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ACCESSION NBR:8505130355 DOC.DATE: 85/05/07 NOTARIZED: NO DOCKET #
FACIL:50-400 Shearon Harris Nuclear Power Plant, Unit 1, Carolina 05000400
AUTH.NAME AUTHOR AFFILIATION
ZIMMERMAN,S.R. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards addl info re fire protection,supplementing 850419 submittal,in response to verbal request for clarification from Auxiliary Sys Branch reviewer.Info covers alternate shutdown sys.

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CP&L

Carolina Power & Light Company

SERIAL: NLS-85-158

MAY 07 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NO. 1 - DOCKET NO. 50-400
FIRE PROTECTION

Dear Mr. Denton:

Carolina Power & Light Company (CP&L) hereby submits additional information concerning fire protection at Shearon Harris Nuclear Power Plant. The enclosed information is submitted in response to a verbal request for clarification from the Auxiliary System Branch reviewer and supplements CP&L's April 19, 1985 submittal (NLS-85-132).

If you have any questions concerning this material or require additional information, please contact me.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

DCM/crs (1443DCM)

Enclosure

cc: Mr. B. C. Buckley (NRC)
Mr. G. F. Maxwell (NRC-SHNPP)
Dr. J. Nelson Grace (NRC-RII)
Mr. Travis Payne (KUDZU)
Mr. Daniel F. Read (CHANGE/ELP)
Wake County Public Library
Mr. Wells Eddleman
Mr. John D. Runkle
Dr. Richard D. Wilson
Mr. G. O. Bright (ASLB)
Dr. J. H. Carpenter (ASLB)
Mr. J. L. Kelley (ASLB)

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REACTOR SHUTDOWN BY USE OF THE ALTERNATIVE SHUTDOWN SYSTEM

In general, recognizing the confined physical location of fires and the operational flexibility and physical diversity of systems available to achieve safe shutdown, one can assume that the plant's defense in depth fire protection features will limit fire damage to the extent that unaffected plant systems will be able to attain safe shutdown. An extensive effort would be required to identify the effects of postulated fires in potential plant locations on the plant systems which are normally available to support safe shutdown. As a conservative alternative to this approach, a minimum set of plant systems (safe shutdown systems) and components is identified in response to the requirements of 10 CFR 50 Appendix R. The identified systems and components can achieve and maintain safe shutdown regardless of the location of the fire and the loss of offsite power. Demonstration of adequate protection of this minimum set of systems from the effects of postulated fires constitutes an adequate and conservative demonstration of the ability to achieve and maintain safe shutdown for the purposes of fire protection.

The safe shutdown systems selected for SHNPP are capable of achieving and maintaining subcritical conditions in the reactor, maintaining reactor coolant inventory, maintaining reactor coolant pressure control, removing decay heat, achieving cold shutdown condition within 72 hours, and maintaining cold shutdown conditions thereafter.

The following is a list and description of the specific shutdown functions necessary to satisfy the Alternative Shutdown System acceptance criteria:

1) Reactor Reactivity Control

2) Reactor Coolant System Inventory Control

3) Reactor Coolant Pressure Control

4) Reactor Heat Removal

5) Process Monitoring

6) Miscellaneous Supporting Functions

As stated in our April 5, 1985 submittal in response to 410.45, the SHNPP design utilizes Alternative Shutdown following a fire induced evacuation of the Control Room. The SHNPP safe shutdown analysis assumes the reactor is tripped prior to control room evacuation. This is consistant with the staff guidance provided in Generic Letter 85-01. The remaining operator actions required to take control of plant systems from the alternative shutdown system are carried out from fire zones unassociated with the control room.

<u>Major Equipment Available from Alternative Shutdown</u>

1) Reactor Reactivity Control

   Reactor reactivity control is initially achieved by tripping the control rods into the core prior to control room evacuation. The reactor reactivity control function will provide sufficient shutdown margin to ensure that (1) the reactor can be made subcritical from required operating conditions, and (2) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

The two means of reactivity control are: (1) control rods, which provide the immediate shutdown reactivity (initiated prior to control room evacuation), and (2) soluble boron addition to the RCS from the boric acid tank by the boric acid transfer pump (SB) and the charging/safety injection pump (SB). This will maintain adequate shutdown margin for the transition from Hot Standby to Cold Shutdown.

No postulated fire will prevent the addition of soluble boron necessary to maintain required shutdown margin throughout the shutdown period. Available indication was provided in CP&L's April 5, 1985 response to 410.46.

2) Reactor Coolant System Inventory Control

The reactor coolant system inventory control function will ensure sufficient makeup inventory is provided for:

- Reactor coolant system fluid losses due to reactor coolant system leakage, and
- Shrinkage of the reactor coolant system water volume during cooldown from Hot Standby to Cold Shutdown conditions.

Adequate performance of this function is assured by maintaining reactor coolant level within the pressurizer.

Inventory makeup to the RCS will be from the boric acid tank by a charging path as described in 1 above. A back-up supply of borated water is available from the Refueling Water Storage Tank. The negative reactivity inserted by the control rods and boron addition will maintain the reactor core subcritical with adequate Shutdown Margin while cooling down the RCS.

3) Reactor Coolant Pressure Control

Reactor coolant pressure control ensures that (1) reactor coolant system integrity is maintained by providing overpressure protection, and (2) sufficient subcooling margin is provided to minimize void formation within the reactor vessel. RCS pressure can be maintained by energization of the pressurizer heaters (SB power supply). Overpressure protection of the RCS is provided for in Hot Standby (prior to cooldown and depressurization) by the pressurizer safety valves. Depressurization capability is provided by the pressurizer power-operated relief valves (PORVs) (SB power supply). After depressurization, when the RCS is aligned with the Residual Heat Removal System (RHR), overpressure protection is provided by RHR suction relief valves.

Adequate subcooled margin is achieved and maintained by operator action using pressure and temperature information received from the RCS pressure and temperature instrumentation. (Indication was provided in April 5 response to 410.46.)

4) Reactor Heat Removal

The reactor heat removal function is capable of transferring fission product decay heat from the reactor core at a rate such that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. Following a reactor trip with an assumed loss of offsite power, decay

heat is initially removed by natural circulation of the RCS, heat transfer to the main steam system through the steam generators, and operation of main steam PORVs (S/G A&C). Decay heat removal requires that sufficient feedwater be supplied to the steam generators to make up for the inventory discharged as steam by the main steam power-operated relief valves. The turbine driven auxiliary feedwater pump will supply sufficient feedwater to make up for inventory losses during initial maintenance of Hot Standby and subsequent cooldown. Feedwater is available from the condensate storage tank, and alternatively from the emergency service water system.

Hot standby can be maintained for 12 hours followed by 4 hours of cooldown to hot shutdown condition. Hot standby can be maintained beyond this 16-hour period by use of the Emergency Service Water System a back-up source of Auxiliary Feedwater water to the Condensate Storage Tank.

After reduction of reactor coolant system temperature below 350°F, the RHR system (SB) is used (via valves 1RH-V 500 SB and 501 SA) to establish long-germ core cooling through the removal of decay heat from the RCS through the component cooling water system (SB) and the emergency service water system (SB). Assuming only 1 RHR heat exchanger 1 RHR pump are in service, cold shutdown can be achieved within 28 hours.

5) Process Monitoring

The process monitoring function is capable of providing readings of those plant process variables necessary for plant operators to perform and/or control the above identified functions. The available indicators were provided in CP&L's April 5, 1985 response to 410.46.

6) Miscellaneous Support Functions

The systems and equipment used to perform the functions described above in items 1-4 may require miscellaneous supporting functions. The major supporting functions are ac/dc power (D/G SB), Essential Services Chilled Water (SB), and HVAC to essential components (SB). These supporting functions will be available and capable of providing the support necessary to ensure acceptable performance of the previously identified safe shutdown features.