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DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards response to Auxiliary Sys,Matls Engineering,Power Sys & Radiological Assessment Branch requests for addl info on SER open items re missile fragments resulting from rupture disk failure & Category I water source.

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Office of Nuclear Reactor Regulation, Director

SUBJECT: [illegible] water source.

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CP&L
Carolina Power & Light Company

SERIAL: LAP-83-505

OCT 26 1983

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

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NOS. 1 AND 2
DOCKET NOS. 50-400 AND 50-401
RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION

Dear Mr. Denton:

Carolina Power & Light Company hereby transmits one original and forty copies of additional information requested by the NRC as part of the safety review of the Shearon Harris Nuclear Power Plant. The cover sheet of the attachment summarizes the related Open Items addressed in the attachment along with the corresponding review branch and reviewer for each response.

We will be providing responses to other requests for additional information shortly.

Yours very truly,

M A McDuffie

M. A. McDuffie
Senior Vice President
Nuclear Generation

JHE/pgp (8323SAL)
Enclosures

cc: Mr. B.C. Buckley (NRC)
Mr. G.F. Maxwell (NRC-SHNPP)
Mr. J. P. O'Reilly (NRC-RII)
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LIST OF OPEN ITEMS, REVIEW BRANCH AND REVIEWER

Auxiliary Systems Branch/N. Wagner
Open Items 357, 358, 361(2), 363(2), 363(3), 365, 370(1), 370(4), 372(8), 383

Materials Engineering Branch/D. Smith
Open Item 403

Power Systems Branch/E. Tomlinson
Open Item 112

Radiological Assessment Branch/S. Block
Open Item 170

Shearon Harris Nuclear Power Plant
Draft SER Open Item 357
ASB Question 5.2.5

Show how flow measurements for identified leakage to the reactor coolant drain tank (RCDT) and pressurizer relief tank (PRT) are capable of detecting leakage with the sensitivity required by the Technical Specifications.

Response:

The Reactor Coolant Pressure Boundary Leak Detection System for the SHNPP is designed to meet the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," Rev. 0 (reference FSAR Section 1.8). This regulatory guide specifies acceptance criteria for sensitivity and response times (See RG. 1.45 C.2 and C.5) for the leakage detection systems listed in RG.1.45 Section C.3. The regulatory guide does not specify a sensitivity for the identified leakage. The level instrumentation on the reactor coolant drain tank and the pressurizer relief tank are used to perform the reactor coolant system inventory balance specified in technical specifications (refer to FSAR Section 16.2 page 3/4 4-14). The fundamental method used in this surveillance test is described below.

Between surveillance tests, increases in identified reactor coolant leakage would be indicated by increasing charging pump flow rate and by unanticipated increases in reactor make-up water usage.

The reactor coolant system inventory balance surveillance test is made by performing an inventory balance on the Reactor Coolant System, the charging and letdown portions of the Chemical Volume and Control System, PRT and the RCDT over a finite period of time. The inventory balance is performed by measuring the beginning and ending levels in the Pressurizer, Volume Control Tank, PRT and the RCDT; and maintaining a constant average temperature in the Reactor Coolant System. The time interval, typically 1 hour, over which the level increase is measured may be less than or equal to the 72-hour surveillance frequency for identified leakage.

Sheron Harris Nuclear Power Plant
DSER Open Item No. 358
NRC ASB Question 5.4.11

Show that missile fragments resulting from the failure of a rupture disc in the pressurizer relief tank will not adversely affect safety-related equipment.

Response:

Missile fragments resulting from the rupture of the pressurizer relief tank rupture disc will not adversely affect any safety-related systems, structures, or components. In addition, there are no safety-related cables or electrical equipment located within the missile envelope. FSAR Section 5.4.11 will be modified to include the above information.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 361(2)
Revised Response ASB Question 9.1.3(2)

Show that a seismic Category I water source can be placed into operation in the event of failure of the RWST as a source of makeup, in sufficient time to prevent boiling or uncovering of spent fuel in the Unit 1 spent fuel pool while Unit 2 is under construction.

Response

The spent fuel pool cooling system for Unit 1 is designed such that a single cooling loop (one pump and one heat exchanger) can remove the maximum abnormal heat load of 38.34 $\times 10^6$ BTU/hr (refer to FSAR Table 9.1.3-2). In this regard the spent fuel pool cooling system can achieve the maximum cooling function in the event of a single failure. The temperature that would be maintained in the Unit 1 spent fuel pool by one cooling loop would be 141°F (refer to FSAR Table 9.1.3-2). Makeup would be required to the spent fuel pool for evaporative losses (even though these losses are not assumed in the duty on the spent fuel cooling system) and leakage from the pool. Makeup would required manual operator action; the time available for operator actions prior to fuel uncovering is on the order of several days.

Normally, makeup would be provided from the refueling water storage tank. The next alternative source would be the demineralized water system. If these sources were unavailable, sufficient emergency backup makeup water could be provided through the use of flexible hoses in conjunction with emergency service water piping. The connection to be used is an emergency connection on both trains 1A-SA and 1B-SB of the fuel pool cooling system (FHB elevation 236.00 feet) and ESW lines in Unit 1 and Unit 2 (common RAB area elevation 236.00 feet).

This emergency backup can be implemented within twenty-four hours. This assures that the spent fuel is adequately cooled.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 363(2)
Revised Response ASB Question 9.1.5(2)

Commit to completing Phase I of NUREG-0612 prior to issuance of an operating license.

Response:

Phase I of NUREG-0612 is the submittal of information requested by Section 2.1 of Enclosure 3 to NRC's 12/22/80 letter to licensees and OL applicants. Carolina Power & Light Company's response to Section 2.1 was submitted to the NRC on 6/26/81. This submittal did not include the following items:

a. Item 2.1-3(a)--Safe load paths for heavy-load-handling systems.

b. Item 2.1-3(b)--Discussion of measures taken to ensure that load-handling operations remain within safe load paths, including procedures, if any, for deviations from these paths.

c. Item 2.1-3(c)--Complete tabulation of heavy loads and their weights and verification that handling of such loads is governed by written procedures containing, as a minimum, the information identified in NUREG-0612, Section 5.1.1(2).

d. Item 2.1-3(d)--Verification that lifting devices identified in the response to Item 2.1-3(c) comply with the requirements of ANSI N14.6-1978 or ANSI B30.9-1971 as appropriate.

e. Item 2.1-3(e)--Documentation of exceptions taken to the recommendations of NUREG-0612 and ANSI B30.2 for inspection, testing, and maintenance procedures for heavy-load-lifting devices.

f. Item 2.1-3(g)--Identification of deviations from the recommendations of ANSI B30.2 or NUREG-0612 for procedures for training qualification and conduct of crane operators.

These items will be prepared prior to fuel load and the approprate discussion or documentation requested by the NRC will be submitted six months prior to fuel load. The current schedule for this submittal is January 1985. CP&L commits to completing Phase I of NUREG-0612 in a manner acceptable to the NRC prior to fuel load.

This response is in conformance with the NRC's schedular request for resolution of this open item. Therefore, this item is confirmatory.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 363(3)
Revised Response ASB Question 9.1.5(3)

Commit to completing Phase II of NUREG-0612 prior to the end of the first refueling.

Response:

Phase II of NUREG-0612 is the submittal of information requested by Sections 2.2-2.4 of Enclosure 3 to NRC's 12/22/80 letter to licensees and OL applicants. Carolina Power & Light Company's response to Sections 2.2-2.4 was submitted to the NRC on 9/23/81. This submittal did not include the following items:

a. Item 2.2-3.4.6--Verification that lifting rigs for the Fuel Handling Building Auxiliary Crane comply with the requirements of ANSI N14.6-1978 or ANSI B30.9-1971 as appropriate.

b. Item 2.2-3.5--Detailed information on interfacing lift points for the FHB auxiliary crane.

c. Item 2.2-4(b), Item 2.3-4(a), and Item 2.3-4(b)--Identification of deviations from the recommendations of NUREG-0612 for procedures for the removal or bypassing of crane interlocks.

d. Item 2.4-2(b)--Identification of deviations from the recommendations of NUREG-0612 for operations of the jib crane.

These items will be prepared during the first cycle of operation and appropriate documentation submitted to the NRC six months prior to the scheduled end of the first refueling outage. CP&L commits to completing Phase II in a manner acceptable to the NRC staff prior to the end of the first refueling outage.

This response is in conformance with the NRC's schedular request for resolution of this open item. Therefore, this item is confirmatory.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 365
ASB Question 9.2.2(1)

Show that all nonsafety-related heat loads in the Component Cooling Water (CCW) System are isolated for safety-related loads in the event of suitable emergency initiating signals.

Response:

Only the following heat sources are considered as essential heat loads which will receive CCW supply:

1. Residual heat removal (RHR) pumps
2. RHR heat exchangers
3. Spent fuel pool heat exchangers (long term cooling)

The nonsafety-related heat loads [i.e., sample heat exchangers and gross failed fuel detector (Item Nos. (k) and (l) of FSAR Section 9.2.2.2-1)] are isolated from safety-related heat loads automatically on Safety Injection "S" initiating signal. The air operated valves 3CC-D547SA-1 and 3CC-D548SB-1 (See revised FSAR Fig. 9.2.2-1) and 3CC-L1SA-1 and 3CC-L2SB-1 (FSAR Fig. 9.2.2-4) provided on the inlet lines to sample panel and gross failed fuel detector system respectively shall close on an "S" signal thus isolating CCW supply to nonsafety-related heat loads. Two check valves, in series, are provided on the outlet lines of each of the nonsafety-related heat load.

The non-essential safety-related heat loads (Item Nos. a, b, c, d, e, h, i, and j of FSAR Section 9.2.2.2.1) are remote manually isolated from the control room by closing four motor operated butterfly valves (two on upstream of the CCW pump suction header and two downstream of the CCW heat exchanger header as shown on FSAR Fig. 9.2.2-1).

It is necessary to close these butterfly valves prior to the recirculation phase of a LOCA. In addition, the analysis of the SHNPP design for conformance with the recommendations of NRC position RSB 5-1 assumes that the butterfly valves are closed. These two analyzed conditions include the assumption that 1 CCW loop may be inoperable due to a single failure and therefore results in heat loads on the operable RHR loop which requires isolation of the nonessential safety-related loads.

FSAR Section 9.1.2 will be revised in a future amendment to include the above information.

Shearon H-rris Nuclear Power Plant
DSER Open Item 370(1)
Supplemental Response

Does the control room ventilation system isolate upon receipt of a radiation signal from either intake?

Response:

The control room area ventilation system isolates all paths to the environment upon receipt of a radiation signal as described in FSAR Section 6.4.3. Section 9.4.1 will be appropriately revised in a future amendment.

Shearon Harris Nuclear Power Plant
DSER Open Item No. 370, Part (4), Section 9.4.1

If the HVAC heaters for the control room are energized by a failure of the control system, will the other cooling train maintain the control room within required limits?

Response:

A single failure of an electric heating coil unit or cooling unit will not prevent the control room HVAC system from completing its safety function (also refer to Table 9.4.1-4). Butterfly valves and/or dampers are provided to isolate flow through affected heating/cooling units as necessary. Redundant units are provided to assure adequate cooling or heating as required. Malfunctioning HVAC equipment can be readily identified and isolated from the control room. There is no significant effect to the control room environment from the isolated malfunctioning train. Heating and cooling equipment for the control room are remotely located and are not in the control room.

In any event, the design of the plant is such that the control room can be evacuated and the plant can be maintained in a safe condition from the auxiliary control panel (refer to FSAR Section 7.4.1.11). The auxiliary control panel area is serviced by totally independent HVAC units.

Shearon Harris Nuclear Power Plant
DSER Open Item No. 372, Part 8 (ASB Review Question 10.4.9(8))

What are the CST setpoints for low level and empty and the respective tank volumes at those setpoints?

Response:

The following values are the setpoints and tank water inventories (volumes for the CST.

ALARM	SETPOINT (NOTE 1)	TANK INVENTORY AVAILABLE
Lo-Lo	Tank elevation 290'-0"	255,000 gallons
Lo-Min	Tank elevation 288'-11"	245,000 gallons
Empty	Tank elevation 264'-6"	15,500 gallons (Note 2)

Note 1: Tank bottom elevation 261'-6"

Note 2: Tank water level that provides 20 minutes of water use at maximum rate to top of AFW supply nozzle.

Details of the condensate storage tank are shown on FSAR Figure 9.2.6-1, Amendment No. 5 and Figure 10.1.0-4. FSAR Section 7.4.1.3 will be revised in a future amendment.

Shearon Harris Nuclear Power Plant
DSER Open Item 383, (ASB Review Question 3.5.1)

State whether missiles generated by the failure of fan components in HVAC equipment were considered in the analysis of internally generated missiles.

Response:

Specifications for in-line, axial, and centrifugal fans for use at SHNPP explicitly require that material gage and fan housing design be shown to be sufficient to withstand equipment-generated mssile penetration at the maximum operating condition to which it can be field adjusted. As described in the fan specifications, the various vendors perform analyses and furnish calculations to demonstrate that the fan housing will preclude expulsion of postulated fan-generated missiles. Missiles generated by failure of fan components, therefore, need not be further evaluated for their effects. Section 3.5.1.1.2 will be updated in a future amendment to the FSAR.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 403

The NRC Materials Engineering Branch has requested information as to whether the new Westinghouse procedures for torquing and heat treatment of the guide tube pins are being followed.

Response:

Shearon Harris is following the new Westinghouse procedures for torquing of the guide tube pins. Additionally, guide tube pins of the higher recommended heat treatment will be installed.

Shearon Harris Nuclear Power Plant
Power Systems Branch
Draft SER Open Item No. 112
Revised Response

The original response to Open Item 112 was provided by letter dated July 1, 1983. After reviewing the response, the reviewer requested some additional information. In particular, the reviewer requested that justification be provided for using a simplex strainer on the suction side of the fuel oil transfer pumps. The concern dealt with the amount of time available to change out the strainer if it should become clogged enough to prevent the proper amount of flow to be delivered to the day tank (90% clogged). Will there always be a sufficient amount of fuel oil in the day tank to allow changing out of the strainer?

The response to this Open Item has been revised to reflect the aforementioned concern. The original question along with the revised response is given below.

Original Question:

EDEFSS compliance with ANSI-N195.

The concern is with the tank overflow line. Provide details and electrical schematics of the control system design which prevents the pump from running continuously. Provide a statement that all floor drains in the diesel generator building are seismically designed, or if they are not, describe why they are not required to be seismically designed. Provide additional information on the return of fuel oil after it passes through the oil separators and whether the floor drains, pumps, and separators wil perform after a design bases accident. Describe the impact of drain line interconnection in regard to impact on connected diesel generator areas to a flooding diesel generator area. Provide justification for using a simplex strainer design rather than the recommended ANSI-N195-1976 duplex strainer. The concern on strainer type is the potential for clogging and maintenance problems.

Response:

The emergency diesel engine fuel oil transfer control scheme from the main fuel oil storage tank to the emergency diesel generator day tank is presented on drawing CAR-2166-B-430 Sheets 19.3 and 19.5, Revision 6, Figure 7.3.1-26.

The control system shown on the Instrument Schematics and Logic Diagrams maintains the proper level of diesel oil in the day tank by the use of interlocks between the Hi-Hi, Hi, and Lo level switches on the day tank. The pumps are automatically controlled through the use of level switches activated by the day tank fuel oil level. In the event the fuel oil transfer pump fails to stop upon receipt of a high day tank level signal, a solenoid-operated valve, located in the inlet to the day tank, will close on a Hi-Hi level signal, thereby preventing overflow. Wtih the day tank inlet valve closed, the fuel oil transfer pump will operate in a recirculation mode, discharging oil into the main fuel oil storage tank as shown in Figure 9.5.4-1.

Each day tank is provided with two level transmitters. One is a non-nuclear safety-grade, seismic Category I device for local level indication and Hi, Lo-Lo alarm annunciation at the diesel engine control panel. This level transmitter is a Class. 1E, seismic Category I device providing day tank level indication in the control room.

Each day tank has two Class 1E, seismic Category I level switches. One switch provides Hi, low level signals and the other switch provides a Hi-Hi level signal. Day tank overfill will be prevented by either switch. The Hi, low level switch will provide pump shutoff on a Hi level signal, and the day tank inlet valve will be closed on a Hi-Hi level signal from the Hi-Hi level switch.

Therefore, the safety-grade day tank instrumentation will preclude the overfill event.

In the unlilkely event the fuel oil transfer pump fails to stop on a day tank Hi level signal and the solenoid valve at the day tank inlet fails to close on a Hi-Hi level signal, the fuel oil will exceed its design level and flow out of the day tank through an overflow line to the day tank cubicle.

In the event of a failure of the day tank or piping, the day tank cubicle has been sized to hold approximately 3,650 gallons, which exceeds the margin recommneded by Regulatory Guide 1.120 (i.e., 110% of the tank volume), before reaching the cubicle access door level. Cubicle access is via stairs to a platform three feet above the finished floor, as shown in Figure 1.2.2-87, thereby minimizing the potential for leakage.

The day tank cubicle has a drain system that includes a normally closed valve. Drainage of the day tank cubicle can occur via operation of the normally closd drain valve in conjunction with operation of the diesel generator sump drain system. Diesel generator sump pumps discharge to the oil separator. Fuel oil, separated from sludge and water, is not reused but is disposed of as shown in Figure 9.5.5-2 (drawing 2165-133, Rev. 4).

Floor drains, sump pumps, and oil separators are not required to function after a design bases accicdent and are, therefore, designed as non-seismic Category I. In the event of a failure of the non-seismic Category I systems, safety systems will not be adversely affected and will function as designed.

As shown in Figure 9.5.5-2, Amendment No. 5, the diesel generator room sump pump discharge drain piping has valving and is physically arranged to prevent potential flooding in one diesel generator area from adversely affecting the other areas. The sumps include Class 1E seismic Category I level instrumentation to alert the control room operators of potential flooding.
The diesel fuel oil transfer pumps are provided with a single basket strainer in the pump suction line. The simplex strainer was conservatively sized so that even when the strainer is 90% clogged there is a negligible pressure drop across the strainer at the design flow rate. In addition, the suction line is provided with a flow switch to alarm on abnormal conditions. Since the fuel oil quality is peridiodically tested and monitored, the strainer is expected not to clog during seven days of operation without maintenance.

In the event that the diesel fuel oil usage exceeds the makeup to the day tank due to clogging of the pump suction strainer, the fuel oil line is provided with a valved bypass to maintain a sufficient amount of fuel oil in the day tank to ensure diesel generator operation for the time required to replace the clogged strainer.

The above procedure will be performed as follows:

1. The flow switch on the suction line of the fuel oil will alarm due to low flow caused by the clogged simplex strainer. In addition to this alarm, the day tank level indicator will show a decreasing tank level due to insufficient fuel oil makeup.

2. At this point the operator, after performing the proper administrative steps, will dispatch personnel to open the strainer bypass to top off the day tank.

3. The diesel fuel oil transfer pump will then be taken out of service, at which point the strainer basket could be cleaned/replaced.

4. The diesel fuel oil transfer pump would then be put back into service in adequate time to ensure continued operation of the diesel generator.

The day tank low level signal to actuate fuel oil transfer occurs with approximately two hours (assuming full-load operation of the engine) of fuel oil in the day tank. The low flow alarm will be set at a flow which is substantially below the normal flow rate (40 gpm) for the transfer pump and yet higher than the full-power consumption rate (7.4 gpm) of the engine. If this alarm occurs when the day tank reaches the low level point, a minimum of two hours is available to dispatch personnel to open the bypass. This operator action can be accomplished within 15 minutes. A full day tank provides approximately 6 hours of full-load operation of the diesel engine. Cleaning or replacement of the basket can occur within this time period.

Shearon Harris Nuclear Power Plant
Draft SER Open Item 170
Radiological Assessment Branch
Revised Response

Provide a discussion of the conformance to the criteria on NUREG 0737, Table II. F.1-3 for the containment high range monitors.

Response

CP&L commits to implement Table II.F.1-3 for the containment high range monitors. The TMI Appendix in the FSAR and FSAR Section 11.5.2 address NUREG 0737, Table II. F.1-3 for the containment high range monitors. FSAR Section 11.5.2.7.2.17 currently addresses the NUREG 0737 recommendations for the range, response, redundancy, and design and qualification. The FSAR will be revised in a future amendment to indicate conformance to the recommendations on special calibration and special environmental qualifications. Specifically, CP&L will provide for the following:

a. In situ calibration for at least one decade below 10 R/hr shall be by means of a calibrated radiation sources.

b. Calibration and type-testing of representative specimens of the detector at a sufficient number of points to demonstrate linearity through all scales up to 10^6 R/hr. Prior to initial use, certification of calibration of each detector for at least one point per decade of range between 1 R/hr and 10^3 R/hr.