OYSTER CREEK NUCLEAR PLANT

SAFETY EVALUATION REPORT FOR
APPENDIX R TO 10 CFR PART 50, ITEMS III.G.3 AND III.L

I. INTRODUCTION

On February 17, 1981, the fire protection rule for nuclear power plants, 10 CFR 50 and Appendix R to 10 CFR Part 50, became effective. This rule required all licensees of plants licensed prior to January 1, 1979, to submit, (1) plans and schedules for meeting the applicable requirements of Appendix R, (2) a design description of any modifications proposed to provide alternative safe shutdown capability pursuant to Paragraph II.G.3 of Appendix R, and (3) exemption requests for which the tolling provision of Section 50.48(c)(6) was to be invoked. Section III.G of Appendix R is a retrofit item to all pre-1979 plants regardless of previous SER positions and resolutions.

By submittals dated June 30, and July 7, 1982, the licensee described the means by which safe shutdown can be achieved in the event of fire and proposed modifications to the Oyster Creek Nuclear Plant to meet the requirements of Appendix R to 10 CFR 50, Items III.G.3 and III.L. Additional information and clarification was obtained through telephone conference calls of September 10 and September 24, 1982.

The licensee has provided a safe shutdown analysis for a fire event, and has demonstrated adequate redundancy in the proposed conceptual design for alternate safe shutdown of the Oyster Creek Nuclear Plant.

II. SYSTEMS USED FOR POST FIRE SAFE SHUTDOWN

A. Systems Required for Safe Shutdown

Safe shutdown of the reactor is initially performed manually by rod insertion from the control room or automatically on loss of power. The licensee is also providing reactor scram capability and neutron monitoring instrumentation at the remote shutdown panel to assure core subcriticality.

Decay heat removal is accomplished by natural circulation of reactor coolant through one of the two isolation condensers. The heat is dissipated to the atmosphere by steam formed on the shell side of the isolation condensers which are supplied with water from the condensate storage tank or as a backup from the fire water system.

Reactor coolant inventory is maintained by control rod drive (CRD) hydraulic pumps which make up for any leakage or shrinkage during reactor shutdown. When decay heat has decreased sufficiently after a trip, the CRD hydraulic system could make up for steam relief through the electromotive relief valves (EMRVs), if they are being used for decay heat removal. Main steam isolation valves (MSIVs) are closed to avoid inventory loss from the reactor vessel during the fire emergency.

Primary system pressure and cooldown rate is controlled by cycling the condensate return valve of the isolation condenser in use.

The primary means of achieving and maintaining cold shutdown is by the use of the shutdown cooling system along with its support systems, reactor building closed cooling water (RBCCW) system and service water system. The shutdown cooling system is used when the reactor water temperature is reduced below 350 F by the isolation condenser.

As an alternate means to achieve and maintain cold shutdown, EMRV's in conjunction with core spray system can be used. The containment spray system and service water system are required to remove heat from the torus for this mode of shutdown.

These systems are adequate for safe plant shutdown.

B. Areas Where Alternate Safe Shutdown is Required

In our fire protection SER of October 3, 1977, we requested that the licensee provide an additional battery room and a remote shutdown station with adequate controls to accomplish safe shutdown outside of the control room. The licensee will provide an additional battery room on the turbine building mezzanine floor with battery set "C." Battery sets "A" and "B" are located on the second floor of the office building. This commitment is documented in the licensee's submittal of June 30, 1982. The licensee's alternate safe shutdown compliance is discussed later in the SER.

C. Section III.G.2 of Appendix R

The licensee has stated that all areas of the plant not required to have an alternate safe shutdown system will comply with the requirements of Section III.G.2 of Appendix R, unless an exemption request has been approved by the staff,

D. Alternate Safe Shutdown Systems

The licensee has committed to provide alternate safe shutdown capability independent of the control room and the cable spreading room. A new remote shutdown panel with additional instrumentation located at elevation 51 feet in the reactor building will be provided for control of the systems described in Section A above. These systems presently exist and have been tested to demonstrate their ability to accomplish the functions intended.

The additional instrumentation will include the following:

Isolation Condensers - control and position indication of steam and condensate line valves, make-up line valve, shell water level indication and vent radiation monitor.

Main Steam - close control and position indication of inner MSIVs and position indication of drain valves.

Reactor Vessel - indications of fuel zone water level, new analog water level, wide range water level and new analog Rx vessel pressure.

Reactor Recirculation - position indication of discharge and suction valves, one trip function and one status light which indicates a trip of all five pumps.

Electromotive Relief Valves - control and position indication of five EMRVs.

Core Spray System - open/close status lights for four parallel valves.

Support System - indication of RBCCW and service water discharge pressure.

CRD System - control of CRD pumps, overload annunciation and indication of pump flow and charging pressure.

Feedwater System - trip and status indication of three feedwater pumps.

Electric Power - Indications of control power transfer switches.

Reactor Scram - de-energizing and status indication of scram and backup scram pilot valves, and status indication of Scram Discharge Volume (SDV) vent and drain pilot valves.

Neutron Flux Monitoring - detector drive control and indication of core flux.

The additional instrumentation being provided by the licensee exceeds the requirements of Appendix R Section III.L for the safe shutdown of the plant.

III. EVALUATION

A. Performance Goals

The performance goals for post fire safe shutdown for reactivity control, reactor coolant makeup, reactor coolant-pressure control and decay heat will be met using the existing mechanical systems and equipment listed in Section II.A. The control of these functions can be accomplished using the new alternate shutdown panel or the control room depending on the fire location.

The process monitoring instruments to be used for post fire shutdown for performance goals are described in Section II.D above.

The available support systems for the post fire safe shutdown are the redundant diesel generators, 4160-V and 480-V AC buses and 125-V DC battery buses. Each of these electrical systems has appropriate control and status indication. Isolation/transfer switches for all components are at the respective motor control centers.

B. 72 Hour Requirement

The licensee stated that the plant is capable of being placed in cold shutdown condition within 72 hours with either onsite or offsite power.

C. Repairs

No repairs are planned by the licensee to comply with Appendix R post-fire shutdown requirements.

D. Associated Circuits and Isolation

The licensee has addressed each type of associated circuits of concern in principle, and committed to provide both adequate protection and isolation for these types of circuits stated in the subparagraphs below. It should be noted that at present, licensee has not been able to determine exact locations of shutdown cable routes. This information will not become available until next scheduled shutdown when detailed design will be completed. However, we conclude that a commitment to provide protection for these cables as stated below is sufficient.

1. Power Source Case

All of the power and control circuit breakers and fuses will be coordinated. Proper coordination of the interrupting devices will be verified and any devices not properly coordinated will be replaced.

2. Spurious Signal Case

The devices whose inadvertent operation by spurious signals could affect safe shutdown have been identified as shutdown circuits and are included in the separation analysis. The licensee will provide isolation and transfer switches for all shutdown circuits as needed to prevent spurious operation. The licensee has provided for tripping of reactor recirculation pumps A and E in order to avoid spurious isolation of the isolation condenser on high flow.

The licensee has determined that no credible fire could prevent safe shutdown due to damage to limit or inhibit circuitry (shutdown logic). At worst, any fire would damage only one train of safe shutdown systems.

The only potential high/low pressure interface identified is the interface between the reactor coolant and shutdown coolant systems. The shutdown cooling system which is intended to be used only below 150 psig is designed to withstand reactor operating pressure of 1250 psig.

3. Common Enclosure Case

The licensee has stated that prior to installation of the alternate shutdown systems, associated circuits in this category will be identified and corrective action taken to provide proper interrupting devices. When identification of associated circuits is physically not possible, then the licensee will protect shutdown circuit either by physical separation or fire barrier.

E. Safe Shutdown Procedures and Manpower

The personnel available, as outlined in the licensee's submittal of June 30, 1982 will include ten people, five of whom are designated for plant shutdown. The remaining five are available to respond to any fire. This manpower commitment is considered adequate.

IV. CONCLUSION

The goals of reactivity control, inventory control, decay heat removal and pressure control, process monitoring and adequate support systems have been met in the conceptual design for alternate safe shutdown facility. Based on our review, we concluded that after licensee committed actions have been completed the Oyster Creek Plant will meet the requirements of Appendix R to 10 CFR Items III.G.a and III.L with respect to safe shutdown in the event of a fire.