June 24, 1998

Mr. W. R. Robinson, Vice President
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165 - Mail Code: Zone 1
New Hill, North Carolina 27562-0165

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING RESPONSE TO GENERIC LETTER 96-06 FOR THE SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 (TAC NO. M96818)

Dear Mr. Robinson:

Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions," dated September 30, 1996, included a request for licensees to evaluate cooling water systems that serve containment air coolers to assure that they are not vulnerable to waterhammer and two-phase flow conditions. By letter dated January 28, 1997, Carolina Power & Light (CP&L) provided a response to GL 96-06 for the Shearon Harris Nuclear Power Plant. The staff has initiated its review of your response and determined that additional information is needed. The Enclosure provides the details of the requested information.

To ensure a timely review of this submittal, the staff requests a response to the enclosed questions by August 30, 1998. If this is not achievable, CP&L should notify the staff and propose a date for submittal of a response to the RAI. Should you have any questions related to this letter or the enclosed RAI, please contact me at (301) 415-1172.

Sincerely,

Original signed by:

Scott C. Flanders, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-400
Enclosure: As stated
cc w/enclosure:
See next page

DFO1

Distribution

Docket File	JZwolinski	TMarsh	ACRS	OGC	BWetzel
PDII-1 RF	JTatum	GHubbard	LPlisco, RII	PUBLIC	

FILENAME - G:\HARRIS\M96818sp.RAI

OFFICE	PM:PDII-1	LA:PDII-1	D:PDII-1		
NAME	SFlanders	Dunnington ETD	PKuo for		
DATE	6/24/98	6/24/98	6/25/98		
COPY	Yes/No	Yes/No	Yes/No		

AA3

cc:

Mr. William D. Johnson
Vice President and Senior Counsel
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Resident Inspector/Harris NPS
c/o U.S. Nuclear Regulatory Commission
5421 Shearon Harris Road
New Hill, North Carolina 27562-9998

Ms. Karen E. Long
Assistant Attorney General
State of North Carolina
Post Office Box 629
Raleigh, North Carolina 27602

Public Service Commission
State of South Carolina
Post Office Drawer
Columbia, South Carolina 29211

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303

Mr. Mel Fry, Director
Division of Radiation Protection
N.C. Department of Environment
and Natural Resources
3825 Barrett Dr.
Raleigh, North Carolina 27609-7721

Ms. D. B. Alexander
Manager
Performance Evaluation and
Regulatory Affairs CPB 9
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602-1551

Mr. Bo Clark
Plant General Manager - Harris Plant
Carolina Power & Light Company
Shearon Harris Nuclear Power Plant
P.O. Box 165
New Hill, North Carolina 27562-0165

Mr. J. W. Donahue
Director of Site Operations
Carolina Power & Light Company
Shearon Harris Nuclear Power Plant
Post Office Box 165, MC: Zone 1
New Hill, North Carolina 27562-0165

Mr. Robert P. Gruber
Executive Director
Public Staff NCUC
Post Office Box 29520
Raleigh, North Carolina 27626

Chairman of the North Carolina
Utilities Commission
Post Office Box 29510
Raleigh, North Carolina 27626-0510

Mr. Milton Shymlock
U.S Nuclear Regulatory Comm.
Atlanta Federal Center
61 Forsyth Street, SW, Suite 23185
Atlanta, Georgia 30303

Mr. Stewart Adcock, Chairman
Board of County Commissioners
of Wake County
P. O. Box 550
Raleigh, North Carolina 27602

Margaret Bryant Pollard, Chairman
Board of County Commissioners
of Chatham County
P. O. Box 87
Pittsboro, North Carolina 27312

Mr. Chris A. VanDenburgh, Manager
Regulatory Affairs
Carolina Power & Light Company
Shearon Harris Nuclear Power Plant
P.O. Box 165, Mail Zone 1
New Hill, NC 27562-0165

Mr. Johnny H. Eads, Supervisor
Licensing/Regulatory Programs
Carolina Power & Light Company
Shearon Harris Nuclear Power Plant
P. O. Box 165, Mail Zone 1
New Hill, NC 27562-0165

REQUEST FOR ADDITIONAL INFORMATION - RESOLUTION OF

GENERIC LETTER 96-06 ISSUES FOR THE

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1

In your letter dated January 28, 1997, you provided an assessment of the waterhammer and two-phase flow issues for the Harris Nuclear Plant. In that assessment, you determined that waterhammer and two-phase flow could occur in the emergency service water (ESW) system, which provides cooling water for the containment fan cooler units (EFCUs). The assessment concluded that should the worst-case waterhammer occur, the ESW system and the EFCUs would remain operable and able to perform their functions. In order to assess your resolution of these issues, the following additional information is requested:

1. If a methodology other than that discussed in NUREG/CR-5220, "Diagnosis of Condensation-Induced Waterhammer," was used in evaluating the effects of waterhammer, describe this alternate methodology in detail. Also, explain why this methodology is applicable and gives conservative results (typically accomplished through rigorous plant-specific modeling, testing, and analysis).

2. For both the waterhammer and two-phase flow analyses, provide the following information:

   a. Identify any computer codes that were used in the waterhammer and two-phase flow analyses and describe the methods used to benchmark the codes for the specific loading conditions involved (see Standard Review Plan Section 3.9.1).

   b. Describe and justify all assumptions and input parameters (including those used in any computer codes) such as amplifications due to fluid structure interaction, cushioning, speed of sound, force reductions, and mesh sizes, and explain why the values selected give conservative results. Also, provide justification for omitting any effects that may be relevant to the analysis (e.g., fluid structure interaction, flow-induced vibration, erosion).

   c. Provide a detailed description of the "worst case" scenarios for waterhammer and two-phase flow, taking into consideration the complete range of event possibilities, system configurations, and parameters. For example, all waterhammer types and water slug scenarios should be considered, as well as temperatures, pressures, flow rates, load combinations, and potential component failures. Additional considerations for two-phase flow include:

      - the consequences of steam formation, transport, and accumulation;
      - cavitation, resonance, and fatigue effects; and
      - erosion considerations.

Enclosure

It is important for licensees to realize that in addition to heat transfer considerations, two-phase flow also involves structural and system integrity concerns that must be addressed. Licensees may find NUREG/CR-6031, "Cavitation Guide for Control Valves," helpful in addressing some aspects of the two-phase flow analyses.

d. Confirm that the analyses included a complete failure modes and effects analysis (FMEA) for all components (including electrical and pneumatic failures) that could impact performance of the cooling water system and confirm that the FMEA is documented and available for review, or explain why a complete and fully documented FMEA was not performed.

e. Explain and justify all uses of "engineering judgement."

3. Determine the uncertainty in the waterhammer and two-phase flow analyses, explain how the uncertainty was determined, and how it was accounted for in the analyses to assure conservative results.

4. Confirm that the waterhammer and two-phase flow loading conditions do not exceed any design specifications or recommended service conditions for the piping system and components, including those stated by equipment vendors; and confirm that the system will continue to perform its design-basis functions as assumed in the safety analysis report for the facility and that the containment isolation valves will remain operable.

5. Discuss specific system operating parameters and other operating restrictions that must be maintained to assure that the waterhammer and two-phase flow analyses remain valid, and explain why it would not be appropriate to establish Technical Specification requirements to acknowledge the importance of these parameters and operating restrictions. Also, describe and justify reliance on any non-safety-related instrumentation and controls in this regard.

6. Provide a simplified diagram of the affected systems, showing major components, active components, relative elevations, lengths of piping runs, and the location of any orifices and flow restrictions.

7. Describe in detail any plant modifications or procedure changes that have been made or are planned to be made to resolve the waterhammer and two-phase flow issues.