flames exist and heat production begins. It is at this stage that combustion of cable or ventilation duct material would begin to evolve quantities of pyrolysis products. The fourth and final stage of fire is called the heat stage. It is during this stage that an uncontrolled production of heat occurs. The amount of time required to go from the incipient stage to the final stage depends on a number of variables which we do not know yet how to accurately quantify. The best protection is provided, however, by utilizing a detection system, such as the one installed in the control room at Shoreham, which responds to the early stages of fire growth.

Q. Does the lack of a toxic gas detection and warning system in the control room violate GDC 3?

A. No it does not. If a postulated fire in cable or ventilation insulation materials produced quantities of smoke and other products of combustion or toxic gases, the control room can be evacuated and the plant can be safely shut down from a remote independent area. However, before evacuation becomes necessary, an alarm will be sounded by the installed smoke detection system before any quantity of toxic gases could accumulate in the control room. If an alarm is sounded, the control room personnel have self-contained breathing apparatus available for immediate use. Fire hoses and portable fire extinguishers are also readily available to fight local fires. The control room ventilation system can be manually operated to purge the area of vapors. Thus the requirements of GDC 3 are met without installation of a toxic gas detection and warning system.

Q. Suffolk County also alleges that the lack of manual fire alarms in the machine shop area violates the requirements of GDC 3. Please describe the machine shop area.

A. The machine shop is located in the Office and Service Building at elevation 15' 0". The floor area of the machine shop is approximately 4,560 square feet. No safety related equipment is located in this zone. Adjacent areas containing safety related equipment such as the battery room and emergency switchgear rooms are separated by three-hour rated fire barriers.

Q. How does GDC 3 apply to non-safety related areas?

A. GDC 3 applies to non-safety related areas only to the extent that a fire in such areas may threaten equipment in safety related areas.

Fire protection for non-safety related areas is required to eliminate such a threat.

Q. Please describe the fire protection features in the machine shop area?

A. The machine shop area is protected by an automatic sprinkler system. As a backup, fire hoses and portable fire extinguishers are available in the vicinity. The machine shop is separated from safety related areas by three hour rated fire barriers.

Q. Does the lack of manual fire alarms in the machine shop area violate GDC 3?

A. No it does not. The installed automatic sprinkler system and 3 hour rated fire barriers adequately provide the plant fire brigade ample time to assemble and extinguish a postulated fire in the machine shop area before the fire could threaten equipment in safety related areas. The addition of a manual fire alarm system in the machine shop area would not significantly aid in the fire protection of safety related areas and equipment.

Q. What are your conclusions concerning Suffolk County Contention 17?

A. As stated in my testimony, the NRC Staff has reviewed Shoreham's fire protection system and found that it meets the requirements of GDC 3. The two specific inadequacies alleged in the contention, lack of a toxic gas detection and warning system in the control room and of manual fire alarms in the machine shop area, do not affect the Staff's finding. Neither system is necessary to meet the requirements of GDC 3.

RANDALL EBERLY

Professional Qualifications

Education:

Bachelor of Science Degree in
Fire Protection Engineering
University of Maryland, 1975

Employment:

February, 1982 - Present

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Engineering
Chemical Engineering Branch

Principle Duties - Staff Fire Protection Reviewer of
Nuclear Power Plants, both operating
and under construction.

June 1975 - February 1982

U.S. Coast Guard
Office of Merchant Marine Safety
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Principle Duties - Staff Fire Protection Engineer for
review and approval of novel fire
protection problems concerning ships
and offshore structures. Participant
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