Progress Energy

Serial: NPD-NRC-2009-083 10CFR52.79
April 28, 2009

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

SHEARON HARRIS NUCLEAR POWER PLANT, UNITS 2 AND 3
DOCKET NOS. 52-022 AND 52-023
SUPPLEMENT 1 TO RESPONSE TO USACE REQUEST FOR ADDITIONAL INFORMATION REGARDING THE ENVIRONMENTAL REVIEW

References: 1. Letter from Donald Palmrose (NRC) to James Scarola (PEC), dated November 13, 2008, "Request for Additional Information Regarding the Environmental Review of the Combined License Application for Harris Nuclear Power Plant, Units 2 and 3"

2. Letter from Garry D. Miller (PEC) to U.S. Nuclear Regulatory Commission (NRC), dated February 12, 2009, "Response to USACE Request for Additional Information Regarding the Environmental Review", Serial NPD-NRC-2009-023

Ladies and Gentlemen:

Progress Energy Carolinas, Inc. (PEC) hereby submits a supplemental response to the United States Army Corps of Engineers (USACE) request for additional information (RAI) provided in Enclosure 2 of the Reference 1.

A supplemental response to two of the USACE RAI questions is provided in Enclosure 1. Enclosure 2 lists the attachments provided with this response.

If you have any further questions, or need additional information, please contact Bob Kitchen at (919) 546-6992, or me at (919) 546-6107.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 28, 2009.

Sincerely,

Garry D. Miller
General Manager
Nuclear Plant Development

Enclosures/Attachments

Progress Energy Carolinas, Inc.
P.O. Box 1551
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D084
NRO

cc (3 copies):
Dr. Donald Palmrose, U.S. NRC Environmental Project Manager

cc: U.S. NRC Director, Office of New Reactors/NRLPO
U.S. NRC Office of Nuclear Reactor Regulation/NRLPO
U.S. NRC Region II, Regional Administrator
U.S. NRC Resident Inspector, SHNPP Unit 1
Mr. Manny Comar, U.S. NRC Project Manager

Shearon Harris Nuclear Power Plant Units 2 and 3
Supplement 1 to Response to USACE Request for Additional Information Regarding the Environmental Review, dated November 13, 2008

NRC RAI #	Progress Energy RAI #	Progress Energy Response
USACE-1	H-0351	February 12, 2009; Serial NPD-NRC-2009-023
USACE-2	H-0352	February 12, 2009; Serial NPD-NRC-2009-023
USACE-3	H-0353	February 12, 2009; Serial NPD-NRC-2009-023
USACE-4	H-0354	February 12, 2009; Serial NPD-NRC-2009-023
USACE-5	H-0355	February 12, 2009; Serial NPD-NRC-2009-023
USACE-6	H-0356	February 12, 2009; Serial NPD-NRC-2009-023
USACE-7	H-0357	February 12, 2009; Serial NPD-NRC-2009-023
USACE-8	H-0358	February 12, 2009; Serial NPD-NRC-2009-023
USACE-9	H-0359	February 12, 2009; Serial NPD-NRC-2009-023
USACE-10	H-0360	February 12, 2009; Serial NPD-NRC-2009-023
USACE-11	H-0361	February 12, 2009; Serial NPD-NRC-2009-023
USACE-12	H-0362	February 12, 2009; Serial NPD-NRC-2009-023
USACE-13	H-0363	February 12, 2009; Serial NPD-NRC-2009-023
USACE-14	H-0364	February 12, 2009; Serial NPD-NRC-2009-023
USACE-15	H-0456	Revised response enclosed – see following pages
USACE-16	H-0366	February 12, 2009; Serial NPD-NRC-2009-023
USACE-17	H-0367	February 12, 2009; Serial NPD-NRC-2009-023
USACE-18	H-0368	February 12, 2009; Serial NPD-NRC-2009-023
USACE-19	H-0369	February 12, 2009; Serial NPD-NRC-2009-023
USACE-20	H-0370	February 12, 2009; Serial NPD-NRC-2009-023
USACE-21	H-0371	February 12, 2009; Serial NPD-NRC-2009-023
USACE-22	H-0372	February 12, 2009; Serial NPD-NRC-2009-023
USACE-23	H-0373	February 12, 2009; Serial NPD-NRC-2009-023
USACE-24	H-0374	February 12, 2009; Serial NPD-NRC-2009-023
USACE-25	H-0375	February 12, 2009; Serial NPD-NRC-2009-023
USACE-26	H-0376	February 12, 2009; Serial NPD-NRC-2009-023
USACE-27	H-0377	February 12, 2009; Serial NPD-NRC-2009-023
USACE-28	H-0378	February 12, 2009; Serial NPD-NRC-2009-023
USACE-29	H-0379	February 12, 2009; Serial NPD-NRC-2009-023
USACE-30	H-0380	February 12, 2009; Serial NPD-NRC-2009-023
USACE-31	H-0457	Revised response enclosed – see following pages

NRC Letter No.: HAR-RAI-LTR-ER-USACE-001

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: USACE-15 (ER Subsection 9.3.2.2.1.5)

Text of NRC RAI:

Please provide avoidance and minimization measures on impacts to streams and wetlands.

This information is required for regulatory compliance (example, only unavoidable impacts are allowed).

PGN RAI ID #: H-456

PGN Response to NRC RAI:

ER Subsection 9.3.2.2.1.5 describes aquatic ecology at the HAR site as part of the comparison of the alternative sites. PEC submitted a RFP to perform LEDPA analyses and provide 404 permitting support. Responses to the RFP were received on December 17, 2008. The scope of this work is provided as Attachment USACE-15A. The majority of the impacts to streams and wetlands related to the preferred alternative are associated with raising the level of the lake. The ER is based on PEC's plan to increase the lake level to the 240-ft. elevation. The ER evaluates the most conservative scenario with regard to the potential impacts of the project by describing the maximum amount of impacts anticipated for streams and wetlands due to raising the level of the lake. This approach was selected so that the EIS that the NRC is currently developing would not need to be changed if project elements changed, since changes would likely mean the impacts would be smaller than originally described in the ER. Final design for project elements has not been completed. Attachment USACE-15B provides justification for the unavoidable impacts of raising the level of the lake and how this approach minimizes impacts to other resources.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

Attachment USACE-15A: Support for Clean Water 404 Permitting and Alternatives Analysis: Least Environmentally Damaging Practicable Alternative (LEDPA) Scope of Work

Attachment USACE-15B: Need for Maximum Harris Reservoir Level

NRC Letter No.: HAR-RAI-LTR-ER-USACE-001

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: USACE-31 (10.4.2.4.1)

Text of NRC RAI:

Please indicate if the new interchange off US 1 is included in these impacts.

This information is needed to evaluate a complete project for this site.

PGN RAI ID #: H-457

PGN Response to NRC RAI:

The potential interchange off US 1 was evaluated in ER Subsection 2.8.2. However, a decision on what type of interchange off US 1 is needed for the project has not been made. Several options are under consideration. Coordination between PEC, the Federal Highway Administration (FHWA), North Carolina Department of Transportation (NCDOT) and other agencies is ongoing to determine an optimal interchange at this location. The areas associated with potential interchanges are included in the wetlands delineation effort that was conducted and described in response to USACE-12. Once the decision is made concerning the type of interchange needed, PEC would conduct appropriate surveys if warranted (e.g., cultural resources, threatened and endangered species) and an evaluation of the socioeconomic and environmental impacts early in the planning phase of the project. PEC will work with the appropriate agencies to acquire permits and identify any necessary mitigation before construction activities begin.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

List of Attachments:

1. NRC RAI # USACE-15 (PGN RAI ID #s H-0456):

   Attachment USACE-15A: Support for Clean Water 404 Permitting and Alternatives Analysis: Least Environmentally Damaging Practicable Alternative (LEDPA) Scope of Work (3 pages, including cover page)

2. NRC RAI # USACE-15 (PGN RAI ID #H-0456):

   HAR ER RAI USACE-15 Attachment B: Need for Maximum Harris Reservoir Level (6 pages)

Attachment USACE – 15A

Support for Clean Water 404 Permitting and Alternatives Analysis:

Least Environmentally Damaging Practicable Alternative (LEDPA) Scope of Work

Support for Clean Water Act 404 permitting and Alternatives analysis

Introduction

Progress Energy Carolinas, Inc. (PEC) is soliciting proposals for technical support in connection with environmental permitting of two additional nuclear power generation units at the existing Shearon Harris Nuclear Plant (HNP) in New Hill, North Carolina. The project, known as the Harris Advanced Reactor (HAR) project, is the subject of a Combined Operating License Application (COLA) submitted to the US Nuclear Regulatory Commission (NRC) in February 2008. Major environmental permits for the project will include Clean Water Act Section 404 permit for dredged or fill material and Clean Water Act Section 401 Water Quality Certification. The 404 permit, to be issued by the US Army Corps of Engineers (ACOE), must be for the Least Environmentally Damaging Practicable Alternative (LEDPA) that meets the needs of the applicant. The permit application to ACOE must include information that will support the ACOE review of alternatives and enable the agency to make the LEDPA determination.

This RFP addresses the evaluation of alternatives to the proposed project and other support for the ACOE permitting process. PEC has studied alternative sites and technologies and information exists to support the development of a LEDPA analysis. An independent review of those studies is needed to evaluate whether the information is sufficient to support the LEDPA determination, and the alternatives information needs to be compiled into a document that can be included in the 404 permit application for ACOE review. Other technical support needed for the 404 permitting process is likely to include participation in development of a mitigation plan for the project and help in preparing other permit application elements.

Please describe your approach to the following tasks and provide your proposed scope of work, any suggested alternative tasks, assumptions, exceptions, staffing, schedule and cost estimate (broken down by task and person or staff level). Please also provide a billing rate schedule.

Scope of Services

PEC is seeking the services of a qualified firm to prepare a LEDPA analysis for the 404 permit application and to provide other technical support during the application preparation and review process. The following services are needed:

Task 1 – LEDPA Analysis

The LEDPA analysis is a key element of the 404 permit application for the HAR project. This task includes the efforts necessary to evaluate PEC's existing alternatives information; identify gaps in the information, if any, and gather information to fill the gaps; and prepare an alternatives analysis report that will successfully support a LEDPA determination by ACOE. The following subtasks are envisioned:

- Prepare Study plan for the LEDPA analysis – To support NRC development of the Environmental Impact Statement (EIS) for the project, PEC must address how it will present its evaluation of alternatives for the EIS and the 404 permit application. The Study Plan will outline the activities

to be performed to develop and document the LEDPA analysis. Assume one meeting with PEC for this sub-task.

- Review background information – This will involve review of existing site evaluation information (siting study), alternatives described in the Environmental Report and other analyses performed by PEC or its advisors to support the selection of the project concept and location.
- Identify gaps and additional information needed – Compare existing information with what is needed , based on ACOE regulations and the firm's experience, to demonstrate LEDPA. Identify information gaps or additional evaluations needed to support a complete LEDPA demonstration. Summarize the gaps and/or information needs in a Technical Memo, and assume attendance at one meeting with PEC to discuss the findings from this effort.
- Gather additional info to address gaps - Implement the recommendations from the previous subtask and gather or obtain the information needed for the LEDPA document. The detailed needs list will not be available until the previous task is completed, so for purposes of this proposal assume that additional desktop evaluations of wetlands/streams/habitat will be needed for one alternative (greenfield) site to provide information equivalent to what exists for the selected site. Assume no field work will be needed.
- Prepare LEDPA analysis report – Using the information reviewed and supplemented during the above subtasks, prepare an alternatives analysis that will addresses the LEDPA criterion. Deliverables for this task will include an internal Technical Memo for PEC use regarding the LEDPA findings and any associated issues or concerns; a White Paper presenting the alternatives analysis, suitable for submittal to ACOE as part of the 404 application package; presentation slides summarizing the alternatives analysis; and attendance at one meeting with PEC to discuss the Technical Memo and White Paper.

Task 2 – Technical Support for Permitting activities

The selected firm may also be requested to provide technical support services during preparation of the 404 permit application package, as well as support during the review process. Specific areas of support could include assistance in brainstorming mitigation alternatives and development of the overall mitigation plan for the project; attendance at meetings with ACOE and/or other agency stakeholders to discuss the LEDPA analysis; or other technical support, as requested. The detailed scope of these services is unknown at this time, so for purposes of this proposal assume 200 hours of effort for this task.

HAR ER RAI USACE-15 Attachment B
Need for Maximum Harris Reservoir Level

Introduction

Harris Reservoir is a manmade reservoir that provides cooling and process water for the existing Shearon Harris Nuclear Power Plant Unit 1 (HNP). The Harris Reservoir and the Auxiliary Reservoir are described together as Harris Lake. The Harris Reservoir is the focus of the following discussion.

Progress Energy Carolinas, Inc. (PEC) is proposing the construction of two additional reactor units (proposed Shearon Harris Nuclear Power Plant Units 2 and 3 [HAR]). These units, along with the existing reactor, would use Harris Reservoir for cooling water. The water level of Harris Reservoir is proposed to be raised from an operating level of 220 feet (ft.) to an operating level of 240 ft. to ensure adequate cooling water while at the same time minimizing adverse impacts to aquatic life and water users in the region.

A technical analysis determined that a reservoir level of at least 240 ft. would be appropriate to provide cooling water to operate the three nuclear reactors in the case of an extreme drought (Sargent and Lundy, 2008). This analysis included hydrologic and meteorological data from 1937 to 2004, estimates of plant consumptive use, assumptions on maximum withdrawal amounts from the Cape Fear River, and a minimum release from Harris Reservoir. Additional evaluations based on the configuration of the dam and safety-related probable maximum flood analyses were used to determine that a mean operating level of 240 ft. would meet safety requirements. Water inflows from the Buckhorn Creek Drainage Basin would be supplemented by makeup water from the Cape Fear River to maintain the 240-ft. reservoir level. This memorandum describes the factors that affect the determination of the required reservoir level.

Need for the Project

As described in Section 8 of the *Shearon Harris Nuclear Power Plant Units 2 and 3 Environmental Report* (Progress Energy, 2008a), power demands in the region are expected to grow in the future. Estimates predict the following:

- An increase in PEC customers of more than 20,000 annually
- An additional 4 million people in North Carolina by 2030
- A corresponding increase in electrical demand for residential and commercial users.

To meet the increased electrical demand, PEC is proposing to add 2,803 megawatts (MW) of generating capacity to their service area. The HAR expansion would provide approximately 2,000 MW of this power to the region.

Cooling Water Supply

The HNP uses Harris Reservoir for cooling water supply. The two proposed reactor units would also use Harris Reservoir for cooling water. The normal net consumptive usage for the additional reactor units is estimated to be 63 cubic feet per second (cfs) (Sargent and Lundy, 2008). To ensure adequate cooling water while at the same time minimizing adverse impacts to the Cape Fear River and its users, the reservoir capacity will be expanded by raising the reservoir from its current normal operating level of 67.1 meters (m) (220 ft.) to a new elevation of 73.2 m (240 ft.). This expansion of Harris Reservoir would increase its capacity by an additional 128,849,000 cubic meters (m^3), from 90,625,000 m^3 to 219,474,000 m^3.

The size of Buckhorn Creek Drainage Basin, which drains to Harris Reservoir, is approximately 70 square miles (mi^2). Runoff from this subwatershed is sufficient to keep Harris Reservoir at the normal operating level of 220-ft. for the HNP. However, the Buckhorn Creek Drainage Basin will not supply sufficient water to maintain the reservoir level necessary for long-term operation of three reactors. For this reason, makeup water is proposed to be withdrawn from the Cape Fear River and pumped into Harris Reservoir. The current proposal is to use three pumps for a maximum pumping rate of 134 cfs to maintain the reservoir level at 240 ft. during normal or above normal conditions.

Need to Maximize the Reservoir Level to Provide Storage Capacity

Raising Harris Reservoir to a maximal level allows for withdrawals of makeup water from the Cape Fear River to be minimized during drought conditions. A number of municipalities in the Cape Fear River Basin rely on surface water for their water supply (see Figure 1). Jordan Lake is the water supply for municipalities above Harris Reservoir and is controlled to maintain a minimum to support downstream users and aquatic life.

Jordan Lake is considered to be split into three volumes: flood, conservation, and sediment storage. The conservation storage volume is further split into a water supply pool and a water quality pool. Water supply comes from the water supply pool. To support aquatic life and other downstream uses, flows in the Cape Fear River are augmented by releases from the B. Everett Jordan Dam. These flows come from the water quality pool.

Based on the U.S. Army Corps of Engineers (USACE) Jordan Lake Rules, the dam is operated to meet a minimum target flow of 600 cfs at the U.S. Geological Survey (USGS) gage at Lillington under normal conditions. However, releases from the dam can drop to as low as 40 cfs, depending on the amount remaining in the conservation pool. Current withdrawals from Jordan Reservoir for water supply purposes are approximately 26.2 cfs. These are expected to increase to 97.9 cfs by 2030 and 113.8 cfs by 2050 (North Carolina Division of Water Resources, 2008). Under drought conditions, the level of the conservation storage volume drops because inflows to the lake are limited while withdrawals and releases continue.

The current and expected future needs for water from the Cape Fear River and the multi-purpose functioning of Jordan Lake as managed by USACE call for water users in the Cape Fear River Basin to optimize their resources and manage water needs for the benefit of the entire system. The expanded Harris Reservoir will provide storage capacity when Cape Fear River flows are adequate to support the withdrawal of makeup water and will enable PEC to reduce or temporarily suspend withdrawals from the Cape Fear River under low water or drought conditions, while maintaining reliable operation of the power generating units. This flexibility in withdrawals will also help minimize impacts to aquatic resources in the Cape Fear River.

Determination of Minimum Reservoir Level

A technical analysis was performed by PEC to determine the minimum reservoir level that would be needed to provide a cooling water supply sufficient for operation of the proposed additional reactors during drought conditions (Sargent and Lundy, 2008). This analysis used historical inflows, rainfall and evaporation, projected consumptive use, and releases from Harris Reservoir.

The analysis computed the reservoir water balance and reservoir levels for the period from October 1939 to September 2004. The water balance included inflows from the drainage basin, precipitation on the reservoir, makeup inflows, releases from the Main Dam, and consumptive use for the three units. A number of combinations using operational reservoir levels from 240 ft. to 246 ft. and makeup water inflows from 30 cfs to 60 cfs were evaluated.

Based on historical inflows and meteorology, the most severe drought period was from 1985 through 1997. The analysis calculated the withdrawals from the Cape Fear River that would be necessary to allow for continuous operation of the plants during extreme drought conditions. A minimum reservoir level of 220 ft. was selected as the low water level allowable to operate all three units without the need for a shutdown.

It was determined that the reservoir level for normal operation is 240 ft., assuming an average release to Buckhorn Creek of 9.5 cfs and continuous makeup water flow from the Cape Fear River of 43 cfs. The 9.5 cfs release from Harris Reservoir is required to address water quality issues in Harris Reservoir. The withdrawal from the Cape Fear River of 43 cfs

is the approximate pumping capacity of one of the three pumps to be installed. An operating level of 240 ft. with these parameters allowed for continuous plant operation during the 1939 to 2004 period with reservoir levels falling to 220 ft. briefly during early 1989.

Determination of Maximum Reservoir Level

Three primary factors were considered in the determination of the maximum reservoir level: (1) plant safety in the event of an extreme flood, (2) impacts to landowners in the event of an extreme flood, and (3) configuration of the Main Dam structure.

A probable maximum flood (PMF) analysis was performed in support of the HAR *Final Safety Analysis Report* (Progress Energy, 2008b). This analysis determined that the maximum operating level of the reservoir is approximately 240 ft. PEC also owns all the property around the reservoir up to 243 ft. This minimizes the potential impacts to other landowners due to flooding if the reservoir is maintained at the 240-ft. level. Finally, the Shearon Harris facility was originally designed for four reactors. As part of these plans, the Main Dam was constructed to accommodate reservoir levels up to 250 ft. Therefore, this configuration can accommodate a reservoir level of 240 ft.

Other Factors Supporting the Need for the Maximum Reservoir Level

The likelihood of the following detrimental outcomes from an increased water demand can be minimized if sufficient storage is developed and maintained in Harris Reservoir. Impacts to power plant operation and customers in the service area may occur if sufficient cooling water is unavailable from Harris Reservoir or the Cape Fear River. During these periods, the plant may need to reduce generation levels to maintain safe operation. This will reduce available electrical power to users in the region. Additional detrimental outcomes may include:

- Adverse impacts to Cape Fear River water quality and ecological integrity as a result of withdrawals during drought or near drought conditions.
- Adverse impacts to Harris Reservoir water quality and ecological integrity as a result of extended periods of lower reservoir level.

The addition of two units and the increase in reservoir levels can have positive outcomes, such as the following:

- Provide reliable base-load power during drought conditions
- Allow for a minimum flow to be released to Buckhorn Creek
- Reduce the need for releases from Jordan Dam during drought periods
- Increase the shoreline area and shoreline-related habitats
- Increase in- reservoir aquatic habitat.

Conclusions

A technical evaluation concluded that a new operating level of 240 ft. for Harris Reservoir could be maintained with withdrawals from the Cape Fear River below 20 percent of the 7Q10, allow for the required minimum release to Buckhorn Creek, and meet applicable safety requirements. The increase in reservoir level is necessary for reliable power generation from the three reactors during extended drought situations. To avoid affecting Jordan Lake water levels, aquatic life, and users of the Cape Fear River, withdrawals from the Cape Fear River may be restricted during extreme drought periods. A large storage reservoir of cooling water can greatly extend the period during which the three reactors can operate with no net water consumption from the river. Future power and water demand forecasts indicate a high demand in the region for both power and water in the upcoming years. Along with conservation, raising the level of Harris Reservoir is one of the best ways to simultaneously meet these two needs.

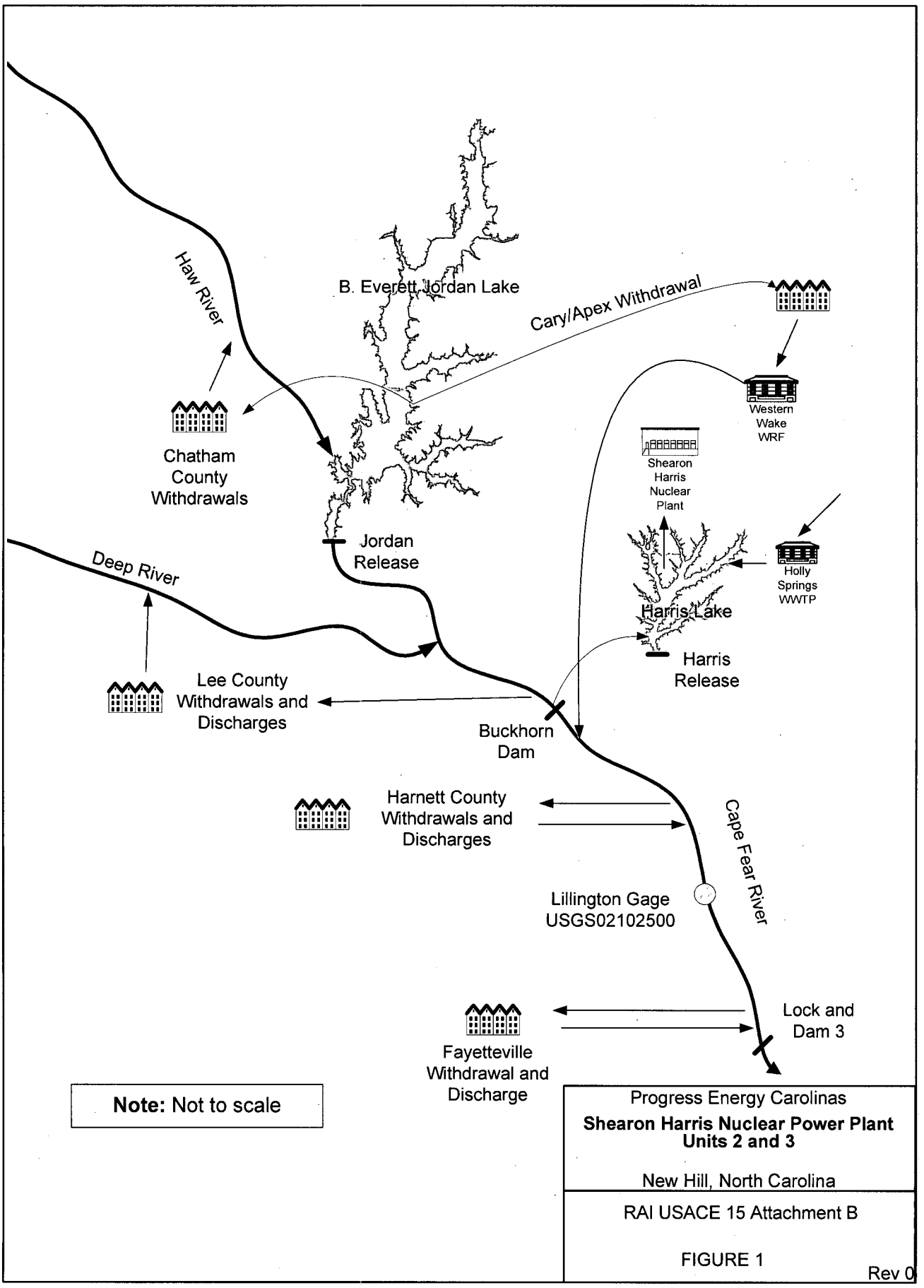
References

North Carolina Division of Water Resources. 2008. *Cape Fear River Basin Surface Water Assessment Modeling of Future Water Use Scenarios.* North Carolina Department of the Environment and Natural Resources, Division of Water Resources. Raleigh, NC.

Progress Energy Carolinas, Inc. 2008a. *Environmental Report,* Shearon Harris Nuclear Power Plant Units 2 and 3 Combined License Application, Part 3. Progress Energy Carolinas, Inc. Raleigh, NC.

Progress Energy Carolinas, Inc. 2008b. *Final Safety Analysis Report,* Shearon Harris Nuclear Power Plant Units 2 and 3 Combined License Application, Part 2. Progress Energy Carolinas, Inc. Raleigh, NC.

Sargent and Lundy, LLC. 2008. Preliminary Evaluation of Lake Level - Normal Pool Level and Makeup Flow Requirement for Two Additional AP1000 Units Attachment A of *Evaluation of Lake Level – Normal Pool Level and Makeup Flow for Two Additional AP 1000 Units, Rev. 1.*


Haw River
B. Everett Jordan Lake
Cary/Apex Withdrawal
Western Wake WRF
Chatham County Withdrawals
Shearon Harris Nuclear Plant
Jordan Release
Deep River
Holly Springs WWTP
Harris Lake
Harris Release
Lee County Withdrawals and Discharges
Buckhorn Dam
Harnett County Withdrawals and Discharges
Cape Fear River
Lillington Gage USGS02102500
Lock and Dam 3
Fayetteville Withdrawal and Discharge
Note: Not to scale
Progress Energy Carolinas
Shearon Harris Nuclear Power Plant Units 2 and 3
New Hill, North Carolina
RAI USACE 15 Attachment B
FIGURE 1
Rev 0