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Docket Nos. 50-275
and 50-323

JUN 18 1974

Pacific Gas and Electric Company
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Vice President and General Counsel
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Gentlemen:

During the course of our ongoing review of the Final Safety Analysis Report for Diablo Canyon, Units 1 and 2, we have noted that the pre-operational testing program does not indicate what preoperational testing of the emergency core cooling systems is planned. Enclosed is a copy of the proposed guidance for preoperational testing for ECCS which has been prepared by the Regulatory staff.

We request that you review the proposed test program and inform us as to which of these tests will be performed. You should provide adequate justification for excluding any tests or portions of tests from your program. In this regard, we want to call your particular attention to Item I.E, "High Pressure Injection System Flow, Preoperational Flow Test - Hot Operating Conditions," which is discussed in Attachment A to the Enclosure.

Please inform us by July 12, 1974 as to when you will be able to provide the information. Contact us if you desire any discussion or clarification of this matter.

Olan D. Parr, Chief
Light Water Reactors
Project Branch 1-3
Directorate of Licensing

Enclosure:
Supplemental Guidance on Preoperational Testing

cc: See page 2

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SUPPLEMENTAL GUIDANCE ON PREOPERATIONAL TESTING OF EMERGENCY CORE COOLING SYSTEMS FOR PRESSURIZED WATER REACTORS

I. Background

All licensees are required to perform various preoperational tests of the installed Emergency Core Cooling Systems and components to demonstrate that the integrated systems or subsystems have been constructed and will function as described in the Final Safety Analysis Report, FSAR. The applicable Regulatory requirements and guidance pertaining to the conduct of these tests are as follows:

A. General Design Criterion 1, "Quality Standards and Records" of Appendix A to 10 CFR Part 50 "General Design Criteria for Nuclear Power Plants" requires that structures, systems and components important to safety be tested to quality standards commensurate with the importance of the safety functions to be performed.

B. Criterion XI "Test Control" of Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," requires that a test program be established to assure that all testing required to demonstrate that structures, systems and components will perform satisfactorily in service is identified and performed.

C. 10 CFR 50.34(b)(iii) references two RO documents, "Guide for the Planning of Preoperational Testing Programs," and "Guide for the Planning of Initial Startup Programs," both dated December 7, 1970.

D. The FSAR for each facility also contains a brief description of the preoperational tests that will be conducted on selected systems. While these FSAR descriptions can be considered as licensee commitments that must be satisfied prior to issuance of a Facility Operating License, the specific commitments vary over a wide range depending on the utility, architect-engineer or nuclear steam supplier.

The purpose of this guidance is to establish minimum preoperational testing requirements for the conduct of tests of Emergency Core Cooling Systems at pressurized water reactors.

It should be noted that this guidance does not cover the testing required for the first of a type system or component. If prototype engineering testing is required, the Directorate of Licensing will request appropriate licensees to document details of the prototype testing program in the FSAR. The purpose of this guidance is to describe the minimum operational

tests that are required to verify that the ECCS system functions under all anticipated modes of system operation and that the installed equipment meets design objectives.

II. Details

The Regulatory position relating to minimum preoperational testing that must be performed on Emergency Core Cooling Systems at pressurized water reactors is described in Attachment A. In addition to the specific system tests described in Attachment A, the licensees test program should verify the following as applicable:

A. Proper operation of initiating instrumentation in all combinations of logic, initiating instrument channel trip on loss of instrument or channel power supply and operation of "fail safe" features provided in the design.

B. Proper operation of interlocks and equipment protective devices utilized in pump and valve controls.

C. Proper functioning of instrumentation and alarms used to monitor the availability of system.

D. Proper operation of alternate electrical power supplies used for system valves, pumps and instrumentation including the operation of automatic and manual power transfer switches.

E. Proper operation of controls including, but not limited to, controls that effect transfer of water supply to pump suction.

F. Proper operation of injection pump and motor under all anticipated operating modes, verification of acceptable NPSH at anticipated maximum system flow conditions, adequacy of individual pump capacity and discharge head, speed of response to reach rated flow capacity, proper pump motor start sequence, adequacy of pump runout protection features, acceptable motor running currents, and acceptable vibration levels of rotating equipment.

G. Acceptability of system piping movements and adequacy of supports under system startup conditions and steady state operation.

H. Proper operation of system valves including speed of response of valves, valve operation at the maximum differential pressure it must operate at under accident conditions and operability of valves at maximum expected temperatures.

III. Test Acceptance

Test data must meet the acceptance criteria developed by the licensee or the licensee should perform an engineering evaluation to resolve discrepancies.

ATTACHMENT A

I. Safety Injection System Preoperational Testing

A. High Pressure Safety Injection System Flow Test - Ambient Conditions

The high-high pressure safety injection system that utilizes the charging pump and the standard high pressure safety injection system that utilizes the high pressure safety injection pump will be tested under this phase of the testing program.

1. Purpose: Demonstrate high pressure safety injection system flow capability.

2. Normally Expected Test Conditions:

   a. Core not installed in reactor vessel

   b. Reactor Vessel open and flooded

3. Test Format:

Fluid from the refueling water storage tank, borated water storage tank or refueling water tank for Westinghouse, Babcock & Wilcox and Combustion Engineering facilities respectively will be injected into the reactor through various combinations of injection legs. Data will be obtained relating to flow-pressure relationship versus time for each injection leg. In addition, data will be obtained for the response time of each pump and valve etc. All data should be compared by the licensee with established criteria.

B. High Pressure Injection System Flow, Preoperational Flow Test - Hot Operating Conditions

1. Purpose: Demonstrate capability of system to deliver required flow under hot operating conditions.

2. Normally Expected Test Conditions:

   a. Reactor vessel closed.

   b. Reactor coolant system filled and maintained at normal operating pressure temperature relationship.

   c. Water level in pressurizer as low as practical.

3. Test Format:

The test will be initiated by actuation of the safety injection signal and fluid from the various safety injection system reservoirs will be injected into the reactor. Data will be obtained relating to the flow/pressure relationship of each safety injection train along with the time required for various system valves to reach full open and individual pumps to reach full speed. These data will be compared with acceptance criteria established by the licensee. The test should also include confirmation that the auxiliary feedwater system has actuated and supplies feedwater to the steam generator. It is recommended that the quantity of cold water injected be limited to that necessary to provide the needed comfirmations of operability.

C. Low Pressure Safety Injection System Preoperational Flow Test, Ambient Conditions

1. Purpose: Demonstrate capability of system or subsystems to deliver fluid from various sources, i.e., refueling water tank, reactor building sump, etc., into the reactor coolant system in the required time.

2. Normally Expected Test Conditions:

a. Core not installed.

b. Reactor vessel open and flooded.

3. Test Format:

The test will be initiated automatically and/or manually, as designed, to permit fluid from various subsystems or sources, i.e., refueling water tank or reactor building sump, to be injected into the reactor coolant system. Valve operating time and time required for pumps to reach full flow and deliver fluid to the reactor will be monitored, i.e., stopwatch or other simple timing device, and will be compared with acceptance criteria established by licensee.

II. Core Flood Tank Accumulator System Testing

A. Core Flood Tank/Accumulator System Flow Test

1. Purpose: Demonstrate general agreement between Core Flood Tank/Accumulator System discharge capability and design objectives.

2. Normally Expected Test Conditions:

   a. Core flood tank/accumulator filled to normal operating level and pressurized with nitrogen to approximately 100 psig (licensee has option of conducting test at core flood tank/accumulator pressures up to normal accumulator precharge pressure).

3. Test Format:

   Each core flood tank/accumulator will be separately discharged into the flooded reactor vessel by opening the appropriate isolation valve.* The following data will be obtained at approximately 5 seconds intervals using a simple timing device.

   a. Core flood tank/accumulator level.

   b. Core flood tank/accumulator pressure.

   c. Core flood tank/accumulator isolation valve position.

4. General:

   At most nuclear facilities, the control circuit for the remote operated, normally open core flood tank/accumulator isolation valve is designed such that each isolation valve receives a confirmatory open signal on receipt of a safety injection signal to assure that the valves are indeed open. This action is deemed necessary to prevent inadvertent valve closures from defeating the primary purpose of this system. As a result of this capability, tests must be conducted on core flood tank/accumulator isolation valves at appropriate facilities to demonstrate that the isolation valve opens under maximum differential pressure conditions, i.e., zero RCS pressure and maximum core flood tank/accumulator precharge pressure. This capability should be demonstrated using normal and emergency power sources.

B. Core Flood Tank Accumulator System Functional Test

   1. Purpose: Demonstrate operation of Core Flood/Accumulator System Check Valves at normal reactor coolant system operating conditions.

*Experience has shown that the core flood tank accumulator has been essentially emptied in less than 30 seconds.

2. Normally Expected Test Conditions:

   a. Core installed or not installed, licensee's option.

   b. Reactor coolant system (RCS) at normal operating temperature and pressure conditions.

   c. Core Flood Tank/Accumulator system at normal operating temperature and pressure conditions.

3. Test Format:

   During the test, the RCS temperature and pressure will be slowly decreased while observing the core flood tank/accumulator level. In order to minimize the effects of thermal shocks to the RCS, the isolation valve associated with each core flood tank/accumulator may be closed when the liquid level has lowered sufficiently to verify operation of the related check valve. It should be noted that operation of all check valves must be verified prior to completing the test.

   Ideally, this phase of the test can be conducted at the completion of the Hot Functional Test.