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MAY 9 1983

MEMORANDUM:FOR: William V. Johnston, Assistant Director for Materials, Chemical and Environmental Technology, Division of Engineering

FROM: L. S. Rubenstein, Assistant Director for Core and Plant Systems, Division of Systems Integration

SUBJECT: SAFETY EVALUATION REPORT INPUT FOR SECTION 9.5.1 - FIRE PROTECTION CONCERNING SAFE SHUTDOWN CAPABILITY AND ALTERNATIVE SHUTDOWN CAPABILITY - SNUPPS (CALLAWAY AND WOLF CREEK)

Enclosed is the Auxiliary Systems Branch's evaluation of the SNUPPS Fire Protection Safe Shutdown Capability and Alternative Shutdown Capability. The systems needed for shutdown were evaluated against Sections III.G and III.L of Appendix R to 10 CFR Part 50. We conclude that the systems identified for shutdown and the methodology applied by the applicants to identify plant areas of noncompliance with Section III.G.2 are acceptable. We further conclude that the design of the remote shutdown system meets the requirements of Section III.L of Appendix R. The Chemical Engineering Branch should review the adequacy of the barriers outside containment identified by the applicant and the combustibles inside containment to assure the adequacy of separation within the containment.

Original signed by
L. S. Rubenstein

L. S. Rubenstein, Assistant Director
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APPENDIX R, SECTIONS III.G AND III.L

SAFETY EVALUATION REPORT

SNUPPS NUCLEAR PLANT (CALLAWAY AND WOLF CREEK)

AUXILIARY SYSTEMS BRANCH

Our review of the SNUPPS fire protection of safe shutdown capability included the list of equipment and components identified in Section 3.11(B) of the SNUPPS Final Safety Analysis Report (FSAR) as being necessary for hot and/or cold shutdown, the safe cold shutdown analysis in FSAR Section 5.4A, the remote shutdown capability described in FSAR Section 7.4, the cable separation discussed in FSAR Section 8.3 and the fire hazards analysis and design comparison with Appendix R in FSAR Section 9.5. We also reviewed the control room fire hazards analysis submitted by letter dated November 15, 1982.

The applicant's safe shutdown analysis and fire hazards analysis demonstrated that redundancy exists for systems needed for hot and cold shutdown. The safe shutdown analysis included components, cabling and support equipment needed to achieve hot and cold shutdown. Thus, in the event of a fire anywhere in the plant, at least one train of systems would be available to achieve and maintain hot shutdown and proceed to cold shutdown.

For hot shutdown at least one train of the following safe shutdown systems would be available: Auxiliary feedwater (AFW) system, steam generator atmospheric dump valves, reactor coolant system, and the chemical and volume control system. For cold shutdown at least one train of the residual heat removal (RHR) system would be available. The RHR system would be used for long-term decay heat removal and provides the capability to achieve cold shutdown within 72 hours after a fire. The availability of these systems includes the components, cabling and support equipment necessary to achieve cold shutdown. The support equipment includes the diesel generators, emergency service water system, component cooling water system, and the necessary ventilation systems.

The applicant's fire hazards analysis demonstrated that except for inside containment and inside the control room, redundant systems and cabling needed for safe shutdown are separated in accordance with III.G.2.a, b, or c of Appendix R. For the control room, the applicant has provided alternate shutdown capability outside the control room in accordance with III.G.3 of Appendix R. Inside the containment there is at least 20 feet between redundant safe shutdown divisions or between diverse systems such as the letdown isolation valves and the

power operated relief and blockvalves. Thus, the requirements of III.G.2.d are met for separation inside containment.

The applicant performed an electrical train separation study in order to ensure that at least one train of the above equipment is available in the event of a fire in areas which might affect these components. Safe shutdown equipment and cabling was identified and traced through each fire area from the components to the power source. Additional equipment and cabling considered as associated either because of a shared common power source or common enclosure or whose fire induced spurious operation could affect shutdown were also identified. Extensive use of computer program checks were used to ensure separation. Each circuit and raceway is identified in the computer program, and the identification includes the applicable separation group. The program is used to check that cables of a particular separation group are routed through the appropriate raceways.

We have reviewed the applicant's method of determining that the separation criteria of Appendix R are met and have reviewed the associated circuits identified by the applicant and the actions necessary or modifications made to prevent spurious operation that would affect safe plant shutdown. Based on our review we

conclude that the applicant has adequately addressed the effects of associated circuit interaction and that the necessary isolation devices and procedures are adequate to ensure that such circuit interactions will not prevent safe shutdown. We further conclude that the applicant's methodology for verifying that separation is in accordance with Appendix R, Item III.G.2 is, therefore, acceptable.

The applicant's analysis indicated that the only area outside containment where redundant divisions are not separated by barriers in accordance with III.G.2 is the control room. Alternate shutdown measures were required for the control room in order to assure the availability of the safe shutdown systems. In the event that a fire disables the control room the remote shutdown panel associated with train B equipment located in a separate fire area of the auxiliary building provides an alternative to fire protection separation within the control room. The control functions and indications provided at the remote shutdown panel are electrically isolated or otherwise separate and independent from the control room. Refer to Section V.C of this SER for further discussion of alternative shutdown capability.

Based on the above, the systems identified for achieving and maintaining safe shutdown in the event of a fire are acceptable and

the methodology used to assure adequate protection of safe shutdown systems is in accordance with Section III.G of Appendix R and therefore is acceptable.

V.C Alternative Shutdown Capability

Section 7.4 of the SNUPPS FSAR describes the remote shutdown panels' capability. Section 5A of the FSAR and the control room fire hazard analysis dated November 15, 1982, describe remote shutdown capability for equipment not on the remote shutdown panel. The design objective of the remote shutdown system for the purposes of this evaluation is to achieve and maintain cold shutdown in the event of a fire in the control room. The train B remote shutdown panel will be the primary alternative shutdown panel since the necessary instruments and controls on this panel are isolated or isolable from the control room.

The turbine driven AFW pump, train B motor driven AFW pump, associated AFW controls, the atmospheric dump valves for steam generators B and D, the group B pressurizer backup heaters, and the train B letdown isolation valve can be controlled at the train B alternate shutdown panel for maintaining hot standby. Separate isolation

switches provided at local stations for control of support systems and cold shutdown systems will be used in conjunction with a procedural approach using pre-planned operator actions to maintain hot standby and to achieve and maintain cold shutdown within 72 hours.

The design of the remote shutdown system complies with the performance goals outlined in Section III.L of Appendix R. Reactivity control is accomplished by manual scram before the operator leaves the control room and boron addition via the chemical and volume control system using the refueling water storage tank (RWST) and the charging pumps. The reactor coolant makeup function is also performed by the charging pumps and RWST. Reactor coolant inventory is assured by maintaining reactor coolant pump seal cooling and seal injection, and by isolating all possible paths of inventory loss such as PORVs, RHR suction lines, normal and excess letdown lines and the reactor vessel head vent. All these operations including reactor scram can be accomplished from outside the control room. Reactor decay heat removal to hot shutdown is accomplished by the AFW system through the steam generators and atmospheric dump valves. Decay heat

removal to cold shutdown is achieved by the residual heat removal system. The following instruments on the alternate shutdown panel will be used to monitor process variables:

- Pressurizer level
- Reactor coolant system pressure (wide range)
- Steam generator level (wide range)
- AFW flow
- Rector coolant cold leg temperature (T_C)
- Reactor coolant hot leg temperature (T_H)
- Source range nuclear instrument

The above instrumentation will all be isolated from the control room on the train B alternate shutdown panel. Isolated valve position indication for the AFW system, letdown isolation valve, and the atmospheric dump valves are also located on the train B panel.

We have reviewed actions required by the procedures for achieving and maintaining safe plant shutdown following a fire. For hot standby the immediate actions are mainly precautionary measures to ensure no spurious operations occur due to the control room fire. Some operations require cutting a control power cable at the equipment

to ensure that a fault in the control room does not prevent certain equipment operation. Such actions may be required for the fuel oil transfer pumps, fuel pool cooling system and some ventilation dampers that are not immediately necessary for or detrimental to maintaining hot standby conditions. These actions will be described in the procedures. For achieving and maintaining cold shutdown local operation of RHR isolation valves, letdown valves and certain CCW system valves may be required and will be in the cold shutdown procedures. We have reviewed the proposed actions and manpower requirements and conclude they are in accordance with III.L.4 and III.L.5 to Appendix R since they can be accomplished exclusive of fire brigade members and are straigtforward and uncomplicated such that cold shutdown can be achieved within 72 hours.

Based on our review, we conclude that the alternative shutdown capability for the control room meets the requirements of Appendix R, Section III.L, and is therefore acceptable.