Progress Energy

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February 12, 2009

10CFR52.79

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
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING THE ENVIRONMENTAL REVIEW

Reference: 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"

Ladies and Gentlemen:

Progress Energy Carolinas, Inc. (PEC) hereby submits a response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) provided in Enclosure 1 of the referenced letter.

A response to the NRC RAIs is provided in Enclosure 1. Enclosure 1 also identifies changes that will be made in a future revision of the Shearon Harris Nuclear Power Plant Units 2 and 3 (HAR) application. Enclosure 2 provides a list of files included on the attached CD (Attachment 1). These files have been prepared in accordance with NRC electronic submittal guidance. A pre-flight report is included as Enclosure 3 that lists the files that do not pass pre-flight, but are deemed acceptable due to rescanning/OCR efforts, text being word searchable, clarity/legibility of high quality, and embedded photos and images.

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 February 12, 2009.

Sincerely,

Garry D. Miller
General Manager
Nuclear Plant Development

Enclosures/Attachment

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DO 84
NRO

cc (with 3 copies of Enclosures/Attachment):
Dr. Donald Palmrose, U.S. NRC Environmental Project Manager

cc (without attached CD):
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
Response to NRC Request for Additional Information Regarding the Environmental Review, dated November 13, 2008

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5.2.2-3	H-0291	Response enclosed – see following pages
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001 Attachment 5.2.1.3-1A	5.2.1.3-1
002 Attachment 2.3.1.3-1A	2.3.1.3-1
003 Attachment 2.3.1.3-1A	2.3.1.3-1
004 Attachment 2.3.1.3-1A	2.3.1.3-1
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006 Attachment 9.2-1A	9.2-1
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014 Attachment 2.4.1-1A	2.4.1-1
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029 Attachment 4.3.1-1H	4.3.1-1
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052 Attachment 2.4-1L	2.4-1
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NRC Letter No.: HAR-RAI-LTR-ER-NRC-001

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.4-1

Text of NRC RAI: Provide a full and detailed transportation impact analysis in the revised ER (i.e., Sections 3.8 & 7.4) that can be cited in the NRC EIS for the proposed construction and operation of Harris Units 2 and 3.

The Applicant has performed a full and detailed transportation impact analysis (#ENG-FM-Calculation) but it has not yet been docketed. This information must be made publicly available by the Applicant so it can be cited in the NRC EIS.

PGN RAI ID #: H-287

PGN Response to NRC RAI:

Progress Energy Carolinas, Inc. (PEC) has performed a full and detailed transportation impact analysis (HAR-GW-GLC-001, Revision 0). This calculation package (provided in the reading room) documents the assumptions, input data, methods, results, and references for the evaluation of the radiological and nonradiological impacts of transporting unirradiated and spent nuclear fuel to and from PEC's Shearon Harris Nuclear Power Plant Units 2 and 3 (HAR) site, as well as three other proposed locations. The results presented in the calculation package were used as the basis for the revisions of Sections 3.8, "Transportation of Radioactive Materials" and 7.4, "Environmental Impacts of Postulated Accidents Involving Radioactive Materials" of the HAR Environmental Report (ER).

Associated HAR COL Application Revisions:

Both ER Sections 3.8, "Transportation of Radioactive Materials" and 7.4, "Environmental Impacts of Postulated Accidents Involving Radioactive Materials" were revised based on the results of the transportation study that was performed to comply with the requirements of Sections 3.8, "Transportation of Radioactive Materials," and 7.4, "Environmental Impacts of Postulated Accidents Involving Radioactive Materials" of NUREG-1555. The revised sections are presented below.

3.8 TRANSPORTATION OF RADIOACTIVE MATERIALS

This section addresses issues associated with the transportation of radioactive materials from the HAR and alternative sites (Brunswick Nuclear Power Plant [BNP], H.B. Robinson Nuclear Power Plant [RNP], and Marion County [refer to ER Subsection 9.3.2]). Postulated accidents due to transportation of radioactive materials are discussed in ER Section 7.4.

3.8.1 TRANSPORTATION ASSESSMENT

The U.S. Nuclear Regulatory Commission (NRC) regulations in 10 CFR 51.52 state that:

> "Every environmental report prepared for the construction permit stage [or early site permit stage, or combined license stage] of a light-water-cooled nuclear power reactor, and submitted after February 4, 1975, shall contain a statement concerning transportation of fuel and radioactive wastes to and from the reactor. That statement shall indicate that the reactor and this transportation either meet all of the conditions in paragraph (a) of this section or all of the conditions in paragraph (b) of this section."

The NRC evaluated the environmental effects of transportation of fuel and waste for light water reactors (LWRs) in the U.S. Atomic Energy Commission's "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Plants" (WASH-1238) and the NRC's "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants, Supplement 1" (NUREG-75/038) and found the impacts to be small. These NRC analyses provided the basis for Table S-4 in 10 CFR 51.52 (reproduced in this ER as Table 3.8-1), which summarizes the environmental impacts of transportation of fuel and radioactive wastes to and from a reference LWR. The table addresses two categories of environmental considerations: (1) normal conditions of transport and (2) accidents in transport.

To compare the impacts of transporting AP1000 fuel to the conditions in Table S-4, the fuel characteristics for the AP1000 were normalized to a reference reactor year (RRY). The reference LWR is an 1100-megawatt electric (MWe) reactor that has an 80-percent capacity factor, for an electrical output of 880 MWe per year. One AP1000 is assumed to operate at 1115 MWe, with an annual capacity factor of 93 percent.

The advanced light water reactor (ALWR) technology that is being considered for the HAR site and the alternative sites is the AP1000. The proposed configuration for this new plant is two units. The standard configuration (a single unit) for the AP1000 has been used to evaluate transportation impacts relative to the reference LWR.

Subparagraphs 10 CFR 51.52(a)(1) through (5) delineate specific conditions the reactor licensee must meet to use Table S-4 as part of its environmental report. For reactors not meeting all of the conditions in paragraph (a) of 10 CFR 51.52, paragraph (b) of 10 CFR 51.52 requires a further analysis of the transportation effects.

The conditions in paragraph (a) of 10 CFR 51.52, establishing the applicability of Table S-4, are reactor core thermal power, fuel form, fuel enrichment, fuel encapsulation, average fuel irradiation, time after discharge of irradiated fuel before shipment, mode of transport for unirradiated fuel, mode of transport for irradiated fuel, radioactive waste form and packaging, and mode of transport for radioactive waste other than irradiated fuel. The following subsections describe the characteristics of the AP1000 relative to the conditions of 10 CFR 51.52 for use of Table S-4. Information for the AP1000 fuel is taken from the DCD and supporting documentation prepared by the Idaho National Engineering and Environmental Laboratory (Reference 3.8-001).

3.8.1.1 Reactor Core Thermal Power

Subparagraph 10 CFR 51.52(a)(1) requires that the reactor have a core thermal power level not exceeding 3800 megawatts (MW).

As noted in DCD Table 4.1-1, the 3400-MWt reactor power level rating of the AP1000 (the AP1000 core thermal is rated at 3400 MWt and the RCP heat addition is 15 MWt, for a total thermal power output of 3415 MWt) meets this requirement.

The core power level was established as a condition because, for the LWRs being licensed when Table S-4 was promulgated, higher power levels typically indicated the need for more fuel and, therefore, more fuel shipments than were evaluated for Table S-4. This is not the case for the new LWR designs, due to the higher unit capacity and higher burnup for these reactors. The annual fuel reloading for the reference LWR analyzed in WASH-1238 was 30 metric tons of uranium (MTU), while the average annual fuel reloading for the AP1000 is approximately 24 MTU. When normalized to equivalent electric output, the annual fuel reloading for the AP1000 is approximately 20 MTU or two-thirds that of the reference LWR.

3.8.1.2 Fuel Form

Subparagraph 10 CFR 51.52(a)(2) requires that the reactor fuel be in the form of sintered UO_2 pellets.

As noted in DCD Table 4.1-1, the AP1000 has a sintered UO_2 pellet fuel form.

3.8.1.3 Fuel Enrichment

Subparagraph 10 CFR 51.52(a)(2) requires that the reactor fuel have a uranium-235 (U-235) enrichment not exceeding 4 percent by weight. As noted in DCD Table 4.1-1, for the AP1000, the enrichment of the initial core varies by region from 2.35 to 4.45 percent, and the average for reloads is 4.51 percent. Because the AP1000 exceeds the U-235 condition in subparagraph 10 CFR 51.52(a)(2), further analysis of the transportation impacts is provided in ER Subsection 3.8.2 and ER Section 7.4.

3.8.1.4 Fuel Encapsulation

Subparagraph 10 CFR 51.52(a)(2) requires that the reactor fuel pellets be encapsulated in Zircaloy rods. Regulation 10 CFR 50.46 also allows use of ZIRLO™.

As noted in DCD Table 4.1-1, the AP1000 uses ZIRLO™ clad fuel rods, which are equivalent to the Zircaloy clad fuel rods evaluated in Table S-4.

3.8.1.5 Average Fuel Irradiation

Subparagraph 10 CFR 51.52(a)(3) requires that the average burnup not exceed 33,000 MWd/MTU.

According to the DCD, the AP1000 has an average maximum burnup of 60,000 MWd/MTU for the peak rod. The extended burnup is 62,000 MWd/MTU. Because the AP1000 exceeds the average burnup condition in subparagraph 10 CFR 51.52(a)(3), further analysis of the transportation impacts is provided in ER Subsection 3.8.2 and ER Section 7.4.

3.8.1.6 Time After Discharge of Irradiated Fuel Before Shipment

Subparagraph 10 CFR 51.52(a)(3) requires that no irradiated fuel assembly be shipped until at least 90 days after it is discharged from the reactor. The WASH-1238 for Table S-4 assumes 150 days of decay time prior to shipment of any irradiated fuel assemblies.

NUREG/CR-6703 updated this analysis to extend Table S-4 to burnups of up to 62,000 MWd/MTU, assuming a minimum of 5 years between removal from the reactor and shipment.

Five years is the minimum decay time expected before shipment of irradiated fuel assemblies. The 5-year minimum time is supported additionally by the following three practices:

- Five years is the minimum cooling time specified in 10 CFR 961.11, within Appendix E of the standard U.S. Department of Energy (DOE) contract for spent fuel disposal with existing reactors.

- In NUREG-1437, the NRC specifies 5 years as the minimum cooling period when it issues certificates of compliance for casks used for shipment of power reactor fuel.

- The NRC has generically considered the environmental effects of spent nuclear fuel with U-235 enrichment levels up to 5 percent and irradiation levels up to 62,000 MWd/MTU, and found that the environmental effects of spent nuclear fuel transport are bounded by the effects listed in Table S-4 (see Table 3.8-1), provided that more than 5 years has elapsed between removal of the fuel from the reactor and shipment of the fuel off-site.

In addition to the minimum fuel storage time, NUREG-1555, Environmental Standard Review Plan 3.8 asks for the capacity of the on-site storage facilities to store irradiated fuel.

As noted in DCD Table 9.1-2, the new spent fuel storage facilities (one per unit) constructed to support the HAR will have enough storage capacity to store 889 total fuel assemblies for each unit. This will provide more than enough capacity for 5 years of spent fuel storage.

3.8.1.7 Transportation of Unirradiated Fuel

Subparagraph 10 CFR 51.52(a)(5) requires that unirradiated fuel be shipped to the reactor site by truck. PEC will receive fuel via truck shipments for the AP1000 units being considered for the HAR and alternative sites.

Table S-4 includes a condition that the truck shipments not exceed 73,000 pounds as governed by federal or state gross vehicle weight restrictions. The fuel shipments to the HAR and the alternative sites will comply with federal and state weight restrictions.

3.8.1.8 Transportation of Irradiated Fuel

Subparagraph 10 CFR 51.52(a)(5) allows for truck, rail, or barge transport of irradiated fuel.

This condition will be met for the AP1000. For the impacts analysis described in ER Subsection 3.8.2, it was assumed that all spent fuel shipments will be made using legal weight trucks. According to 10 CFR 961.1, the DOE is responsible for spent fuel transportation from reactor sites to the repository and will make the decision on the transport mode.

3.8.1.9 Radioactive Waste Form and Packaging

Subparagraph 10 CFR 51.52(a)(4) requires that, with the exception of spent fuel, radioactive waste shipped from the reactor is to be packaged and in a solid form.
PEC will solidify and package its radioactive waste. The DCD provides the following information regarding the treatment and packaging of radioactive wastes:

> Processing and packaging of wastes will most likely be by mobile systems in the auxiliary building rail car bay and in the mobile systems facility part of the radwaste building. The packaged waste is stored in the auxiliary and radwaste buildings until it is shipped offsite to a licensed disposal facility.
>
> The use of mobile systems for the processing functions permits the use of the latest technology and avoids the equipment obsolescence problems experienced with installed radwaste processing equipment. The most appropriate and efficient systems may be used as they become available.

The process technologies that are available through vendors for large quantities of radioactive liquid waste typically include ion exchange through resin columns, resin dewatering, and solidification. Vendor processed wastes are typically packaged in high integrity containers, liners, or drums as appropriate. Small quantities of liquid waste are usually absorbed and then allowed to dry and shipped as dry active waste (DAW).

DAW will be placed in an approved transport container, surveyed to ensure it meets all applicable U.S. Department of Transportation criteria, and shipped to an off-site facility for disposal. Radiological DAW will be disposed of at an approved permitted disposal facility.

3.8.1.10 Transportation of Radioactive Waste

Subparagraph 10 CFR 51.52(a)(5) requires that the mode of transport of low-level radioactive waste be either truck or rail. PEC will ship radioactive waste from the HAR and the alternative sites by truck.

Radioactive waste shipments are subject to a weight limitation of 73,000 pounds per truck and 100 tons per cask per rail car. Radioactive waste from the AP1000 will be shipped in compliance with federal and state weight restrictions.

3.8.1.11 Number of Truck Shipments

Table S-4 (see Table 3.8-1) limits traffic density to less than one truck shipment per day or three rail cars per month. The number of truck shipments that will be required, assuming that all radioactive materials (fuel and waste) are received at the site or transported off-site via truck, was estimated, and a discussion below is provided.

Table 3.8-2 summarizes the number of truck shipments of unirradiated fuel. The table also normalizes the number of shipments to the electrical output for the reference LWR analyzed in WASH-1238. When normalized for electrical output, the number of truck shipments of unirradiated fuel for the AP1000 is less than the number of truck shipments estimated for the reference LWR.

For the AP1000, the initial core load is estimated at 84.5 MTU per unit, and the annual reload requirements are estimated at 24 MTU per year per unit. This equates to approximately 157 fuel assemblies in the initial core (assuming 0.5383 MTU per fuel assembly) and 43 fuel assemblies per year for refueling. The vendor is designing a transportation container that will accommodate one 4.3-m (14-ft.) fuel bundle. Due to weight limitations, the number of such containers will be limited to seven to eight per truck shipment. For the initial core load, the trucks are assumed to carry seven containers to allow for shipment of core components and the fuel assemblies. Truck shipments will be able to accommodate eight containers per shipment for refueling. The number of new fuel truck shipments equates to 23 for the initial core loading and 5.3 for annual reloads.

The numbers of spent fuel shipments were estimated as follows: For the reference LWR analyzed in WASH-1238, the NRC assumed that 60 shipments per year will be made, each carrying 0.5 MTU of spent fuel. This amount is equivalent to the annual refueling requirement of 30 MTU per year for the reference LWR. For this transportation analysis, PEC assumed that the AP1000 will also ship spent fuel at a rate equal to the annual refueling requirement. The shipping cask capacities used to calculate annual spent fuel shipments were assumed to be the same as those for the reference LWR (0.5 MTU per legal weight truck shipment). This results in 46 shipments per year for one AP1000. After normalizing for electrical output, the number of spent fuel shipments is 39 per year for the AP1000. The normalized spent fuel shipments for the AP1000 will be less than the reference LWR that was the basis for Table S-4.

Table 3.8-3 presents estimates of annual waste volumes and numbers of truck shipments. The values are normalized to the reference LWR analyzed in WASH-1238. The normalized annual waste volumes and waste shipments for the AP1000 will be less than the reference LWR that was the basis for Table S-4.

The total number of truck shipments of fuel and radioactive waste to and from the reactor is estimated at 65 per year for the AP1000. These radioactive material transportation estimates are well below the one truck shipment per day condition given in 10 CFR 51.52, Table S-4.

Doubling the estimated number of truck shipments to account for empty return shipments still results in a number of shipments well below the one truck shipment per day condition.

3.8.1.12 Summary

Table 3.8-4 summarizes the reference conditions in paragraph (a) of 10 CFR 51.52 for use of Table S-4 and the values for the AP1000. The AP1000 does not meet the conditions for average fuel enrichment or average fuel irradiation. Therefore, ER Subsection 3.8.2 and ER Section 7.4 present additional analyses of fuel transportation effects for normal conditions and accidents, respectively. Transportation of radioactive waste met the applicable conditions in 10 CFR 51.52 and no further analysis is required.

3.8.2 INCIDENT-FREE TRANSPORTATION IMPACTS ANALYSIS

Environmental impacts of incident-free transportation of fuel are discussed in this section. Transportation accidents are discussed in ER Section 7.4.

In NUREG-1811, NUREG-1815, and NUREG-1817, the NRC analyzed the transportation of radioactive materials in its assessments of environmental impacts for the proposed ESP sites at North Anna, Clinton, and Grand Gulf, respectively. The NRC analyses were reviewed for guidance in assessing transportation impacts for the HAR site and alternative sites.

In many cases, the assumptions used by the NRC are "generic" (that is, independent of the reactor technology). For example, the radiation dose rate associated with fuel shipments is based on the regulatory limit rather than the fuel characteristics or packaging. PEC used these same generic assumptions in assessing transportation impacts for unirradiated fuel shipments to the HAR and alternative sites.

3.8.2.1 Transportation of Unirradiated Fuel

Table S-4 (see Table 3.8-1) includes conditions related to radiological doses to transport workers and members of the public along transport routes. These doses, based on calculations in WASH-1238, are a function of the radiation dose rate emitted from the unirradiated fuel shipments, the number of exposed individuals and their locations relative to the shipment, the time of transit (including travel and stop times), and the number of shipments to which the individuals are exposed. In its assessments of environmental impacts for proposed ESP sites, the NRC calculated the radiological dose impacts of unirradiated fuel transportation using the radioactive material transportation (RADTRAN) 5 computer code.

The RADTRAN 5 calculations estimated worker and public doses associated with annual shipments of unirradiated fuel. One of the key assumptions in WASH-1238 for the reference LWR unirradiated fuel shipments is that the radiation dose rate at 1 m (3.28 ft.) from the transport vehicle is approximately 1.0E-03 milliSeiverts (mSv) per hour (0.1 milliRoentgen equivalent man [mrem] per hour). This assumption was also used by the NRC to analyze ALWR unirradiated fuel shipments for proposed ESP sites. This assumption is reasonable for all of the ALWR types because the fuel materials will all be low-dose rate uranium radionuclides and will be packaged similarly (inside a metal container that provides little radiation shielding). The per-shipment dose estimates are "generic" (that is, independent of reactor technology) because they were calculated based on an assumed external radiation dose rate rather than the specific characteristics of the fuel or packaging. Thus, the results can be used to evaluate the impacts for any of the ALWR designs.

For shipments from fuel fabrication facility sites, highway routes were analyzed using the routing computer code Transportation Routing Analysis Geographic Information System (TRAGIS) (Reference 3.8-002) and 2000 U.S. Census data.

Routes were estimated by minimizing the total impedance of a route, which is a function of distance and driving time between the origin and destination. TRAGIS can also estimate routes that maximize the use of interstate highways. For unirradiated fuel, the commercial route setting was used to generate highway routes generally used by commercial trucks. However, the routes chosen may not be the actual routes used in the future. The population summary module of the TRAGIS computer code was used to determine the exposed populations within 800 m (2624 ft.) (that is, 0.8 km [0.5 mi.] on either side) of the route. Unirradiated fuel for the AP1000 could be manufactured at facilities located in Wilmington, North Carolina; Columbia, South Carolina; or Lynchburg, Virginia. Because it is currently unknown which of these facilities would be used, the Lynchburg facility was evaluated to

bound the radiological impacts because the distances to that facility would be greater than the other facilities. In addition to the HAR site near New Hill, North Carolina, three alternate sites were evaluated. These sites and starting locations are shown in Table 3.8-5. Summary data for unirradiated fuel are provided in Table 3.8-6.

Other input parameters used in the radiation dose analysis for ALWR unirradiated fuel shipments are summarized in Table 3.8-6. The results for this "generic" fresh fuel shipment based on the RADTRAN 5 analyses are provided in Table 3.8-7.

These unit dose values were used to estimate the impacts of transporting unirradiated fuel to the HAR and alternative sites. Based on the parameters used in the analysis, these per-shipment doses are expected to conservatively estimate the impacts for fuel shipments to a site in PEC's region of interest. For example, the average shipping distance of 3139 km (2000 mi.) used in the NRC analyses exceeded the shipping distance for fuel deliveries to the HAR and alternative sites (306 km [190 mi.] to 526 km [327 mi.]).

The unit dose values were combined with the average number of annual shipments of unirradiated fuel to calculate annual doses to the public and workers that can be compared to Table S-4 conditions.

The number of unirradiated fuel shipments was normalized to the reference LWR analyzed in WASH-1238. The number of shipments per year was obtained from Table 3.8-2. The results are presented in Table 3.8-8. As shown, the calculated radiation doses for transporting unirradiated fuel to the HAR and alternative sites are within the conditions presented in Table S-4 (see Table 3.8-1).

Draft NUREG-1872 provides the following information:

> Although radiation may cause cancers at high doses and high dose rates, there are currently no data that unequivocally establish the occurrence of cancer following exposure to low doses below about 100 mSv (10,000 mrem) and at low dose rates. However, radiation protection experts conservatively assume that any amount of radiation may pose some risk of causing cancer or a severe hereditary effect and that the risk is higher for higher radiation exposures. Therefore, a linear, no-threshold dose response relationship is used to describe the relationship between radiation dose and detriments such as cancer induction. A recent report by the National Research Council (2006), the BEIR VII report, supports the linear, no-threshold dose response theory. Simply stated, any increase in dose, no matter how small, results in an incremental increase in health risk. This theory is accepted by the NRC as a conservative model for estimating health risks from radiation exposure, recognizing that the model probably overestimates those risks.
> Based on this model, the staff estimates the risk to the public from radiation exposure using the nominal probability coefficient for total detriment (730 fatal cancers, nonfatal cancers, and severe hereditary effects per 10,000 [person-Sieverts] person-Sv [1,000,000 [person-roentgen equivalent man] person-rem) from [International Commission on Radiation Protection] ICRP Publication 60 (ICRP 1991).

All of the public doses presented in Table 3.8-8 are less than 1E-03 person-Sv (1E-01 person-rem) per year; therefore, the total detriment estimates associated with these doses will each be less than 1E-04 fatal cancers, nonfatal cancers, and severe hereditary effects

per year. These risks are very small compared to the fatal cancers, nonfatal cancers, and severe hereditary effects that the same population will incur annually from exposure to natural sources of radiation.

3.8.2.2 Transportation of Spent Fuel

This subsection discusses the environmental impacts of transporting spent fuel from the HAR and alternative sites to a spent fuel disposal facility using Yucca Mountain, Nevada, as a possible location for a geologic repository. The impacts of the transportation of spent fuel to a possible repository in Nevada provides a reasonable bounding estimate of the transportation impacts to a monitored retrievable storage facility because of the distances involved and the representative exposure to members of the public in urban, suburban, and rural areas.

Draft NUREG-1872 provides the following information:

> Normal conditions, sometimes referred to as "incident-free" transportation, are transportation activities in which shipments reach their destination without an accident occurring enroute. Impacts from these shipments would be from the low levels of radiation that penetrate the heavily shielded spent fuel shipping cask. Radiation exposures would occur to (1) persons residing along the transportation corridors between the [HAR site and alternative sites] and the proposed repository location; (2) persons in vehicles traveling on the same route as a spent fuel shipment; (3) persons at vehicle stops for refueling, rest, and vehicle inspections; and (4) transportation crew workers.

This analysis is based on shipment of spent fuel by legal-weight trucks in casks with characteristics similar to casks currently available (that is, massive, heavily shielded, cylindrical metal pressure vessels). Each shipment is assumed to consist of a single shipping cask loaded on a modified trailer. These assumptions are consistent with assumptions made in the evaluation of environmental impacts of spent fuel transportation in Addendum 1 to NUREG-1437. As discussed in NUREG-1437, the assumption of using legal-weight trucks is a conservative assumption because the alternative, using heavy-haul trucks, would require fewer shipments.

In its assessments of proposed ESP sites, the NRC calculated the environmental impacts of spent fuel transportation using the RADTRAN 5 computer code (Reference 3.8-003). Routing and population data used in the RADTRAN 5 for truck shipments were obtained from the TRAGIS routing code (Reference 3.8-002). The population data in the TRAGIS code were based on 2000 U.S. Census data. For fresh fuel, the commercial routing option was used with the following constraints:

- Prohibit use of links prohibiting truck use.
- Prohibit use of ferry crossing.
- Prohibit low height clearance.
- Prohibit narrow width clearance.
- Prohibit use of roads with hazardous materials prohibition.

- Prohibit use of roads with radioactive materials prohibition.
- Prohibit use of roads with tunnels.

For spent fuel, the highway route controlled option was selected with the following constraints:

- Prohibit use of links prohibiting truck use.
- Prohibit use of ferry crossing.
- Prohibit low height clearance.
- Prohibit narrow width clearance.
- Prohibit use of roads with radioactive materials prohibition.
- Prohibit use of roads with tunnels.
- Las Vegas Beltway is considered a preferred route.

Although shipping casks have not been designed for the ALWR fuels, the ALWR fuel designs will not be significantly different from existing LWR designs. Current shipping cask designs were used for analysis.

Radiation doses are a function of many parameters, including vehicle speed, traffic count, dose rate at 1 m (3.3 ft) from the vehicle, packaging dimensions, number in the truck crew, stop time, and population density at stops. A listing of the values for the parameters used in the NRC analyses can be found in Appendices G and H of NUREG-1811, NUREG-1815, and NUREG-1817.

The transportation route selected for a shipment determines the total potentially exposed population and the expected frequency of transportation-related accidents. For truck transportation, the route characteristics most important to the risk assessment include the total shipping distance between each origin-destination pair of sites and the population density along the route.

Representative shipment routes for the HAR and alternative sites were identified using the TRAGIS (Version 4.6.2) routing model (Reference 3.8-002) for the truck shipments. The highway data network in Web-TRAGIS is a computerized road atlas that includes a complete description of the interstate highway system and of all U.S. highways. The population densities along a route are derived from 2000 U.S. Census data. This transportation route information is summarized in Table 3.8-9. Other input parameters used in the radiation dose analysis for ALWR spent nuclear fuel shipments are summarized in Table 3.8-10. The results for the incident-free spent fuel shipments are presented in Table 3.8-11.

These per-shipment dose estimates are independent of reactor technology because they were calculated based on an assumed external radiation dose rate emitted from the cask, which was fixed at the regulatory maximum of 10 mrem per hour at 2 m (6.6 ft.). For purpose of this analysis, the transportation crew consists of two drivers. Stop times were assumed to accrue at the rate of 30 minutes per 4-hour driving time.

The number of spent fuel shipments for the transportation impacts analysis was derived as described in ER Subsection 3.8.1. The normalized annual shipment values and corresponding population dose estimates per RRY are presented in Table 3.8-12. The population doses were calculated by multiplying the number of spent fuel shipments per year for the AP1000 by the per-shipment doses. For comparison to Table S-4, the population doses were normalized to the reference LWR analyzed in WASH-1238.

As shown in Table 3.8-12, population doses to the transport crew and the onlookers for both the AP1000 and the reference LWR exceed Table S-4 values.
As noted in NUREG-1811, NUREG-1815, and NUREG-1817, two key reasons for these higher population doses relative to Table S-4 are the number of spent fuel shipments and the shipping distances assumed for these analyses relative to the assumptions used in WASH-1238:

- The analyses in WASH-1238 used a "typical" distance for a spent fuel shipment of 1609 km (1000 mi.) The shipping distances used in this assessment were between 4400 and 4900 km (2734 and 3045 mi.), as presented in Table 3.8-9.

- The number of spent fuel shipments are based on shipping casks designed to transport shorter-cooled fuel (that is, 150 days out of the reactor). This analysis assumed that the shipping cask capacities are 0.5 MTU per legal-weight truck shipment. Newer cask designs are based on longer-cooled spent fuel (that is, 5 years out of reactor) and have larger capacities. For example, spent fuel shipping cask capacities used in the analysis were approximately 1.8 MTU per legal-weight truck shipment.

Use of the newer shipping cask designs will reduce the number of spent fuel shipments and decrease the associated environmental impacts (because the dose rates used in the impacts analysis are fixed at the regulatory limit rather than actual dose rates based on the cask design and contents).

If the population doses in Table S-4 (see Table 3.8-1) were adjusted for the longer shipping distance and larger shipping cask capacity, the population doses from incident-free spent fuel transportation from the HAR and the alternative sites would probably fall within Table S-4 requirements.

Other conservative assumptions in the spent fuel transportation impacts calculation include:

- The shipping casks assumed in the Yucca Mountain Environmental Impact Statement (EIS) (Reference 3.8-004) transportation analyses were designed for spent fuel that has cooled for 5 years. In reality, most spent fuel will have cooled for much longer than 5 years before it is shipped to a possible geologic repository. The NRC developed a probabilistic distribution of dose rates based on fuel cooling times that indicates that approximately three-fourths of the spent fuel to be transported to a possible geologic repository will have dose rates less than half of the regulatory limit (NUREG/CR-6672, Volume 1). Consequently, the estimated doses in Table 3.8-12 could be divided in half if more realistic dose rate projections are used for spent fuel shipments from the HAR and the alternative sites.

- The average time at a truck stop was assumed to be 30 minutes. Many stops made for actual spent fuel shipments are short-duration stops (10 minutes) for brief visual

inspections of the cargo (checking the cask tie-downs). These stops typically occur in minimally populated areas, such as an overpass or freeway ramp in an unpopulated area. Based on data for actual truck stops, the NRC concluded that the assumption of a 30-minute stop for every 4 hours of driving time used to evaluate other potential ESP sites will overestimate public doses at stops by at least a factor of two (NUREG-1811, NUREG-1815, and NUREG-1817).

Consequently, the doses to onlookers presented in Table 3.8-12 could be reduced by half to reflect more realistic truck shipping conditions.

The environmental impact of incident-free transportation of unirradiated and spent fuel is anticipated to be SMALL and does not warrant additional mitigation.

3.8.3 REFERENCES

3.8-001 Idaho National Engineering and Environmental Laboratory, "Early Site Permit ER Sections and Supporting Documentation," Engineering Design File Number 3747, 2003.

3.8-002 Johnson, P. E. and R. D. Michelhaugh, *Transportation Routing Analysis Geographic Information System (TRAGIS) User's Manual*, Oak Ridge National Laboratory, ORNL/NTRC-006, Revision 0, June 2003.

3.8-003 Neuhauser, K. S. and F. L. Kanipe, *RADTRAN 5 User Guide*, Sandia National Laboratories, SAND2003-2354, July 2003.

3.8-004 U.S. Department of Energy, *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*, DOE/EIS-0250, February 2002.

3.8-005 Jason Technologies Corporation, "Transportation Health and Safety Calculation/Analysis Documentation in Support of the Final EIS for the Yucca Mountain Repository," Prepared for U.S. Department of Energy, CAL-HSS-ND-000003, December 2001.

3.8-006 U.S. Department of Energy, *A Resource Handbook on DOE Transportation Risk Assessment*, DOE/EM/NTP/HB-01, July 2002.

3.8-007 Neuhauser, K.S. and F.L. Kanipe, *RADTRAN 5 User Guide*, Sandia National Laboratories, SAND2000-1257, May 2000.

3.8-008 Weiner, Ruth F., Douglas M. Osborn, Daniel Hinojosa, Terence J. Heames, Janelle Penisten, and David Orcutt, *RADCAT 2.3 User Guide*, SAND2006-6315, Sandia National Laboratories, December 2007 (includes RADTRAN 5.6).

Table 3.8-1 (Sheet 1 of 2)
Summary Table S-4 — Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor

Normal Conditions of Transport

	Environmental Impact
Heat (per irradiated fuel cask in transport)	250,000 Btu/hr
Weight (governed by federal or state restrictions)	73,000 lb. per truck; 100 tons per cask per rail car
Traffic density:	
Truck	Less than 1 per day
Rail	Less than 3 per month

Exposed Population	Estimated Number of Persons Exposed	Range of Doses to Exposed Individuals (per reactor year) [a]	Cumulative Dose to Exposed Population (per reactor year) [b]
Transportation workers	200	0.01 to 300 mrem	4 person-rem.
General public:			
Onlookers	1100	0.003 to 1.3 mrem	3 person-rem.
Along route	600,000	0.0001 to 0.06 mrem	

Accidents in Transport

Types of Effects	Environmental Risk
Radiological effects	Small[c]
Common (nonradiological) causes	1 fatal injury in 100 reactor years 1 nonfatal injury in 10 reactor years $475 property damage per reactor year

Notes:

Data supporting this table are given in the Commission's "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," WASH-1238, December 1972, and Supp. 1 NUREG-75/038 April 1975.

a) The Federal Radiation Council has recommended that the radiation doses from the sources of radiation other than natural background and medical exposures should be limited to 5000 mrem per year for individuals as a result of occupational exposure and should be limited to 500 mrem per year for individuals in the general population. The dose to individuals due to average natural background radiation is about 130 mrem per year.

b) Person-rem is an expression for the summation of whole body doses to individuals in a group. Thus, if each member of a population group of 1000 people were to receive a dose of 0.001 rem (1 mrem), or if two people were to receive a dose of 0.5 rem (500 mrem) each, the total person-rem dose in each case would be 1 person-rem.

Table 3.8-1 (Sheet 2 of 2)
Summary Table S-4 — Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor

Notes (continued):

c) Although the environmental risk of radiological effects stemming from transportation accidents is currently incapable of being numerically quantified since a specific reactor has not been selected, the risk remains small regardless of whether it is being applied to a single reactor or a multireactor site.

Btu/hr = British thermal units per hour
lb. = pound
mrem = milliRoentgen equivalent man
person-rem = person-roentgen equivalent man
rem = roentgen equivalent man

Table 3.8-2
Number of Truck Shipments of Unirradiated Fuel (One AP1000 Unit)

Reactor Type	Number of Shipments per Unit			Unit Electric Generation (MWe)[c]	Capacity Factor[c]	Normalized Shipments Total[d]	Normalized Shipments Annual[e]
	Initial Core[a]	Annual reload	Total[b]				
Reference LWR	18[f]	6.0	252	1100	0.8	252	6.3
AP1000	23[g]	5.3[g]	230	1115	0.93[h]	196	4.9

Notes:

a) Shipments of the initial core have been rounded up to the next highest whole number.

b) Total shipments of fresh fuel over 40-year plant lifetime (initial core load plus 39 years of average annual reload quantities).

c) Unit generating capacities from the DCD and an assumed capacity factor.

d) Normalized to electric output for WASH-1238 reference plant (1100-MWe plant at 80 percent or an electrical output of 880 MWe).

e) Annual average for 40-year plant lifetime.

f) The initial core load for the reference boiling water reactor in WASH-1238 was 150 metric tons of uranium (MTU). The initial core load for the reference pressurized water reactor was 100 MTU. Both types result in 18 truck shipments of fresh fuel per reactor.

g) Initial core load of 157 assemblies required and 43 per year for refueling. Assume 7 assemblies/shipments for initial loading and 8 assemblies/shipments for annual reload.

h) Capacity factor was assumed.

LWR = light water reactor
MWe = megawatt electric

Table 3.8-3
Number of Radioactive Waste Shipments (One AP1000 Unit)

Reactor Type	Waste Generation, ft^3/yr, per unit	Annual Waste Volume, ft^3/yr, per site	Electrical Output, MWe, per site	Capacity Factor	Normalized Waste Generation Rate, $ft.^3$ per reactor-year[a]	Normalized Shipments/ reactor-year[b]
Reference LWR	3800	3800	1100	0.80	3800	46
AP1000	1964	3928	2230[c]	0.93	1667	21

Notes:

a) Annual waste generation rates normalized to equivalent electrical output of 880 MWe for reference LWR (1100-MWe plant with an 80 percent capacity factor) analyzed in WASH-1238.

b) The number of shipments was calculated assuming the average waste shipment capacity of 83 $ft.^3$ per shipment (3800 ft^3/yr divided by 46 shipments per year) used in WASH-1238.

c) The AP1000 site includes two reactor units at a net of 1115 MWe per unit.

LWR = light water reactor
$ft.^3$ = cubic foot
ft^3/yr = cubic feet per year
MWe = megawatt electric

Table 3.8-4 (Sheet 1 of 2)
AP1000 Comparisons to Table S-4 Reference Conditions

Characteristic	Table S-4 Condition	AP1000 Single Unit
Reactor Power Level (MWt)	Not exceeding 3800 per reactor	3415 (AP1000 core thermal = 3400 MWt + RCP heat addition = 15 MWt for a total thermal power output of 3415 MWt)
Fuel Form	Sintered UO_2 pellets	Sintered UO_2 pellets
U-235 Enrichment (%)	Not exceeding 4	Initial Core Region 1: 2.35 Region 2: 3.40; Region 3: 4.45 Reload Average 4.51
Fuel Rod Cladding	Zircaloy rods; NRC has also accepted ZIRLO™ per 10 CFR 50.46	Zircaloy or ZIRLO™
Average burnup (MWd/MTU)	Not exceeding 33,000	Peak-62,000
Unirradiated Fuel		
Transport Mode	Truck	Truck
No. of shipments for initial core loading [(a)]	--	23
No. of reload shipments per year [(a)]	--	5.3
Irradiated Fuel		
Transport mode	Truck, rail, or barge	Truck, rail
Decay time prior to shipment	Not less than 90 days is a condition for use of Table S-4; 5 years is per contract with DOE	Minimum of 5 years
No. of spent fuel shipments by truck [(a)]	--	39 per year
No. of spent fuel shipments by rail	--	Not analyzed
Radioactive Waste		
Transport mode	Truck or rail	Truck
Waste form	Solid	Solid
Packaged	Yes	Yes
No. of waste shipments by truck [(a)]	--	21 per year
Traffic Density		
Trucks per day [(b)]	Less than 1	<1
(normalized total)	--	(65 per year)

Table 3.8-4 (Sheet 2 of 2)
AP1000 Comparisons to Table S-4 Reference Conditions

Characteristic	Table S-4 Condition	AP1000 Single Unit
Rail cars per month	Less than 3	Not analyzed

Notes:

a) Table 3.8-2 provides the total numbers of truck shipments of fuel and waste for the AP1000. The values presented are normalized based on electric output and summed for comparison to the traffic density condition in Table S-4 (see Table 3.8-1).

b) Total truck shipments per year calculated after normalization of estimated fuel and waste shipments for equivalent electrical output to the reference reactor analyzed in WASH-1238.

MWd/MTU = megawatt days per metric ton of uranium
MWe = megawatt electric
MWt = megawatt thermal
U-235 = uranium-235
UO_2 = uranium dioxide

Table 3.8-5
Primary and Alternative Sites for the HAR COLA

Site	Location	TRAGIS Origin Location
HAR	New Hill, NC	HARRIS NP (NC)
BNP	Southport, NC	SOUTHPORT (NC)
RNP	Hartsville, SC	HARTSVILLE (SC)
Marion County	Proprietary	Proprietary

Table 3.8-6 (Sheet 1 of 2)
RADTRAN 5 Input Parameters for HAR Analysis of Unirradiated Fuel Shipments

Parameter	Parameter Value	Comments and Reference
Package		
Package dimension	11.76 m	Approximate length of two LWR Traveller XLs at 226 inches each.
Dose rate at 1 m from vehicle	0.1 mrem per hour	WASH-1238
Fraction of emitted radiation that is gamma	0.5	Assumed the same as for spent nuclear fuel (Reference 3.8-005)
Fraction of emitted radiation that is neutrons	0.5	Assumed the same as for spent nuclear fuel (Reference 3.8-005)
Crew		
Number of crew	2	WASH-1238 and Reference 3.8-006
Distance from source to crew	3.1 m	Reference 3.8-007
Crew shielding factor	1.0	No shielding - Analytical assumption
Route-specific parameters		
Rural Suburban Urban	88.49 kilometers per hour	Average speed in rural areas (Reference 3.8-006). Conservative in-transit speed of 55 miles per hour assumed: predominately interstate highways used.
Number of people per vehicle sharing route	1.5	Reference 3.8-006
One-way traffic volumes		
Rural	Varies by State	Reference 3.8-008 [(a)]
Suburban	Varies by State	Reference 3.8-008 [(a)]
Urban	Varies by State	Reference 3.8-008 [(a)]
Minimum and maximum distances to exposed resident off-link population	10 to 800 m	NUREG/CR-6672

Table 3.8-6 (Sheet 2 of 2)
RADTRAN 5 Input Parameters for HAR Analysis of Unirradiated Fuel Shipments

Parameter	Parameter Value	Comments
Distances (km)/Population densities (persons per km^2)		
HAR		
Rural	15.7/184.7	Reference 3.8-002
Suburban	383.5/115.9	Reference 3.8-002
Urban	1895.4/5.4	Reference 3.8-002
BNP		
Rural	17.1/364.7	Reference 3.8-002
Suburban	321.4/152.6	Reference 3.8-002
Urban	2156.5/8.2	Reference 3.8-002
RNP		
Rural	17.8/243.8	Reference 3.8-002
Suburban	313.9/156.1	Reference 3.8-002
Urban	1916.7/8.3	Reference 3.8-002
Marion County		
Rural	18.1/251.2	Reference 3.8-002
Suburban	322.7/173.4	Reference 3.8-002
Urban	1897.1/9.5	Reference 3.8-002
Truck Stop Parameters		
Min/Max radii of annular area around vehicle at stops	1 to 10 m	NUREG/CR-6672
Population density at stops	30,000 persons/km^2	NUREG/CR-6672
Shielding factor applied to annular area around vehicle at stops	1.0	NUREG/CR-6672
Min/Max radii of annular area around truck stop	10 to 800 m	NUREG/CR-6672
Population density surrounding truck stops	340 persons/km^2	NUREG/CR-6672
Shielding factor applied to area around truck stop	0.2	NUREG/CR-6672
Stop time	30 minutes per 4 hour driving time	NUREG/CR-6672
Shipments per year	4.9 Normalized	See Table 3.8-2

Notes:
a) Appendix D, Table D-3 and D-7

km = kilometer
km^2 = square kilometer
LWR = light water reactor
m = meter
mrem = milliRoentgen equivalent man

Table 3.8-7
Radiological Impacts of Transporting Unirradiated Fuel to the HAR and Alternative Sites by Truck (One AP1000 Unit)

Population Component	Dose (person-rem per shipment)			
	HAR	BNP	RNP	Marion Co.
Transport workers	1.66E-04	2.86E-04	2.22E-04	2.36E-04
General public (Onlookers – persons at stops and sharing the highway)	1.26E-04	7.52E-04	7.21E-04	7.35E-04
General public (Along Route – persons living near a highway)	1.91E-05	2.26E-05	2.16E-05	2.45E-05

Notes:

person-rem = person-roentgen equivalent man

Table 3.8-8
Radiological Impacts of Transporting Unirradiated Fuel to the HAR and Alternative Sites by Truck as Compared to the Reference LWR (One AP1000 Unit)

Reactor Type	Normalized Average Annual Shipments	Cumulative Annual Dose (person-rem per RRY) [a]		
		Transport Workers	General Public-Onlookers	General Public-Along Route
Reference LWR	6.3	1.10E-02	4.20E-02	1.00E-03
HAR	4.9	8.13E-04	6.17E-04	9.36E-05
BNP	4.9	1.40E-03	3.68E-03	1.11E-04
RNP	4.9	1.09E-03	3.53E-03	1.06E-04
Marion County	4.9	1.16E-03	3.60E-03	1.20E-04
10 CFR 51.52	365	4.00E+00	3.00E+00	3.00E+00
Table S-4 Condition	< 1 per day	--	--	--

Notes:

a) Table values for the HAR were calculated by multiplying Table 3.8-7 values by the number of shipments.

LWR = light water reactor

person-rem = person-roentgen equivalent man

RRY = reference reactor year

Table 3.8-9
Transportation Route Information for Spent Fuel Shipments from the HAR and Alternative Sites to the Potential Yucca Mountain Disposal Facility

Reactor Site	One-Way Shipping Distance (km)				Population Densities (people/km^2)			Stop Time per Trip (hours)
	Total	Rural	Suburban	Urban	Rural	Suburban	Urban	
HAR	4294.0	3310.3	893.4	90.5	9.8	335.9	2174.5	5.0
BNP	4526.7	3480.9	950.8	95.3	10.1	332.6	2175.7	5.5
RNP	4234.3	3349.4	802.3	82.9	9.6	315.3	2209.2	5.0
Marion County	4272.2	3368.1	821.3	83.0	9.7	313.0	2208.6	5.0

Notes:

km = kilometer

km^2 = square kilometer

Table 3.8-10
RADTRAN 5 Input Parameters for HAR Analysis of Spent Nuclear Fuel Shipments

Parameter	Parameter Value	Comments and Reference
Package		
Package dimension	5.82 m	Plus 2 ft. (Reference 3.8-006)
Dose rate at 1 meter from vehicle	14 mrem per hour	Approximate dose at 1 m that is equal to the legal limit of 10 mrem per hour at 2 m (WASH-1238)
Fraction of emitted radiation that is gamma	0.5	Reference 3.8-005
Fraction of emitted radiation that is neutrons	0.5	Reference 3.8-005
Crew		
Number of crew	2	WASH-1238 and Reference 3.8-006
Distance from source to crew	3.1 m	Reference 3.8-007
Crew shielding factor	1.0	Analytical assumption. Results in dose rate to crew greater than legal limit. Crew dose rate reset by RADTRAN to 2 mrem per hour
Route-specific parameters		
Rural Suburban Urban	88.49 kilometers per hour	Average speed in rural areas given in Reference 3.8-006. Conservative in-transit speed of 55 miles per hour assumed: predominately interstate highways used.
Number of people per vehicle sharing route	1.5	Reference 3.8-006
One-way traffic volumes		
Rural	Varies by State	Reference 3.8-008 [(a)]
Suburban	Varies by State	Reference 3.8-008 [(a)]
Urban	Varies by State	Reference 3.8-008 [(a)]
Minimum and maximum distances to exposed resident off-link population	10 to 800 m	NUREG/CR-6672
Shipments per year per reactor	46 Average 39 normalized	See Table 3.8-2

Notes: a) Appendix D, Table D-3 and D-7

ft. = foot

m = meter

mrem = milliRoentgen equivalent man

Table 3.8-11
Radiological Impacts of Transporting Spent Fuel from the HAR and Alternative Sites by Truck to the Potential Yucca Mountain Disposal Facility (One AP1000 Unit)

Population Component	Dose (person-rem per shipment)			
	HAR	BNP	RNP	Marion Co.
Transport workers	1.96E-01	2.06E-01	1.93E-01	1.95E-01
General public (Onlookers – persons at stops and sharing the highway)	4.53E-01	4.93E-01	4.49E-01	4.50E-01
General public (Along Route – persons living near a highway)	8.69E-03	9.19E-03	7.48E-03	7.60E-03

Notes:

person-rem = person-roentgen equivalent man

Table 3.8-12
Population Doses from Spent Fuel Transportation, Normalized to Reference LWR

Reactor Site	Exposed Population	Cumulative Dose Limit Specified in Table S-4 (person-rem per RRY)	Reactor Type: Reference LWR — Number of Spent Fuel Shipments per Year: 60 — Environmental Effects (person-rem per RRY) [b]	Reactor Type: One AP1000 Unit — Number of Spent Fuel Shipments per Year: 39 [a] — Environmental Effects (person-rem per RRY) [b]
HAR	Crew	4	5.90E+00	7.64E+00
	Onlookers	3	2.10E+01	1.77E+01
	Along Route	3	6.00E-01	3.39E-01
BNP	Crew	4	5.90E+00	8.03E+00
	Onlookers	3	2.10E+01	1.92E+01
	Along Route	3	6.00E-01	3.58E-01
RNP	Crew	4	5.90E+00	7.53E+00
	Onlookers	3	2.10E+01	1.75E+01
	Along Route	3	6.00E-01	2.92E-01
Marion County	Crew	4	5.90E+00	7.61E+00
	Onlookers	3	2.10E+01	1.76E+01
	Along Route	3	6.00E-01	2.96E-01

Notes:

a) This value is normalized.

b) Table values for the HAR were calculated by multiplying Table 3.8-11 values by the number of shipments, in this case 39.

LWR = light water reactor
person-rem = person-roentgen equivalent man
RRY = reference reactor year

7.4 TRANSPORTATION ACCIDENTS

The advanced light water reactor (ALWR) technology being considered for the HAR and alternative sites (Brunswick Nuclear Power Plant (BNP), H.B. Robinson Nuclear Power Plant (RNP) and Marion County [refer to ER Subsection 9.3.2]) is the AP1000. The configuration for this new nuclear power generating facility is two units. A single AP1000 unit was used to evaluate transportation impacts in ER Section 3.8 and the accidents from transportation in this section relative to the reference light water reactor (LWR) in WASH-1238.

Subparagraphs 10 CFR 51.52(a)(1) through (5) delineate specific conditions the reactor licensee must meet to use Table S-4 (reproduced in this ER as Table 3.8-1) as part of its ER. For reactors not meeting all of the conditions in paragraph (a) of 10 CFR 51.52, paragraph (b) of 10 CFR 51.52 requires a further analysis of the transportation effects.

The conditions in paragraph (a) of 10 CFR 51.52 establishing the applicability of Table S-4 are reactor core thermal power, fuel form, fuel enrichment, fuel encapsulation, average fuel irradiation, time after discharge of irradiated fuel before shipment, mode of transport for unirradiated fuel, mode of transport for irradiated fuel, radioactive waste form and packaging, and mode of transport for radioactive waste other than irradiated fuel.

Based on comparison of the AP1000 characteristics to the criteria listed in 10 CFR 51.52(a), the AP1000 does not meet the following two evaluation criteria (as discussed in ER Subsections 3.8.1.3 and 3.8.1.5, respectively):

- Subparagraph 10 CFR 51.52(a)(2) requires that the reactor fuel have a uranium-235 (U-235) enrichment not exceeding 4 percent by weight. As noted in DCD Table 4.1-1, for the AP1000, the enrichment of the initial core varies by region from 2.35 to 4.45 percent, and the average for reloads is 4.51 percent. The AP1000 fuel exceeds the 4 percent U-235 condition.

- Subparagraph 10 CFR 51.52(a)(3) requires that the average burnup not exceed 33,000 megawatt days per metric ton of uranium (MWd/MTU). According to the DCD, the AP1000 has an average maximum burnup of 60,000 MWd/MTU for the peak rod. The extended burnup is 62,000 MWd/MTU. Therefore, the AP1000 does not meet this subsequent evaluation condition.

Because the AP1000 does not meet all criteria set forth in Table S-4, a subsequent analysis was performed for the HAR and the alternative sites that is used as the supporting basis for ER Section 3.8 and this section.

ER Section 3.8 addresses issues associated with the transportation of radioactive materials from the HAR and alternative sites. This section addresses accidents associated with the shipment of unirradiated and spent fuel.

7.4.1 TRANSPORTATION OF UNIRRADIATED FUEL

Accidents involving unirradiated fuel shipments are addressed in Table S-4 of 10 CFR 51.52(a) (see Table 3.8-1). The consequences of accidents that are severe enough to

result in a release of unirradiated particles to the environment from ALWR fuels are not significantly different from those for current generation LWRs. The fuel form, cladding, and packaging are similar to those LWRs analyzed in WASH-1238. Consequently, as described in the NRC's assessment of environmental impacts at the North Anna, Clinton, and Grand Gulf Early Site Permit (ESP) sites (NUREG-1811, NUREG-1815, and NUREG-1817, respectively), the NRC concluded that the overall transportation accident risks associated with advanced reactor spent fuel shipments are likely to be SMALL and are consistent with the risks associated with transportation of spent fuel from current generation reactor.

7.4.2 TRANSPORTATION OF SPENT FUEL

In its assessments of the proposed ESP sites, the NRC used the radioactive material transportation (RADTRAN) 5 computer code to estimate impacts of transportation accidents involving spent fuel shipments (Reference 7.4-001). As provided in Draft NUREG-1872, "RADTRAN 5 considers a spectrum of potential transportation accidents, ranging from those with high frequencies and low consequences (e.g., "fender benders") to those with low frequencies and high consequences (i.e., accidents in which the shipping container is exposed to severe mechanical and thermal conditions)."

The NRC conducted a screening analysis on the inventories reported in an Idaho National Engineering and Environmental Laboratory document entitled, "Early Site Permit ER Sections and Supporting Documentation," to select the dominant contributors to accident risks to simplify the RADTRAN 5 calculations (Reference 7.4-002). The screening identified the radionuclides that would contribute more than 99.999 percent of the dose from inhalation, and the results are reported in NUREG-1811, NUREG-1815, and NUREG-1817.

Radionuclide inventories are important parameters in the calculation of accident risks. The radionuclide inventories used in this analysis were taken directly from NUREG-1811, NUREG-1815, and NUREG-1817, with the exception of Cobalt-60 (Co-60), which is discussed below.

Co-60 inventories were taken directly from NUREG/CR-6672. The following discussion is from Section 7.2.3.5 of NUREG/CR-6672 and provides a discussion regarding the importance of including Co-60 in the overall source term:

> During reactor operation, corrosion products formed in the reactor's primary cooling system deposit on fuel assembly surfaces where elements in these deposits are activated by neutron bombardment. The resulting radioactive deposits are called CRUD. Due to vibratory loads during incident free transportation, impact loads during collision accidents, and thermal loads during accidents that lead to fires, portions of these radioactive deposits may spall from the rods. Then, if some of these spalled materials become airborne during an accident, their release to the atmosphere could contribute to the radiation exposures caused by the accident. Although CRUD contains a number of radionuclides, only Co-60 would contribute significantly to these radiation exposures. Since the CRUD deposits on typical [pressurized water reactor] PWR spent fuel rods typically contain 0.2 [Curies] Ci of Co-60 per rod and the generic PWR assemblies for which ORIGEN inventories were calculated contain respectively 289 spent fuel rods, the amounts of Co-60 produced by activation of

deposits on assembly surfaces is 57.8 Ci for the generic PWR assembly (115.6 [Curies per metric ton of uranium] Ci/MTU based on 0.5 MTU/assembly).

The spent fuel inventory used in this analysis for the AP1000 is presented in Table 7.4-1.

Massive shipping casks are used to transport spent fuel because of the radiation shielding and accident resistance required by 10 CFR 71. Spent fuel shipping casks must be certified Type B packaging systems, meaning they must withstand a series of severe hypothetical accident conditions with essentially no loss of containment or shielding capability. As noted in Draft NUREG-1872, "the probability of encountering accident conditions that would lead to shipping cask failure is less than 0.01 percent (i.e., more than 99.99 percent of all accidents would result in no release of radioactive material from the shipping cask). The staff assumed that shipping casks for Westinghouse AP1000 reactor spent fuel would provide equivalent mechanical and thermal protection of the spent fuel cargo."

The NRC performed the RADTRAN 5 accident risk calculations using unit radionuclide inventories (Ci/MTU) for the spent fuel shipments from the ALWRs. The resulting risk estimates were multiplied by the expected annual spent fuel shipments (metric tons of uranium per year [MTU/yr]) to derive estimates of the annual accident risks associated with spent fuel shipments from each potential ALWR. The amount of spent fuel shipped per year was assumed to be equivalent to the annual discharge quantity: 24 MTU/yr for the AP1000. This discharge quantity has not been normalized to the reference LWR. The normalized value is presented in Table 7.4-2. Information on how these values were calculated is presented in ER Section 3.8.

In the NRC's assessment of the proposed ESP sites, the NRC used the release fractions for current generation LWR fuels to approximate the impacts from the ALWR spent fuel shipments. This assumed that the fuel materials and containment systems (cladding and fuel coatings) behave similarly to current LWR fuel under applied mechanical and thermal conditions. For this analysis, the same release fractions were used to approximate the impacts from the AP1000 spent fuel shipments.

The shipping distances and population distribution information for the routes from the HAR and alternative sites were the same as those used for the "incident-free" transportation impacts analysis (described in ER Subsection 3.8.2).

Table 7.4-2 presents unit accident risks associated with transportation of spent fuel from the HAR and alternative sites to the proposed Yucca Mountain repository. The accident risks are provided in the form of a unit collective population dose (person-roentgen equivalent man [person-rem]). The table also presents estimates of accident risk per reference reactor year (RRY) normalized to the reference LWR analyzed in WASH-1238.

The estimated shipping distances from the HAR and alternative sites to the spent fuel disposal facility are presented in ER Section 3.8.

7.4.3 NONRADIOLOGICAL IMPACTS

Nonradiological impacts are calculated using accident, injury, and fatality rates from published sources. The rates (that is, impacts per vehicle-km traveled) are then

multiplied by estimated travel distances for workers and materials. The general formula for calculating nonradiological impacts is as follows:

Impacts = (unit rate) x (round-trip shipping distance) x (annual number of shipments)

In this formula, impacts are presented in units of the number of accidents, number of injuries, and number of fatalities per year. Corresponding unit rates (impacts per vehicle-km traveled) are used in the calculations.

The general approach used in this analysis to calculate nonradiological impacts of unirradiated and spent fuel shipments is based on the approach used in the Yucca Mountain Supplemental Environmental Impact Statement, which used adjusted state-level accident, injury, and fatality statistics, as shown in Table 7.4-3 (References 7.4-003 and 7.4-004). The round-trip distances between the proposed ALWR sites and the fuel fabrication facility (assumed to be located in Columbia, South Carolina, and Lynchburg, Virginia) and Yucca Mountain, Nevada (Table 7.4-4) provided the data for the last part of the equation. State-by-state shipping distances were obtained from the Web-TRAGIS output file and combined with the annual number of shipments and accident, injury, and fatality rates by state (References 7.4-003 and 7.4-004), to calculate nonradiological impacts. The results are shown in Table 7.4-4. The values presented in Table 7.4-5 were calculated from the values reported in Table 7.4-4 multiplied by the applicable number of shipments for unirradiated and spent fuel. Table 7.4-5 values were then compared to those reported in Table S-4 of 10 CFR 51.52 (see Table 3.8-1). It should be noted that because of the larger round trip distances and greater number of shipments, 95 percent of the total nonradiological impacts (fresh fuel and spent nuclear fuel), are from the shipment of spent nuclear fuel. Also it should be noted that the fatalities/RRY calculated for the shipment of fresh and spent nuclear fuel are slightly smaller than those reported in Table S-4. This is primarily due to the longer shipping distances and adjusted accident, injury, and fatality rate data that were used for the shipment of fresh fuel to and spent fuel from HAR and the alternative sites versus what was used for the basis to support Table S-4.

7.4.4 CONCLUSION

Considering the uncertainties in the data and computational methods, the NRC concluded that the overall transportation accident risks associated with ALWR unirradiated and spent fuel shipments are considered to be SMALL and are consistent with the transportation risks from current generation reactors presented in Table S-4 of 10 CFR 51.52. The same conclusion is true of the transportation accident risks associated with the spent fuel from the proposed new reactors at the HAR site and the alternative sites.

7.4.5 REFERENCES

7.4-001 Neuhauser, K. S. and F. L. Kanipe, *RADTRAN 5 User Guide*, Sandia National Laboratories, SAND2003-2354, July 2003.

7.4-002 Idaho National Engineering and Environmental Laboratory, "Early Site Permit ER Sections and Supporting Documentation," Engineering Design File Number 3747, July 2003.

7.4-003 Saricks, C.L. and M.M. Tompkins, *State-Level Accident Rates of Surface Freight Transportation: A Reexamination*, Argonne National Laboratory, ANL/ESD/TM-150, April 1999.

7.4-004 Blower, Daniel and Anne Matteson, Center for National Truck Statistics, "Evaluation of the Motor Carrier Management Information System Crash File, Phase 1," UMTRI 2003-6, prepared for Federal Motor Carrier Safety Administration, March 2003.

Table 7.4-1
Radionuclide Inventory Used in Transportation Accident Risk Calculations for the AP1000

Radionuclide	AP1000 Inventory (Ci/MTU)
Am-241	7.27E+02
Am-242m	1.31E+01
Am-243	3.34E+01
Ce-144	8.87E+03
Cm-242	2.83E+01
Cm-243	3.07E+01
Cm-244	7.75E+03
Cm-245	1.21E+00
Cs-134	4.80E+04
Cs-137	9.31E+04
Co-60 [(a)]	1.20E+02
Eu-154	9.13E+03
Eu-155	4.62E+03
Pm-147	1.76E+04
Pu-238	6.07E+03
Pu-239	2.55E+02
Pu-240	5.43E+02
Pu-241	6.96E+04
Pu-242	1.82E+00
Ru-106	1.55E+04
Sb-125	3.83E+03
Sr-90	6.19E+04
Y-90	6.19E+04

Notes:

The "m" next to an isotope indicates a metastable state.

a) Co-60 is the key radionuclide constituent of fuel assembly crud.

Ci/MTU = Curies per metric ton uranium

Table 7.4-2
Spent Fuel Transportation Accident Risks for the AP1000

Site	Unit Population Dose (person-rem) [a]	Shipments per Year [b]	Population Dose (person-rem per RRY) [c]
HAR	1.43E-06	39	5.58E-05
BNP	1.55E-06	39	6.05E-05
RNP	1.29E-06	39	5.03E-05
Marion County	1.30E-06	39	5.07E-05
Table S-4	--	--	SMALL

Notes:

a) The inventory in RADTRAN calculations was adjusted for the 0.5 MTU per shipment.

b) Calculations are based on 39 normalized shipments per year.

c) Values are the product of unit population dose multiplied by normalized shipments per year.

person-rem = person-roentgen equivalent man
RRY = reference reactor year

Table 7.4-3 (Sheet 1 of 2)
Adjusted Accident, Injury, and Fatality Rates for the United States

	Accidents/Trucks (km)		Fatalities/Trucks (km)		Injuries/Trucks (km)	
State/Parameter	Interstate	Total	Interstate	Total	Interstate	Total
Alabama	4.63E-07	6.19E-07	1.35E-08	3.45E-08	1.78E-07	2.56E-07
Arizona	2.17E-07	1.76E-07	1.48E-08	1.48E-08	1.4E-07	1.1E-07
Arkansas	2.2E-07	2.43E-07	9.76E-09	3.5E-08	1.18E-07	1.49E-07
California	2.63E-07	1.36E-07	1.1E-08	5.67E-09	1.49E-07	7.68E-08
Colorado	7.32E-07	7.12E-07	1.8E-08	2.76E-08	3.78E-07	3.64E-07
Connecticut	1.48E-06	1.45E-06	2.28E-08	3.01E-08	7.36E-07	7.39E-07
Delaware	8.5E-07	1.19E-06	8.82E-09	3.7E-08	4.1E-07	6.13E-07
Florida	1.13E-07	1.46E-07	1.21E-08	1.69E-08	6.6E-08	8.52E-08
Georgia	N/A	1.1E-06	N/A	3.07E-08	N/A	5.51E-07
Idaho	4.84E-07	6.48E-07	5.98E-09	3.92E-08	3.68E-07	4.73E-07
Illinois	3.64E-07	4.86E-07	1.31E-08	1.73E-08	1.8E-07	1.97E-07
Indiana	3.69E-07	2.77E-07	1.06E-08	1.35E-08	1.68E-07	1.38E-07
Iowa	1.84E-07	2.43E-07	1.48E-08	2.11E-08	1.03E-07	1.36E-07
Kansas	4.66E-07	6.29E-07	8.19E-09	3.61E-08	3.05E-07	4.14E-07
Kentucky	5.09E-07	8.5E-07	2.02E-08	3.61E-08	2.65E-07	4.33E-07
Louisiana	N/A	3.63E-07	N/A	1.45E-08	N/A	2.21E-07
Maine	7.2E-07	6.76E-07	1.43E-08	1.23E-08	3.74E-07	4E-07
Maryland	8.86E-07	1.22E-06	1.02E-08	3.13E-08	5.51E-07	7.27E-07
Massachusetts	1.41E-07	2.54E-07	1.26E-09	5.98E-09	6.12E-08	1.25E-07
Michigan	4.64E-07	3.53E-07	1.69E-08	1.69E-08	3.13E-07	2.64E-07
Minnesota	2.81E-07	2.89E-07	4.72E-09	1.89E-08	1.01E-07	1.45E-07
Mississippi	7.88E-08	1.03E-07	3.94E-09	5.35E-09	4.68E-08	6.84E-08
Missouri	7.62E-07	8.8E-07	1.95E-08	3.1E-08	3.77E-07	4.38E-07
Montana	1.02E-06	9.54E-07	2.14E-08	3.2E-08	3.07E-07	3.1E-07
Nebraska	5.24E-07	7.12E-07	2.16E-08	2.95E-08	2.36E-07	3.11E-07
Nevada	3.69E-07	4.02E-07	1.04E-08	1.4E-08	1.78E-07	1.94E-07

Table 7.4-3 (Sheet 2 of 2)
Adjusted Accident, Injury, and Fatality Rates for the United States

	Accidents/Trucks (km)		Fatalities/Trucks (km)		Injuries/Trucks (km)	
State/Parameter	Interstate	Total	Interstate	Total	Interstate	Total
New Hampshire	4.32E-07	6.25E-07	N/A	1.86E-08	1.96E-07	2.81E-07
New Jersey	9.27E-07	8.09E-07	1.91E-08	1.12E-08	4.69E-07	4.55E-07
New Mexico	1.85E-07	1.77E-07	1.86E-08	1.73E-08	1.38E-07	1.3E-07
New York	N/A	5.66E-07	N/A	1.95E-08	N/A	2.22E-07
North Carolina	5.68E-07	5.48E-07	2.35E-08	2.55E-08	3.8E-07	3.79E-07
North Dakota	4.96E-07	5.61E-07	1.61E-08	1.75E-08	2.27E-07	3.04E-07
Ohio	2.69E-07	1.9E-07	6.14E-09	6.14E-09	1.68E-07	1.28E-07
Oklahoma	4.4E-07	4.53E-07	2.09E-08	2.32E-08	3.47E-07	3.42E-07
Oregon	N/A	3.54E-07	N/A	3.21E-08	N/A	1.63E-07
Pennsylvania	8.44E-07	1.11E-06	2.13E-08	3.83E-08	4.6E-07	6.4E-07
Rhode Island	N/A	N/A	N/A	N/A	N/A	N/A
South Carolina	N/A	7.7E-07	N/A	4.09E-08	N/A	3.96E-07
South Dakota	3.82E-07	3.76E-07	9.61E-09	2E-08	2.06E-07	1.91E-07
Tennessee	2.02E-07	2.61E-07	1.57E-08	2.05E-08	1.1E-07	1.52E-07
Texas	9.85E-07	1.08E-06	2.05E-08	4.25E-08	6.57E-07	6.45E-07
Utah	4.76E-07	5.58E-07	1.87E-08	2.19E-08	3.04E-07	3.41E-07
Vermont	3.09E-07	4.89E-07	N/A	1.53E-08	1.82E-07	2.64E-07
Virginia	6.45E-07	4.35E-07	2.54E-08	1.83E-08	3.72E-07	2.59E-07
Washington	4.35E-07	3.36E-07	2.83E-09	8.35E-09	2.16E-07	1.68E-07
West Virginia	2.82E-07	3.53E-07	2.65E-08	4.38E-08	1.34E-07	1.68E-07
Wisconsin	7.37E-07	9.04E-07	1.43E-08	3.5E-08	4E-07	4.92E-07
Wyoming	1.11E-06	1.11E-06	1.7E-08	1.95E-08	3.88E-07	3.88E-07

Notes:

km = kilometer

N/A = not available

Sources: References 7.4-003 and 7.4-004

Table 7.4-4
Nonradiological Impacts, Per Shipment, Resulting from Shipment of Unirradiated and Spent Nuclear Fuel

	Unirradiated Fuel				Spent Nuclear Fuel			
	Round-trip distance, km	Accidents	Injuries	Fatalities	Round-trip distance, km	Accidents	Injuries	Fatalities
HAR	306	4.11E-04	2.38E-04	1.98E-05	4294.0	2.91E-03	1.91E-03	1.42E-04
BNP	525.5	6.22E-04	3.97E-04	2.53E-05	4526.7	3.17E-03	2.08E-03	1.53E-04
RNP	408.2	5.10E-04	3.10E-04	2.20E-05	4234.3	2.96E-03	1.87E-03	1.49E-04
Marion County	434.2	5.29E-04	3.29E-04	2.23E-05	4272.2	3.02E-03	1.90E-03	1.53E-04

Notes:

km = kilometer

Table 7.4-5
Nonradiological Impacts Resulting from the Total Amount of Shipments of Unirradiated and Spent Nuclear Fuel for a RRY, Normalized to Reference LWR

Site	Accidents per RRY[(a)]	Injuries per RRY[(a)]	Fatalities per RRY[(a)]
HAR	1.16E-01	7.57E-02	5.64E-03
BNP	1.27E-01	8.31E-02	6.09E-03
RNP	1.18E-01	7.44E-02	5.92E-03
Marion Co.	1.20E-01	7.57E-02	6.08E-03
Table S-4	--	1.00E-01	1.00E-02

Notes:

a) The values in the table have been calculated from the values presented in Table 7.4-4 based on 4.9 shipments per year of unirradiated fuel and 39 shipments per year of spent fuel ([(unirradiated fuel accidents – 4.11E-04) x (4.9 shipments)] + [(spent fuel accidents – 2.91E-03) x (39 shipments)] = Accidents per RRY – 1.16E-01).

km = kilometer
RRY = reference reactor year

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.2.1.3-1

Text of NRC RAI:

Provide details on the offsite impact to groundwater flow, water quality, and usage from the proposed 20-ft increase in the Harris Reservoir elevation during operations.

PGN RAI ID #: H-288

PGN Response to NRC RAI:

An increase in the Main Reservoir pool elevation from 220 to 240 feet NGVD29 is expected to result in minimal off-site impacts to groundwater flow, usage, or quality. The Main Reservoir is and will continue to be surrounded by higher topography within the Buckhorn Creek Drainage Basin. The size and shape of the Buckhorn Creek Drainage basin is shown in ER Figure 2.3-4; associated contour lines are shown in the attached Figure 1 (Attachment 5.2.1.3-1A). A review of the topographic elevations in Figure 1 indicates that precipitation that falls in the basin will eventually flow to either the Auxiliary or Main Reservoirs through surface runoff, or return to the atmosphere through evapotranspiration. It is noted that the groundwater elevations surrounding the two reservoirs are higher than the existing pool elevations in the Main and Auxiliary Reservoirs as described in ER Subsection 2.3.1.3.2. Therefore, the direction of groundwater flow can be expected to be toward the reservoirs, with some groundwater discharging into the reservoirs, mostly through shoreline seeps. Increasing the Main Reservoir pool elevation from 220 to 240 feet NGVD29 will cause the groundwater seepage to occur at a higher elevation, effectively reducing groundwater gradients in the vicinity of the shoreline. No impacts to the flow, usage, or quality of groundwater are assumed to occur away from the Main Reservoir shoreline.

One area that could be affected by an increase in the level of the reservoir is the portion of the Buckhorn Creek Drainage Basin below the Main Dam. The increase in potentiometric head attributable to the 20-foot increase in pool elevation could create higher groundwater elevations and gradients immediately below the Main Dam. However, since the sub-basins within the Buckhorn Creek Drainage Basin naturally connect at this point, seepage below or around the Main Dam will drain to the same surface creek as the flow over the dam spillway, with minimal impacts to groundwater in this area.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 001 Attachment 5.2.1.3-1A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.2.2-1

Text of NRC RAI: Provide PEC's plans and potential schedule for addressing NCDENR's need to have instream flow studies completed for the Buckhorn Creek.

In a letter to the NRC dated August 29, 2008, the NCWRC stated "[it] is concerned about effects of Harris Nuclear Plant expansion downstream from the project. Currently, Buckhorn Creek, which is impounded by Harris Reservoir, has no minimum instream flow. An instream flow study should be performed to determine a suitable instream flow for Buckhorn Creek and that instream flow regime should be implemented. The instream flow regime should provide a minimum release from the Harris Reservoir dam and provide seasonal variation like that expected for an unregulated stream."

PGN RAI ID #: H-289

PGN Response to NRC RAI:

PEC plans to initiate an instream flow study on Buckhorn Creek and the Cape Fear River beginning in 2009, with an anticipated completion date of November 2009. The results of the study will be provided to the North Carolina Department of Environment and Natural Resources (NCDENR) for review once completed. It is anticipated that meetings between PEC and NCDENR's Division of Water Resources (DWR) will be held to discuss the results of the study and set a minimum flow if the study indicates that one is required. Coordination meetings will occur with other interested agencies and will likely include the North Carolina Division of Water Quality (NCDWQ), North Carolina Natural Heritage Program (NCNHP), North Carolina Wildlife Resources Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and U.S. Army Corps of Engineers (USACE).

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.2.2-2

Text of NRC RAI: Provide PEC's plans and potential schedule form addressing NCDENR's need to have instream flow studies completed for the Cape Fear River.

In a letter to the NRC dated August 29, 2008, the NCWRC stated that "An instream flow study is also needed to determine the effects of water withdrawal from the Cape Fear River. The NCWRC anticipates varying withdrawal limits based on existing flows in the Cape Fear River. For example, more water could be withdrawn from the river during high flow periods with minimal effect on the river while no water should be withdrawn from the river during low flow periods.'

PGN RAI ID #: H-290

PGN Response to NRC RAI:

PEC plans to initiate an instream flow study on Buckhorn Creek and on the Cape Fear River in early 2009 with an estimated completion date of November 2009. In addition to the instream flow study, the results of the study will be incorporated into the NCDWR Cape Fear River Basin Hydrologic Model to evaluate water availability. Prior to performing the modeling analysis, discussions will be held with NCDWR and USACE to reach a consensus on modeling input parameters and plant operating scenarios to be evaluated. The results of the instream flow studies and the modeling evaluation will be provided to the NCDENR for review. It is anticipated that meetings between PEC and the DWR will be held to discuss the results of the study and potential water withdrawal scenarios. Coordination meetings will occur with other interested agencies and will likely include NCDWQ, NCNHP, NCWRC, USFWS, and USACE.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.2.2-3

Text of NRC RAI: Provide a description of the operation of the discharge structure as modified for a higher reservoir level which would satisfy potential USACE, NCDENR, and NCWRC concerns for controlling a minimum release flow rate from the Harris Reservoir.

PGN RAI ID #: H-291

PGN Response to NRC RAI:

As described in the HNP FSAR, the main dam structure includes three Howell-Bunger valves. The Howell Bunger valve in the central pier is a 24-inch valve with centerline at an elevation of 206.7 feet mean sea level (ft. msl). A 36-inch-diameter steel pipe with intake at an elevation of 195.0 ft. msl in the reservoir conveys water to the valve. The valves in the two abutments of the spillway are 36-inch valves with center lines at an elevation of 213.0 ft. msl. The intake for the west abutment valve is in the abutment at an elevation of 213.0 ft. msl, whereas the east abutment has its intake inside the reservoir at an elevation of 180.0 ft. msl, connected to the valve by a 48-inch diameter steel pipe. These valves can be used to provide a controlled release at or above the required minimum. While the intakes for these valves will be at a level in the lake, which may have lower dissolved oxygen levels, the design of the Howell Bunger valve provides a high level of aeration.

Compliance with any minimum flow requirements in Buckhorn Creek will be checked at the USGS Gage USGS02102192 (Buckhorn Creek near Corinth, NC). The actual method for control of the valves, constant, manual, or remotely controlled, will be determined once the minimum flow requirement has been established. PEC plans to initiate an instream flow study on Buckhorn Creek and on the Cape Fear River in early 2009, with an estimated completion date of November 2009. If the existing Howell Bunger valves cannot be utilized for any low flow requirements that are established by NCDENR, a modification of one of the valves or installation of a new, smaller valve will be performed.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.3.1.3-1

Text of NRC RAI: Provide the following reference as referred to in the ER:

2.3-017 Harding Lawson Associates Group, Inc., "GM-1 Pilot Study Report," Prepared for North Carolina LLRW Management Authority, October 27, 1997.

PGN RAI ID #: H-292

PGN Response to NRC RAI:

ER Reference 2.3-017 is being provided in digital format (on a separately submitted DVD) and is listed under attachments to this response.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 002 Attachment 2.3.1.3-1A Part 1 of 4.pdf, 003 Attachment 2.3.1.3-1A Part 2 of 4.pdf, 004 Attachment 2.3.1.3-1A Part 3 of 4.pdf, and 005 Attachment 2.3.1.3-1A Part 4 of 4.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.7-1

Text of NRC RAI: Verify monthly and annual onsite precipitation amounts listed in Table 2.7-69 of the ER. Compare precipitation measurements with nearby NWS stations to determine representativeness.

Compare onsite precipitation measurements with nearby NWS stations for the same months/years to support the following statement in Section 2.7.4.1.4 of the ER: "The onsite precipitation data presented here are considered to be representative of the HAR site and are generally consistent with the long-term regional observations from the Charlotte, Greensboro, and Raleigh-Durham meteorological observing stations when compared with long-term periods of record at those locations."

PGN RAI ID #: H-293

PGN Response to NRC RAI:

A review of the monthly and annual average on-site precipitation totals in ER Table 2.7-69 indicates that the 1994–1999 data are actually in centimeters rather than inches as indicated in the table heading. As a result, all 1994–1999 monthly and annual average values need to be divided by 2.54 to convert the values to inches. Additionally, the average monthly values in the far right column will need to be re-calculated to reflect the correct monthly values. These revisions will be made in a future amendment to the ER.

Precipitation measurements from the closest first order NWS meteorological observing stations (Charlotte, Greensboro, Raleigh-Durham and Wilmington) are summarized in ER Table 2.7-2 for long-term periods of record and are inclusive of the 1994–1999 on-site data period. The table includes observations of maximum annual and maximum monthly precipitation. The 8 years of on-site precipitation data reported in Table 2.7-69 are consistently within the bounds of the long-term regional observations from Charlotte, Greensboro, Raleigh-Durham, and Wilmington when compared with long-term periods of record at those locations.

The statement in the ER regarding the representativeness of the on-site data will be revised for clarity in a future amendment to the ER.

Associated HAR COL Application Revisions:

A revised version of ER Table 2.7-69 "Monthly and Annual Precipitation" is provided below and shows the revised precipitation values for 1994-1999 as well as the affected averages. The last two sentences of the second paragraph of ER Subsection 2.7.4.1.4 "Precipitation" will be revised from:

"The on-site precipitation data presented here are considered to be representative of the HAR site and are generally consistent with the long-term regional observations from the Charlotte, Greensboro, and Raleigh-Durham meteorological observing stations when compared with long-term periods of record at those locations. Regional precipitation data appear to be reasonably representative of the site area and there is no reason to expect that on-site measurements of precipitation would be significantly different."

to read:

"The 8 years of on-site precipitation data reported in Table 2.7-69 are consistently within the bounds of the long-term regional observations from Charlotte, Greensboro, Raleigh-Durham and Wilmington when compared with long-term periods of record at those locations."

FSAR Table 2.3.2-260 will be revised to be consistent with the revisions to ER Table 2.7-69 described above. The last two sentences of FSAR Subsection 2.3.2.1.5 "Precipitation" will also be revised as described for ER Subsection 2.7.4.1.4. Note that this is also the subject of an FSAR RAI (FSAR RAI 02.03.02-4).

Attachments/Enclosures:

None.

Table 2.7-69
Monthly and Annual Precipitation (in.)
Shearon Harris Nuclear Power Plant Meteorological Monitoring Station
Period of Record: January 14, 1976 to December 31, 1978 and March 1, 1994 to February 28, 1999

Month	1976(a)	1977(a)	1978(a)	1994(b)	1995(c)	1996(c)	1997(c)	1998(c)	1999(d)	Average
January	1.29	2.65	7.42	NA	4.09	2.82	2.06	3.22	2.56	3.26
February	1.15	1.57	1.74	NA	5.38	2.23	2.11	3.24	1.06	2.31
March	4.69	6.18	3.85	3.83	2.30	3.14	2.29	6.33	NA	4.08
April	0.43	2.17	4.36	0.58	0.83	3.48	4.51	3.10	NA	2.43
May	2.72	1.87	3.59	3.86	4.60	2.67	1.91	6.26	NA	3.43
June	2.74	0.77	5.08	3.22	5.80	3.11	2.87	1.35	NA	3.12
July	1.66	1.92	4.63	5.56	2.08	5.80	5.54	2.99	NA	3.77
August	1.76	3.78	3.47	3.75	3.02	2.31	0.47	0.79	NA	2.42
September	2.87	6.16	2.72	2.35	2.14	7.09	2.69	2.19	NA	3.53
October	1.26	4.17	0.91	4.90	10.07	3.70	2.25	1.57	NA	3.60
November	1.14	2.35	3.57	1.37	3.35	2.42	1.96	0.95	NA	2.14
December	3.66	3.08	2.85	1.11	1.09	1.98	1.83	0.60	NA	2.03
Annual	25.37	36.67	44.19	30.54	44.74	40.76	30.50	32.61	3.62	36.12

Notes:

a) Period of Record: January 14, 1976 to December 31, 1978 (HNP FSAR).

b) Period of Record: March 1, 1994 to December 31, 1994.

c) Period of Record: January 1 to December 31 of indicated year.

d) Period of Record: January 1, 1999 to February 28, 1999.

Source: Reference 2.7-018

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.7-2

Text of NRC RAI: Quantify expected direct and indirect ozone (and ozone precursor) emission rates and establish if a conformity determination is required under 40 CFR 51, Subpart W.

Section 2.7.2 of the ER states that "Although Wake County is currently designated by USEPA and NCDENR to be in non-attainment of the NAAQS for ozone, the operation of the HNP facility (including the proposed units) should not result in an increase in ozone levels at any location because there will be no significant emissions of any ozone forming pollutants from the facility." Please quantify expected direct and indirect ozone (and ozone precursor) emission rates to establish if a conformity determination is required under 40 CFR 51, Subpart W.

PGN RAI ID #: H-294

PGN Response to NRC RAI:

Since the February 2008 submittal of the HAR COLA, Wake County has been re-designated as a maintenance area for ozone. Wake County is also designated as a maintenance area for carbon monoxide. The requirements of 40 CFR 51, Subpart W, specify that a conformity analysis is not required in any air quality maintenance area if the individual project related emissions of NOx, VOC's or CO (i.e., ozone precursor pollutants) will be less than 100 tons/yr. The estimated maximum annual emissions during the operation of the HAR facility (proposed Shearon Harris Nuclear Power Plant Units 2 and 3 [HAR 2 and 3]) will be well below this threshold, as follows:

Pollutant	HAR Emissions (tons/yr)
NOx	16.4
VOC	3.5
CO	2.4

It is noted that these emissions will be attributable to the infrequent operation (maintenance and testing) of diesel-fueled emergency generators and fire pump engines. There will be no other sources of these pollutant emissions from the HAR facility. The operation of the existing Shearon Harris Nuclear Power Plant Unit 1 (HNP 1) is expected to generate a lesser quantity of emissions than HAR 2 and 3 and the total combined emissions from both facilities will also be well below the 100 ton/yr threshold.

Given the small quantity of estimated emissions from the HNP and HAR facilities, a conformity analysis and determination will not be required.

Associated HAR COL Application Revisions:

The second and third paragraphs of ER Subsection 2.7.2 "Regional Air Quality" will be revised from:

"The HAR site is located in Wake County, which is currently designated by the U.S. Environmental Protection Agency (USEPA) as being in non-attainment of the NAAQS for 8-hour Ozone Subpart I and in attainment for the remaining NAAQS (Reference 2.7-007). Wake County is also designated as a CO maintenance area. The county was re-designated as being in attainment for CO on September 18, 1995 (Reference 2.7-008).

The North Carolina Department of Environment and Natural Resources (NCDENR) operates a network of ambient air quality monitoring stations throughout the State. The NCDENR separates the State into seven regions. The HAR site is located in the Raleigh region, which includes 13 monitoring locations. Three of the monitoring stations are located within Wake County. These stations monitor for various NAAQS criteria pollutants (i.e., ozone, $PM_{2.5}$, particulate matter of 10 µm and smaller [PM_{10}], sulphur dioxide [SO_2], and CO) (Reference 2.7-008 and Reference 2.7-009). Although Wake County is currently designated by USEPA and NCDENR to be in nonattainment of the NAAQS for ozone, the operation of the HNP facility (including the proposed units) should not result in an increase in ozone levels at any location because there will be no significant emissions of any ozone forming pollutants from the facility."

to read:

"The HAR site is located in Wake County, which is currently designated by the U.S. Environmental Protection Agency (USEPA) as a maintenance area for the 8-hour Ozone standard and in attainment for the remaining NAAQS (Reference 2.7-007). Wake County is also designated as a CO maintenance area. The county was re-designated as being in attainment for CO on September 18, 1995 (Reference 2.7-008).

The North Carolina Department of Environment and Natural Resources (NCDENR) operates a network of ambient air quality monitoring stations throughout the State. The NCDENR separates the State into seven regions. The HAR site is located in the Raleigh region, which includes a network of monitoring locations. Several of the monitoring stations are located within Wake County. These stations monitor for various NAAQS criteria pollutants (i.e., ozone, $PM_{2.5}$, particulate matter of 10 µm and smaller [PM_{10}], sulfur dioxide [SO_2], and CO) (Reference 2.7-008 and Reference 2.7-009). Although Wake County is currently designated by USEPA and NCDENR as a maintenance area for ozone, the operation of the HNP facility (including the proposed units) should not result in a measurable increase in ozone levels at any location because there will be no significant emissions of any ozone forming pollutants from the facility."

A revision will also be required for ER Table 2.7-3 (Sheet 2 of 2), which will be revised to remove Wake County from the list of nonattainment areas for the 8-hour ozone standard.

The third paragraph of FSAR Subsection 2.3.1.2.6 "Inversions and High Air Pollution Potential" will also be revised to reflect the re-designation of Wake County from "nonattainment area" to "maintenance area."

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.3.3.1-1

Text of NRC RAI: Identify the method or model for estimating cooling tower plume impacts in Section 5.3.3.1.1 of the ER. If not publicly available, submit the model for review, as well as any associated documentation and assumptions, including electronic input and output files.

Section 5.3.3.1.1 of the ER mentions an "An analytical cooling tower plume model" that was used to analyze cooling tower plumes in the 1983 FSAR for the HNP site; however, no specific reference to the model was provided.

PGN RAI ID #: H-295

PGN Response to NRC RAI:

The cooling tower plume model that is described in the 1983 FSAR for the HNP cooling tower has not been identified and the electronic input and output files are no longer readily available. An additional modeling analysis using the Electric Power Research Institute (EPRI) Seasonal/Annual Cooling Tower Impact (SACTI) model has been performed to further assess the frequency of occurrence and the characteristics of visible plumes and solids deposition using the SACTI model. The input and output files for the modeling analysis for two cases, namely the operation of the cooling towers for HAR 2 and 3 (Case 1) and the operation of HAR 2 and 3 in conjunction with the existing cooling tower for HNP 1 (Case 2) will be provided under separate cover due to the requirements for native file submittal. A complete description of the modeling analyses for Cases 1 and 2 has been documented in a Technical Memorandum entitled "HAR Cooling Tower Plume Impact Analysis." A copy of this Technical Memorandum (338884-TMEM-082, Rev. 0) will be provided in the reading rooms for NRC's review.

See the response to HAR ER RAI 5.3.3.1-2 for additional information concerning the above-described analysis.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

The following electronic files are being provided under separate cover:

File Name	Description
Case 1 (HAR 2 and 3)	
Case 1 Assumptions.pdf	Assumption worksheets for determining input parameters for SACTI model.
Preprocessor Model	
AllYears.tap	Meteorological surface data
FORT.2	SACTI created binary input file (Tables)
FORT.3	SACTI created binary input file (Plume)
FORT.4	SACTI created binary input file (Tables)
mixht.tap	Bi-Daily mixing height data
PREP.EXE	Preprocessor Model – executable file
PREP.OUT	Preprocessor Model – output file
PREP.USR	Preprocessor Model – user created input file
Plume Model	
Includes a copy of FORT.3 from above.	
FORT.8	SACTI created binary input file (Tables)
MULT.EXE	Plume Model – executable file
MULT.OUT	Plume Model – output file
MULT.USR	Plume Model – user created input file
Tables Model	
Includes copies of FORT.2, FORT.4, and FORT.8 from above.	
FORT.9	SACTI created binary input file (PagePlot – not used)
TABLES.EXE	Tables Model – executable file
TABLES.OUT	Tables Model – output file
TABLES.USR	Tables Model – user created input file
Case 2 (HAR 2 and 3, HNP 1)	
Case 2 Assumptions.pdf	Assumption worksheets for determining input parameters for SACTI model.

Preprocessor Model

AllYears.tap	Meteorological surface data
FORT.2	SACTI created binary input file (Tables)
FORT.3	SACTI created binary input file (Plume)

File Name	Description
FORT.4	SACTI created binary input file (Tables)
mixht.tap	Bi-Daily mixing height data
PREP.EXE	Preprocessor Model – executable file
PREP.OUT	Preprocessor Model – output file
PREP.USR	Preprocessor Model – user created input file
Plume Model	
Includes a copy of FORT.3 from above.	
FORT.8	SACTI created binary input file (Tables)
MULT.EXE	Plume Model – executable file
MULT.OUT	Plume Model – output file
MULT.USR	Plume Model – user created input file
Tables Model	
Includes copies of FORT.2, FORT.4, and FORT.8 from above.	
FORT.9	SACTI created binary input file (PagePlot – not used)
TABLES.EXE	Tables Model – executable file
TABLES.OUT	Tables Model – output file
TABLES.USR	Tables Model – user created input file

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.3.3.1-2

Text of NRC RAI: Resolve the inconsistency between Section 5.3.3 that implies a single natural draft cooling tower will be used and Section 1.14 that states two cooling towers will be used. How do multiple cooling towers affect predicted plume lengths, salt deposition, hours of fogging and icing, cloud shadowing, and increases in precipitation and humidity?

Section 5.3.3 suggests that "a single natural draft cooling tower will be used to provide a heat sink during normal operation of HAR 2 and 3." Subsequent discussion in this section further implies one cooling tower will be used for both HAR 2 and 3. Section 1.14 of the ER, however, states that "Waste heat will be dissipated by two main cooling towers...". Please resolve this inconsistency. How do multiple cooling towers affect predicted plume lengths, salt deposition, hours of fogging and icing, cloud shadowing, and increases in precipitation and humidity?

PGN RAI ID #: H-296

PGN Response to NRC RAI:

Two cooling towers will be used, one each for HAR 2 and HAR 3. The text of ER Subsections 5.3.3 and 5.3.4 will be revised in a future amendment to be consistent with other sections of the ER that correctly indicate that there will be two cooling towers, one each for HAR 2 and HAR 3.

While the results of a modeling analysis of the existing HNP 1 cooling towers was provided in ER Subsection 5.3.3.1, an additional modeling analysis was performed to assess the frequency of occurrence and the characteristics of visible plumes and solids deposition of all three cooling towers using the SACTI model. This analysis, which has been documented in a Technical Memorandum entitled "HAR Cooling Tower Plume Impact Analysis," was used to evaluate two cases, namely the operation of the cooling towers for HAR 2 and 3 (Case 1) and the operation of HAR 2 and 3 in conjunction with the existing cooling tower for HNP 1 (Case 2). A copy of this Technical Memorandum (338884-TMEM-082, Rev. 0) will be provided in the reading rooms for NRC's review.

The results of the modeling analyses, as described in the Technical Memorandum, indicate that, when all three cooling towers are in operation, the median visible plume length will be approximately 0.62 miles in length, and 98 percent of all plumes will be less than 4.91 miles long. The modeling analysis using the SACTI model also predicts that maximum solid/salt deposition rates will be only 7.31 kg/km^2/mo., which is well below NRC's significant impact level of 1000 kg/km^2/mo and should not represent a

significant impact to local habitat or ecosystems (see ER Subsection 5.3.3.2.1 "Salt Drift"). Plume shadowing impacts are predicted to occur 15 percent of the time within 200 meters of the cooling towers and only 3 percent of the time at distances of 1000 meters from the cooling towers. While the potential exists for an increase in precipitation attributable to the increase in moisture to the atmosphere from the cooling towers, there is no evidence available to suggest that the cooling towers will contribute to a significant increase in precipitation, either locally or regionally.

Associated HAR COL Application Revisions:

ER Subsections 5.3.3 and 5.3.4 will be revised to clarify that there will be two new natural draft cooling towers, one each for HAR 2 and HAR 3.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.1-1

Text of NRC RAI:

Provide a re-evaluation of the LOCA DBA for the AP1000 reactor using assumptions that are acceptable to the NRC.

By letter dated August 14, 2008, NRC informed the AP1000 vendor that an unacceptable assumption was made in evaluating the LOCA DBA for Revision 16 of the AP1000 DCD. Provide an evaluation of the LOCA that does not make use of the unacceptable assumption.

PGN RAI ID #: H-297

PGN Response to NRC RAI:

The rejection of the assumption made in evaluating the LOCA DBA provided in Revision 16 of the AP1000 DCD is addressed for HAR by using the revised LOCA EAB and LPZ acceptance criteria χ/Q values provided in Revision 17 of the AP1000 DCD, which do not credit the rejected assumption. In order to accommodate this change, the HAR EAB distance will be increased in the southerly sectors from the FSAR Rev. 0 value of 1245 meters to a value of 1600 meters. HAR COLA ER Subsection 7.1.3 and Tables 7.1-2 through 7.1-12 will be updated as a result of this change to include the DCD Revision 17 values. The change involves incorporation of the short-term (accident) values used in the DCD Revision 17 accident evaluation to which the HAR site-specific values are compared and revision to the HAR ER site-specific accident doses.

Associated HAR COL Application Revisions:

Revise the third sentence of the second paragraph of ER Subsection 7.1.3 from:

"The X/Q value for 1.2 to 3.2 hours at the HAR site was not calculated."

to read:

"The X/Q value for 1.4 to 3.4 hours at the HAR site was not calculated."

Replace existing ER Tables 7.1-2 through 7.1-12 with the following tables:

Table 7.1-2
Summary of HAR Site-Specific Off-Site Doses Consequences

Accident	EAB Dose TEDE Rem	LPZ Dose TEDE Rem	Guideline Limit TEDE Rem
Main Steam Line Break			
Pre-existing Iodine Spike	5.6E-02	1.6E-02	25
Accident-initiated Iodine Spike	6.2E-02	4.9E-02	2.5
Reactor Coolant Pump Locked Rotor			
No Feedwater	4.5E-02	6.9E-03	2.5
Feedwater Available	3.4E-02	1.4E-02	2.5
Control Rod Ejection Accident	2.0E-01	1.0E-01	6.3
Steam Generator (SG) Tube Rupture			
Pre-existing Iodine Spike	1.2E-01	2.2E-02	25
Accident-initiated Iodine Spike	6.2E-02	1.5E-02	2.5
Small Line Break	1.2E-01	1.8E-02	2.5
Design Basis LOCA	2.7E+00	9.5E-01	25
Fuel Handling Accident	2.9E-01	4.6E-02	6.3

Notes:
Doses are based on FGR 11 (Reference 7.1-001) and FGR 12 (Reference 7.1-002) dose conversion.

TEDE guidelines from Regulatory Guide 1.183. Small line break criteria based on SRP 15.6.2

Table 7.1-3
Ratio of HAR 50-Percent Accident Site X/Q Values to AP1000 DCD X/Q Values

POST-ACCIDENT TIME PERIOD (HR.)	HAR SITE X/Q VALUES (SEC/M^3)	AP1000 X/Q VALUES (SEC/M^3)	X/Q RATIO HAR SITE / AP1000 DCD
LOCA			
EAB			
1.4 to 3.4 hr. (1)	5.64E-05	5.10E-04	1.11E-01
LPZ			
0 to 8 hr.	8.80E-06	2.20E-04	4.00E-02
8 to 24 hr.	7.70E-06	1.60E-04	4.81E-02
24 to 96 hr.	5.84E-06	1.00E-04	5.84E-02
96 to 720 hr.	3.84E-06	8.00E-05	4.80E-02
All Other Accidents			
EAB			
0--2 hr	5.64E-05	1.00E-03	5.64E-02
LPZ			
0--8 hr	8.80E-06	5.00E-04	1.76E-02
8--24 hr	7.70E-06	3.00E-04	2.57E-02
24--96 hr	5.84E-06	1.50E-04	3.89E-02
96--720 hr	3.84E-06	8.00E-05	4.80E-02

Notes:
(1) The EAB X/Q value for the period 0 to 2 hours was used for the 1.4 to 3.4 hour period for the HAR site. The 1.4 to 3.4 hour period represents the worst two-hour period for the EAB dose.
Definitions:
EAB = exclusion area boundary
LPZ = low population zone
sec/m^3 = seconds per cubed meter
X/Q = atmospheric dispersion coefficient

Table 7.1-4
Main Steam Line Break, 0 to 96 Hours, Pre-Existing Iodine Spike

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 2 hr.	1.00E+00	
0 to 8 hr.	-	5.81E-01
8 to 24 hr.	-	7.18E-02
24 to 96 hr.	-	1.08E-01
Total	1.00E+00	7.61E-01
HAR COLA		
0 to 2 hr.	5.64E-02	
0 to 8 hr.	-	1.02E-02
8 to 24 hr.	-	1.84E-03
24 to 96 hr.	-	4.20E-03
Total	5.64E-02	1.63E-02

Table 7.1-5
Main Steam Line Break, 0 to 96 Hours, Accident-Initiated Iodine Spike

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 2 hr.	1.10E+00	
0 to 8 hr.	-	1.02E+00
8 to 24 hr.	-	3.77E-01
24 to 96 hr.	-	5.36E-01
Total	1.10E+00	1.93E+00
HAR COLA		
0 to 2 hr.	6.20E-02	
0 to 8 hr.	-	1.80E-02
8 to 24 hr.	-	9.68E-03
24 to 96 hr.	-	2.09E-02
Total	6.20E-02	4.85E-02

Table 7.1-6
Locked Rotor Accident, 0 to 1.5 Hours, Pre-Existing Iodine Spike

	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
No Feedwater		
AP1000 Tier 2		
0 to 1.5 hr.	8.00E-01	3.89E-01
Total	8.00E-01	3.89E-01
HAR COLA		
0 to 1.5 hr.	4.51E-02	6.85E-03
Total	4.51E-02	6.85E-03
Locked Rotor Accident, 0 to 8 Hours, Pre-Existing Iodine Spike		
FW Available		
AP1000 Tier 2		
0 to 2 hr.	6.00E-01	
0 to 8 hr.	-	7.94E-01
Total	6.00E-01	7.94E-01
HAR COLA		
0 to 2 hr.	3.38E-02	
0 to 8 hr.	-	1.40E-02
Total	3.38E-02	1.40E-02

Table 7.1-7
Control Rod Ejection Accident, 0 to 720 Hours, Pre-Existing Iodine Spike

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 2 hr.	3.60E+00	
0 to 8 hr.	-	4.58E+00
8 to 24 hr.	-	7.84E-01
24 to 96 hr.	-	6.32E-02
96 to 720 hr.	-	2.06E-02
Total	3.60E+00	5.45E+00
HAR COLA		
0 to 2 hr.	2.03E-01	
0 to 8 hr.	-	8.06E-02
8 to 24 hr.	-	2.01E-02
24 to 96 hr.	-	2.46E-03
96 to 720 hr.	-	9.89E-04
Total	2.03E-01	1.04E-01

Table 7.1-8
Steam Generator Tube Rupture, 0 to 24 Hours, Accident-Initiated Iodine Spike

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 2 hr.	1.10E+00	
0 to 8 hr.	-	6.27E-01
8 to 24 hr.	-	1.69E-01
Total	1.10E+00	7.96E-01
HAR COLA		
0 to 2 hr.	6.20E-02	
0 to 8 hr.	-	1.10E-02
8 to 24 hr.	-	4.34E-03
Total	6.20E-02	1.54E-02

Table 7.1-9
Steam Generator Tube Rupture, 0 to 24 Hours, Pre-Existing Iodine Spike

	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 2 hr.	2.20E+00	
0 to 8 hr.	-	1.16E+00
8 to 24 hr.	-	7.24E-02
Total	2.20E+00	1.23E+00
HAR COLA		
0 to 2 hr.	1.24E-01	
0 to 8 hr.	-	2.04E-02
8 to 24 hr.	-	1.86E-03
Total	1.24E-01	2.23E-02

Table 7.1-10
Small Line Break Accident, 0 to 0.5 Hour, Accident-Initiated Iodine Spike

	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 0.5 hr.	2.10E+00	1.02E+00
Total	2.10E+00	1.02E+00
HAR COLA		
0 to 0.5 hr.	1.18E-01	1.80E-02
Total	1.18E-01	1.80E-02

Table 7.1-11
AP1000 Design Basis LOCA, 0 to 720 Hours

	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
1.4 to 3.4 hr.	2.46E+01	-
0 to 8 hr.	-	2.17E+01
8 to 24 hr.	-	7.50E-01
24 to 96 hr.	-	2.93E-01
96 to 720 hr.	-	5.49E-01
Total	2.46E+01	2.33E+01
HAR COLA		
1.4 to 3.4 hr.	2.70E+00	-
0 to 8 hr.	-	8.68E-01
8 to 24 hr.	-	3.61E-02
24 to 96 hr.	-	1.71E-02
96 to 720 hr.	-	2.64E-02
Total	2.70E+00	9.48E-01

Table 7.1-12
Fuel-Handling Accidents, 0 to 2 Hours

	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
AP1000 Tier 2		
0 to 2 hr.	5.20E+00	2.59E+00
Total	5.20E+00	2.59E+00
HAR COLA		
0 to 2 hr.	2.93E-01	4.56E-02
Total	2.93E-01	4.56E-02

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.2-1

Text of NRC RAI: Provide an accident-specific table of population dose from water ingestion from the MACCS2 code, similar to Table 7.2-3 in the ER.

PGN RAI ID #: H-298

PGN Response to NRC RAI:

Water ingestion dose risk as calculated by MACCS2 is summarized in ER Subsection 7.2.5.4. Accident-specific population dose risk (that is, by source term) from water ingestion is presented in the table below. The data of the first four columns are from Table 7.2-3 in the ER and represent the 50-mile population dose from all contributors as calculated by MACCS2. The three last columns summarize the water ingestion dose contribution to the total.

Source Term	Freq. (/yr)	Dose (person-sv)	Dose Risk (person-sv/yr)	Water Dose (person-sv)	Water Dose Risk (person-sv/yr)	% Water Dose
ST1 - CFI	1.89E-10	6.27E+04	1.19E-05	3.37E+02	6.37E-08	0.54%
ST2 - CFE	7.47E-09	6.70E+04	5.00E-04	5.51E+02	4.12E-06	0.82%
ST3 - IC	2.21E-07	2.44E+02	5.39E-05	2.57E-01	5.68E-08	0.11%
ST4 - BP	1.05E-08	1.50E+05	1.58E-03	2.54E+03	2.67E-05	1.7%
ST5 - CI	1.33E-09	6.27E+04	8.34E-05	4.81E+02	6.40E-07	0.77%
ST6 - CFL	3.45E-13	2.94E+04	1.01E-08	4.00E+01	1.38E-11	0.14%
Total	2.41E-07	--	2.22E-03	--	3.15E-05	1.4%

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.2-2

Text of NRC RAI: Explain any differences between the source term described in the ER (Reference 7.2-001) and that provided in Chapter 49 of the AP1000 PRA, including the justification for using it.

Instead of using the source term provided in Chapter 49 of the AP 1000 PRA, the ER references a source term in a Westinghouse document (Reference 7.2-0001). Explain and justify any differences in the source term used for severe accidents.

PGN RAI ID #: H-299

PGN Response to NRC RAI:

ER Reference 7.2-0001 from Westinghouse contains the AP1000 MACCS2 ATMOS input files used by Westinghouse. The ATMOS files were solicited from Westinghouse to maximize consistency with prior Westinghouse MACCS2 analyses.

The source terms used for ER MACCS2 analysis of severe accidents are identical to those provided in Table 49-2 of the AP1000 PRA Chapter 49, with the following exceptions:

The AP1000 third and fourth plumes were combined for the ER analysis into a single third plume. The third and fourth plumes were combined to avoid a potential known MACCS2 calculation error. The ER MACCS2 analysis was performed with MACCS2 version 1.12, and Sandia National Laboratory issued a Software Defect Notification (Log Number M2V1-12A) in May 1998 for MACCS2 version 1.12, which stated that using four plume segments could result in calculation errors under some conditions. To avoid this potential issue, the AP1000 third and fourth plumes were combined so that a fourth plume was not used in the modeling. The third and fourth plumes were combined by adding the release fractions for each MACCS2 group together and using the start time of the third plume.

1. Individual plume durations were limited to a maximum value of 10 hours to meet a MACCS2 calculation limit associated with plume meander modeling. This calculation limit is discussed in Section 5.8 of NUREG/CR-6613 Vol. 1 (Code Manual for MACCS2). Any plume duration that exceeded 10 hours was revised to specify 10 hours.

2. The AP1000 release "DIRECT" was not evaluated for the ER analysis since this release was evaluated only by Westinghouse as a sensitivity case.

The source terms used in the ER MACCS2 analysis are summarized in the following table.

ER MACCS2 SOURCE TERMS

Release	Plume	Start Time (seconds)	Duration (seconds)	Release Fraction (MACCS2 Group)									Plume Energy (watts)	Plume Position
				1 Inert	2 I	3 Cs	4 Te/Sb	5 Sr	6 Ru	7 La	8 Ce	9 Ba		
CFI	1	2924	29666	5.40E-1	3.19E-3	3.18E-3	4.18E-4	2.11E-2	9.11E-3	3.53E-3	2.64E-5	1.62E-2	0	Leading
	2	32590	36000	2.58E-1	1.35E-4	1.35E-4	1.67E-5	6.50E-4	1.68E-4	4.53E-3	1.68E-5	3.40E-4	0	Midpoint
	3	86420	36000	1.22E-1	0.00E+0	0.00E+0	6.04E-6	0.00E+0	0.00E+0	1.12E-2	4.06E-5	0.00E+0	0	Midpoint
CFE	1	3004	16806	4.16E-1	5.53E-2	5.37E-2	1.23E-3	3.14E-3	1.16E-2	5.57E-5	9.54E-7	4.63E-3	0	Leading
	2	19810	36000	4.05E-1	1.26E-3	1.21E-3	1.61E-4	3.43E-4	2.58E-3	9.66E-6	4.56E-8	6.45E-4	0	Leading
	3	89970	36000	1.42E-1	0.00E+0	0.00E+0	6.04E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0	Midpoint
IC	1	4378	36000	9.83E-4	1.20E-5	1.15E-5	8.04E-7	1.07E-5	1.31E-5	1.35E-6	5.85E-9	1.20E-5	0	Midpoint
	2	84810	36000	4.93E-4	0.00E+0	0.00E+0	4.83E-9	0.00E+0	0.00E+0	6.00E-9	3.20E-11	0.00E+0	0	Leading
	3	134400	36000	1.17E-3	0.00E+0	0.00E+0	1.81E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0	Midpoint
BP	1	31890	14550	1.00E+0	1.69E-1	1.62E-1	6.27E-3	3.57E-3	4.48E-2	1.30E-4	3.19E-6	8.93E-3	0	Midpoint
	2	46440	36000	0.00E+0	4.64E-2	3.38E-2	3.12E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.00E-6	0	Leading
	3	86490	36000	0.00E+0	2.34E-1	7.60E-2	6.89E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.00E-6	0	Leading
CI	1	100.8	36000	5.73E-1	4.56E-2	2.10E-2	1.64E-3	2.03E-2	4.04E-2	2.39E-4	2.97E-6	3.16E-2	0	Midpoint
	2	50020	36000	1.13E-1	0.00E+0	0.00E+0	1.15E-5	0.00E+0	0.00E+0	1.00E-7	0.00E+0	0.00E+0	0	Midpoint
	3	136400	36000	8.40E-2	0.00E+0	0.00E+0	9.37E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0	Midpoint
CFL	1	2922	23438	3.36E-4	1.20E-5	1.15E-5	1.00E-6	1.57E-5	1.68E-5	9.96E-7	7.41E-9	1.61E-5	0	Midpoint
	2	26360	36000	1.19E-3	5.00E-8	3.23E-8	1.75E-8	1.04E-6	2.90E-7	1.07E-5	4.05E-8	6.60E-7	0	Midpoint
	3	108000	36000	9.79E-1	2.13E-5	1.19E-5	3.67E-5	2.83E-3	1.42E-3	1.41E-1	5.34E-4	2.60E-3	0	Midpoint

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.3-1

Text of NRC RAI: Justify application of the NRC staff conclusions for DCD Rev. 15 presented in NUREG-1793 to DCD Rev. 16 based on design considerations.

The NRC staff conclusions described in Section 7.3.3 specifically relates to Rev. 15 of the AP1000 design; the COL application references the Rev. 16 of the design. Justify application of the conclusions for DCD Rev. 15 to DCD Rev. 16 based on design considerations. What is the basis for assuming that the conclusions are appropriate? Have the source terms changed? Have the core damage frequencies changed?

PGN RAI ID #: H-300

PGN Response to NRC RAI:

A Severe Accident Mitigation Design Alternative (SAMDA) evaluation was conducted by Westinghouse for the AP1000 plant design located at a generic site and is documented in Appendix 1B of the AP1000 DCD. ER Section 7.3 updates the Westinghouse AP1000 SAMDA analysis using Shearon Harris site-specific data in place of generic site data.

In DCD Revision 15, Appendix 1B is based on DCD Revision 9 (that is, Appendix 1B has not been revised since DCD Revision 9). For DCD Revision 16, several essentially editorial changes were made in Appendix 1B:

- In Sections 1B.1.4.1 and 1B.1.4.2, a sentence was added to identify that certain information was extracted from Chapter 49 of the AP1000 PRA.

- In Section 1B.1.9, one item in the bulleted list of design features included in the AP1000 design was slightly modified. The item referenced as "Canned motor reactor coolant pump" was revised to specify "Sealless motor reactor coolant pump." Per Westinghouse AP1000 Licensing Design Change Document APP-GW-GLN-016, Revision 0, this change was made to provide flexibility in selecting a specific pump design and thus increase the number of possible pump vendors.

A comparison of Appendix 1B Table 1B-1 from Revision 15 and Revision 16 demonstrates that the core damage frequencies and the mean dose results associated with each release category did not change between revisions. (The source terms are not specifically listed in Appendix 1B, but a meaningful change in source terms would be evidenced by a change in mean dose results.)

The lack of changes to Appendix 1B in DCD Revision 16 supports the conclusion that other changes made as part of Revision 16, including design changes, do not materially

impact the generic AP1000 SAMDA evaluation. Therefore, the NRC staff's conclusions described in Subsection 7.3.3 regarding the SAMDA evaluation based on Revision 15 are also judged applicable to Revision 16.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.3-2

Text of NRC RAI: Clearly distinguish between SAMDAs and SAMAs.

The terms SAMA and SAMDA are not interchangeable. SAMDAs are related only to design. SAMAs include SAMDAs, but they also include other mitigation alternatives such as policies, procedures, and training. Separate discussions of SAMDA and other SAMAs would help clarify the distinction.

PGN RAI ID #: H-301

PGN Response to NRC RAI:

PGN agrees with the scope of definitions for SAMDA and SAMA identified in this RAI. SAMDAs are related to design changes. SAMAs include design changes and possibly other mitigation alternatives, such as policies, procedures, and training. The first paragraph of ER Subsection 7.3.1 and the fifth paragraph of ER Subsection 7.3.3 attempt to reflect these distinctions.

As noted in ER Subsection 7.3.3, in the absence of a completed plant with established procedural and administrative controls (this terminology is intended to address the three areas of policies, procedures, and training identified in this RAI), the SAMA analysis can evaluate only physical plant modifications. Evaluation of administrative SAMAs would not be appropriate until the plant design is finalized and the plant and administrative processes and procedures are being developed. At that time, appropriate administrative controls on plant operations will be incorporated into the plant's management systems as part of its baseline. Therefore, for the purposes of the ER, the SAMA evaluation is effectively a SAMDA evaluation. Revising the ER is not warranted.

Consideration of other mitigation alternatives, such as policies, procedures, and training, will be addressed as outlined in the response to RAI 7.3-3.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 7.3-3

Text of NRC RAI: Expand the discussion of administrative SAMAs found in the paragraph beginning at the bottom of page 7-40.

The paragraph beginning at the bottom of page 7-40 mentions administrative procedures. What is included in administrative procedures? Do they include plant operational procedures, policies, and training? When will development of these items be completed? Will risk insights from PRAs be considered in the development of the plant procedures, policies, training?

PGN RAI ID #: H-302

PGN Response to NRC RAI:

The fifth paragraph of ER Subsection 7.3.3 notes that in the absence of a completed plant with established procedural and administrative controls, the SAMA analysis can evaluate only physical plant modifications. Evaluation of administrative SAMAs would not be appropriate until a plant design is finalized and the plant administrative processes and procedures are being developed. At that time, appropriate administrative controls on plant operations will be incorporated into the plant's management systems as part of its baseline.

The ER terminology in this paragraph is intended to address the three areas of policies, procedures, and training identified in this RAI. Revising the ER is not warranted.

The site-specific development of plant procedures, policies, and training will be completed before fuel load. Risk insights from PRAs will be considered in the development of plant procedures, policies, and training.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 9.2-1

Text of NRC RAI: Provide supporting information clarifying the impacts of a conventional pulverized coal fired power plant.

Please provide the missing information and/or clarification so staff can provide timely and effective support to the NRC with the technical review of the alternatives requiring new power generation:

Alternatives requiring new power generation must be competitive with the proposed project. The ER (Sec. 9.2.3) appears to have calculated emissions from a circulating fluidized bed coal fired plant, however, waste generation and cumulative impacts appear to be predicated on a conventional pulverized coal fired plant. Please reassess the coal fired generating alternative including all impacts and cumulative impacts to be consistent with the feasible alternative of conventional pulverized coal power plants.

PGN RAI ID #: H-303

PGN Response to NRC RAI:

The information contained in this response will be incorporated into Subsection 9.2.3.1.1 in a future revision of the ER.

Air emissions were estimated for two power generation alternatives using coal and natural gas as fuels based on the emission factors contained U.S. Environmental Protection Agency (EPA) document, AP-42, Fifth Edition, as posted in the Technology Transfer Network, Clearinghouse for Inventories and Emission Factors (Attachment 9.2-1A) and identified in Table 9.2-3 below. The emissions from these facilities are based on a nominal power generation capacity of 2000 MW with maximum generation capacity of approximately 2200 MW.

The coal power facility assumes the use of Bituminous coal fired in a pulverized coal, dry bottom, wall-fired combustor. Sulfur content of the coal was assumed to be 2 percent by weight. Emissions control included the use of lime in the combustor unit, a wet scrubber system to control acid gas emissions, selective catalytic reduction to minimize nitrogen oxides emissions, and a baghouse to control particulate matter.

The natural gas fired power facility assumes the use of a combined cycle Gas Turbine Generator (GTG). Water injection is used to control nitrogen oxides emissions.

Table 9.2-3
Air Emissions from Alternative Power Generation Facilities

Fuel	Bituminous Coal [1]	Natural Gas [2]
Combustion Facility	Pulverized coal, dry bottom, wall-fired	Combined Cycle GTG
Nominal Generation Capacity	2000 MW	2000 MW
Air Pollutant Emissions (tons per year) [3]		
Sulfur Dioxide (SO_2)	5,431	197
Nitrogen Dioxide (NO_2)	16,011	7,516
Carbon Monoxide (CO)	1,668	1,735
Particulate Matter (PM)	167	382
PM. Less than 10 um (PM10)	39	272
Carbon Dioxide, equiv. (CO2e)	20,180,000	6,423,000

Notes:
(1) AP-42 Section 1.1, Tables 1.1-3, 1.1-4, 1.1-19 and 1.1-20
(2) AP-42 Section 3.1, Table 3.1-1 and 3.2-2a
(3) Emissions based on maximum generation capacity

Associated HAR COL Application Revisions:

The information contained in the above Response will be incorporated into Subsection 9.2.3.1.1 in a future revision of the ER.

Attachments/Enclosures:

See 006 Attachment 9.2-1A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 9.4-1

Text of NRC RAI: Provide supporting data and information demonstrating a quantifiable alternative site selection process in the revised ER that can be cited in the NRC EIS for the proposed construction and operation of Harris Units 2 and 3.

Please provide the missing information and/or clarification so staff can provide timely and effective support to the NRC with the technical review of the need for power assessment:

The alternative site selection process should follow a clear and defensible process to determine the final alternative sites, and the proposed site. Analysis performed on the four alternative sites to determine the proposed Harris site is clear and logical; however it is not clear how the region of interest was screened to provide candidate areas, potential sites, and candidate or alternative sites. Please provide a clear analysis of the site screening process from the defined region of interest to the selection of the four alternative sites.

PGN RAI ID #: H-304

PGN Response to NRC RAI:

The following information will be incorporated into Subsection 9.3.1.1 in a future revision of the ER in order to address the comment.

The site selection process followed by PEC was consistent with the siting process outlined in ESRP Section 9.3 (Reference RAI 9.4-1 01) as discussed in ER Subsection 9.3.1. The first step of PEC's site selection process was to identify the Region of Interest (ROI). The next step in the site selection process was to identify suitable candidate areas by screening the ROI using exclusionary criteria. Candidate areas refer to one or more areas within the ROI that remain after unsuitable areas have been removed. ROI screening was done at a high level with the purpose of quickly identifying areas within the ROI that would not be suitable for the siting of a nuclear power station.

The criteria used in the ROI screening process to identify candidate areas were consistent with those identified in ESRP Section 9.3 (Reference RAI 9.4-1 01). The criteria included the following, as identified on Attachment 9.4-1A:

Exclusionary criteria used in screening the ROI to identify candidate areas include:

- Proximity to major population centers (that is, not located in an area with greater than or equal to 300 ppsm [or 300 persons per 2.6 km2]).

- Proximity of adequate transmission lines (that is, within 30 mi. [48.3 km]) of 345-kV or 500-kV transmission lines). The 345-kV or 500-kV transmission lines are needed for the EPR standard grid connection design. It should be noted that areas with proximity to 230-kV lines that could potentially be upgraded were also considered.
- Lack of a suitable cooling water source (that is, within 15 mi [24.1 km] of an adequate cooling water source).
- Dedicated land (that is, not located within national, state parks, historic sites, or tribal lands).

Publicly held information on geographic information system (GIS) database Web sites were used to obtain the screening information. The GIS information was layered to produce a figure that represented the suitable candidate areas for the potential placement of a nuclear power facility (Attachment 9.4-1B).

Next, the candidate areas were screened and evaluated in order to develop a list of potential geographic locations for the placement of the proposed nuclear station. Information used in the screening and evaluation of the candidate areas was obtained from PEC personnel, GoogleEarth™ images, publicly held information on GIS database Web sites, topographic maps showing roads, urban areas, wetlands, parks, and other dedicated lands.

The screening process used to identify the potential sites considered discretionary criteria (that is, distance of a site from population centers, proximity of transmission lines, proximity to suitable source of cooling water) similar to those used in the process of identifying the candidate areas. However, identifying potential sites required a more detailed review of available information (Reference RAI 9.4-1 01). The goal of the screening process was to use a logical process that produced a list of the best potential sites located within the candidate areas. (Reference RAI 9.4-1 01)

The screening process also included consideration of existing site conditions, including whether the site was improved or potentially contained wetlands or floodplains. Aerial screening was used to identify areas within which potential sites were identified. The screening of the potential sites was conducted as an iterative process by applying refined criteria until an appropriate number of potential sites were identified. In addition, the potential sites needed to satisfy PEC's overall business objectives; and offer the ability of constructing and operating future nuclear units to provide PEC customers with reliable, cost-effective electric service.

The screening and evaluation of the Candidate Areas resulted in the identification of the 11 potential sites.

Sites outside the ROI were considered only in specific instances. The Savannah River Site (which is outside the PEC service territory and the ROI) was considered as a potential site because the site aggressively pursued a new nuclear plant with PGN, Duke, and SCANA. PEC eliminated the Savannah River Site from further consideration

because it is not close to the PEC service territory and because of high transmission costs and an undesirable cooling water source.

References

Reference RAI 9.4-1 01

NRC. 2007. NUREG-1555, "Environmental Standard Review Plan, Section 9.3: Site Selection Process," October.

Associated HAR COL Application Revisions:

The information contained in this response will be incorporated into Subsection 9.3.1.1 in a future revision of the ER.

Attachments/Enclosures:

See 007 Attachment 9.4-1A.pdf and 008 Attachment 9.4-1B.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 9.4-2

Text of NRC RAI: Provide McCallum-Turner, Site Selection Analysis Report. Submit as proprietary information or redacted as appropriate.

PGN RAI ID #: H-305

PGN Response to NRC RAI:

PEC will make available a proprietary copy of the requested document to the NRC under separate cover in accordance with criteria for withholding materials per 10 CFR 2.390.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.4.2-1

Text of NRC RAI: Explain the logic behind selecting the X/Q values used in Table 5.4-7 "Gaseous Pathways – Dose Summary Maximum Exposed Individuals Based on One AP1000 unit".

List all necessary GASPAR input data and reference the sources or specify the assumptions behind the selection of the pathway vectors (i.e. cow milk, goat milk etc...)

In reviewing the GASPAR output it is not clear why the highest X/Q value in a compass sector was not used in Table 5.4-7 in the pathway analysis, specifically X/Q values near the EAB. The source of much of the data in Table 5.4-7 is not given and entries can not be verified.

PGN RAI ID #: H-306

PGN Response to NRC RAI:

The atmospheric dispersion factors used in calculating the doses in Table 5.4-7 were selected based on the actual location for a specific pathway. The plume and ground deposition doses are based on the EAB at 0.99 mi. in the SSW sector. This is consistent with NUREG-1555, Section 5.4.1, where the pathways for the Maximum Exposed Individual (MEI) doses are based on the list of "nearest" receptors, including the nearest residence, milk cow, milk goat, meat animal, and vegetable garden larger than 50 m^2. NUREG-1555, Section 5.4.2 further states: "When site-specific conditions are so that it is not obvious that the particular location will result in maximum individual dose, select two or more locations for input to the GASPAR and LADTAP codes, then identify the "maximum" location based on the code outputs." The HAR pathway doses in Table 5.4-7 are based on the following locations:

a) Plume and Ground Deposition @ EAB – 0.99 mi. SSW
b) Nearest Milk Cow – 5.28 mi. SSW
c) Nearest Goat – 5.28 mi. SSW
d) Nearest Garden – 4.08 mi. SSW
e) Nearest Residence – 4.08 mi. SSW
f) Nearest Meat Animal – 3.06 mi. SW

In determining the reported MEI dose for HAR, the pathway doses from the locations listed above were conservatively added, even though it is not plausible that a single individual would be continuously located at the different locations. Moreover, the use of the EAB for the plume and ground doses provides additional conservatism, as this location is within the property owned by PEC and it is not realistic to have a member of

the public located there for any significant time, if at all. This method provides a conservative MEI dose compared with the dose that would be established in accordance with the NUREG-1555, where the individual locations would be evaluated separately. Therefore, use of the EAB X/Q value is not appropriate in the pathway analysis and, therefore, not used in determining the Table 5.4-7 pathway doses, except as noted above.

Regulatory Guide 1.206, Section C.II.2, endorses Regulatory Guide 4.2 as providing the most currently available comprehensive guidance for COL applicants to understand the format and contents of an ER. It also references NUREG-1555 and Regulatory Guide 4.2 Supplement 1 for additional information. While these documents in general require the parameters used to determine estimated doses from the gaseous effluent system to be provided, none require the ER to provide a detailed basis for each parameter. ER Table 5.4-3 has been revised to list all of the necessary GASPAR input data used to calculate the gaseous pathway doses. This is consistent with the level of information provided in HAR FSAR Section 11.3, which uses Section 11.3 of the Regulatory Guide 1.206 and Standard Review Plan 11.3, Revision 3 for guidance. In lieu of providing this detail in the ER or FSAR, the requested material has been provided to the staff in annotated FSAR Table 11.3-201, which is included in the response to NRC-RAI-LTR-027 that was transmitted via PEC Letter Serial NPD-NRC-2008-081, dated November 7, 2008. Annotated Table 11.3-201 provides additional information on how the values in FSAR Table 11.3-201, which are equivalent to the values in revised ER Table 5.4-3 below, were derived. Also new ER Table 5.4-22 is added to provide the sector average meteorological dispersion factors used as a direct input to the GASPAR computer code.

Associated HAR COL Application Revisions:

Revise the first sentence of the last paragraph of ER Subsection 5.4.1.2 from:

"Tables 5.4-3, 5.4-4, and 5.4-5 present the gaseous pathway parameters used by the code to calculate doses for both the maximum exposed individual and for the population."

to read:

"Tables 5.4-3, 5.4-4, 5.4-5 and 5.4-22 present the gaseous pathway parameters used by the code to calculate doses for both the maximum exposed individual and for the population."

Replace existing ER Tables 5.4-3, 5.4-7 and 5.4-9 with the following tables and add new Table 5.4-22:

Table 5.4-3
GASPAR II Input

Input Parameter	Value
Site Specific Data Values	
Distance from site to NE Corner of the United States (mi.)	1100
Fraction of the year leafy vegetables are grown	0.42
Fraction of the year milk cows are on pasture	0.67
Fraction of max individual's vegetable intake from own garden	1.0
Fraction of milk-cow feed intake from pasture while on pasture	1.0
Humidity over growing season (g/m^3) (Absolute Humidity)	8
Average temperature over growing season	0 (Value not used)
Fraction of the year goats are on pasture	0.75
Fraction of goat feed intake from pasture while on pasture	1.0
Fraction of the year beef cattle are on pasture	0.67
Fraction of beef-cattle feed intake from pasture while on pasture	1.0
Population Data	Table 2.5-2 and 2.5-4
Total Agriculture Production Rate (50-mile)	
-Vegetables (kg/yr)	Table 5.4-5
-Milk (L/yr)	Table 5.4-5
-Meat (kg/yr)	Table 5.4-5
Source Term	
Source Term Multiplier	1
Nuclide Release Data	Table 3.5-3
Meteorological Data	
Met Data for Input to GASPAR[(a)]	Sector Average Table 5.4-22
Special Location Data:	
Annual Average (X/Q)[(b)]	Table 2.7-76
Annual Average (D/Q)[(c)]	Table 2.7-77
Annual Average Decayed (2.26 day) (X/Q)	Table 2.7-78

Table 5.4-3
GASPAR II Input

Input Parameter	Value
Annual Average Depleted and Decayed (8-day) (X/Q)	Table 2.7-79

Notes:

a) NUREG/CR-2919 describes the technique for computing the χ/Q segment values as given by the following relationship:

$$\overline{\chi}/Q_{Seg}(K) = \frac{R_1 \bullet \chi/Q(R_1,K) + r_1 \bullet \chi/Q(r_1,K) + \ldots + r_n \bullet \chi/Q(r_n,K) + R_2 \bullet \chi/Q(R_2,K)}{R_1 + r_1 + \ldots + r_n + R_2}$$

where

$\chi/Q_{Seg}(K)$ = average value of χ/Q for the segment for the directional sector K

$\chi/Q(R_1, K)$ = χ/Q value at downwind distance R_1 for the directional sector K

R_1, R_2 = downwind distance of the segment boundaries

r_1, r_n = selected radii between R_1 and R_2 .

b) X/Q - Chi/Q or atmospheric dilution factors

c) D/Q - relative deposition

Replace the existing ER Table 5.4-7 with the following table:

Table 5.4-7 (Sheet 1 of 2)
Gaseous Pathways – Dose Summary Maximum Exposed Individuals
Based on One AP1000 Unit

Pathway		T.Body (mrem/yr)	GI-Tract (mrem/yr)	Bone (mrem/yr)	Liver (mrem/yr)	Kidney (mrem/yr)	Thyroid (mrem/yr)	Lung (mrem/yr)	Skin (mrem/yr)	Location
Plume		3.84E-01	3.84E-01	3.84E-01	3.84E-01	3.84E-01	3.84E-01	4.14E-01	2.14E+00	EAB[a]
Ground		6.25E-02	6.25E-02	6.25E-02	6.25E-02	6.25E-02	6.25E-02	6.25E-02	7.34E-02	EAB[a]
Cow Milk	Adult	1.60E-02	1.56E-02	6.13E-02	1.63E-02	1.61E-02	8.33E-02	1.56E-02	1.55E-02	Nearest Milk Cow[b]
	Teen	2.73E-02	2.69E-02	1.13E-01	2.81E-02	2.77E-02	1.34E-01	2.68E-02	2.67E-02	
	Child	6.25E-02	6.19E-02	2.77E-01	6.40E-02	6.34E-02	2.75E-01	6.20E-02	6.18E-02	
	Infant	1.26E-01	1.25E-01	5.41E-01	1.30E-01	1.28E-01	6.42E-01	1.25E-01	1.25E-01	
Goat Milk	Adult	2.05E-02	1.93E-02	6.28E-02	2.11E-02	2.02E-02	1.10E-01	1.93E-02	1.91E-02	Nearest Goat Milk[c]
	Teen	3.29E-02	3.16E-02	1.15E-01	3.49E-02	3.33E-02	1.76E-01	3.18E-02	3.14E-02	
	Child	7.07E-02	6.94E-02	2.83E-01	7.51E-02	7.22E-02	3.55E-01	6.98E-02	6.92E-02	
	Infant	1.38E-01	1.36E-01	5.49E-01	1.48E-01	1.41E-01	8.31E-01	1.37E-01	1.36E-01	
Vegetable	Adult	6.76E-02	6.78E-02	2.69E-01	6.76E-02	6.69E-02	1.94E-01	6.59E-02	6.57E-02	Nearest Garden[d]
	Teen	1.05E-01	1.05E-01	4.48E-01	1.06E-01	1.05E-01	2.81E-01	1.03E-01	1.03E-01	
	Child	2.37E-01	2.36E-01	1.08E+00	2.39E-01	2.37E-01	5.78E-01	2.34E-01	2.34E-01	
Inhalation	Adult	8.02E-03	8.09E-03	1.07E-03	8.17E-03	8.29E-03	6.65E-02	1.01E-02	7.81E-03	Nearest Residence[e]
	Teen	8.11E-03	8.17E-03	1.30E-03	8.37E-03	8.54E-03	8.25E-02	1.13E-02	7.88E-03	
	Child	7.17E-03	7.09E-03	1.58E-03	7.44E-03	7.58E-03	9.54E-02	9.78E-03	6.96E-03	
	Infant	4.14E-03	4.05E-03	7.94E-04	4.42E-03	4.41E-03	8.52E-02	5.97E-03	4.00E-03	
Meat	Adult	1.69E-02	1.76E-02	7.42E-02	1.69E-02	1.68E-02	2.12E-02	1.68E-02	1.67E-02	Nearest Meat Cow[f]
	Teen	1.37E-02	1.41E-02	6.27E-02	1.38E-02	1.37E-02	1.69E-02	1.37E-02	1.37E-02	
	Child	2.50E-02	2.51E-02	1.18E-01	2.50E-02	2.50E-02	2.98E-02	2.49E-02	2.49E-02	

Table 5.4-7 (Sheet 2 of 2)
Gaseous Pathways – Dose Summary Maximum Exposed Individuals
Based on One AP1000 Unit

Pathway		T.Body (mrem/yr)	GI-Tract (mrem/yr)	Bone (mrem/yr)	Liver (mrem/yr)	Kidney (mrem/yr)	Thyroid (mrem/yr)	Lung (mrem/yr)	Skin (mrem/yr)	Location
Total without Plume	Adult	1.92E-01	1.91E-01	5.31E-01	1.93E-01	1.91E-01	5.38E-01	1.90E-01	1.98E-01	
	Teen	2.50E-01	2.48E-01	8.03E-01	2.54E-01	2.51E-01	7.53E-01	2.49E-01	2.56E-01	
	Child	4.65E-01	4.62E-01	1.82E+00	4.73E-01	4.68E-01	1.40E+00	4.63E-01	4.70E-01	
	Infant	3.31E-01	3.28E-01	1.15E+00	3.45E-01	3.36E-01	1.62E+00	3.30E-01	3.38E-01	
	MAX	4.65E-01	4.62E-01	1.82E+00	4.73E-01	4.68E-01	1.62E+00	4.63E-01	4.70E-01	
Total with Plume	Adult	5.76E-01	5.75E-01	9.15E-01	5.77E-01	5.75E-01	9.22E-01	6.04E-01	2.34E+00	
	Teen	6.34E-01	6.32E-01	1.19E+00	6.38E-01	6.35E-01	1.14E+00	6.63E-01	2.40E+00	
	Child	8.49E-01	8.46E-01	2.21E+00	8.57E-01	8.52E-01	1.78E+00	8.77E-01	2.61E+00	
	Infant	7.15E-01	7.12E-01	1.54E+00	7.29E-01	7.20E-01	2.00E+00	7.44E-01	2.48E+00	
	MAX	8.49E-01	8.46E-01	2.21E+00	8.57E-01	8.52E-01	2.00E+00	8.77E-01	2.61E+00	

Notes:

a) EAB – 0.99 mi SSW

b) Nearest Milk Cow – 5.28 mi SSW

c) Nearest Goat – 5.28 mi SSW

d) Nearest Garden – 4.08 mi SSW

e) Nearest Residence – 4.08 mi SSW

f) Nearest Meat Cow – 3.06 mi SW

Replace ER Table 5.4-9 as shown:

Table 5.4-9

Gaseous Pathways – Comparison of Maximum Individual Dose Compared to 10 CFR 50, Appendix I Criteria (One AP1000 Unit)

Type of Dose	Design Objective	Point of Evaluation	Calculated Dose
Gaseous Effluents (Noble Gases Only)			
Gamma Air Dose	10 mrad	Exclusion area boundary	0.64 mrad
Beta Air Dose	20 mrad	Exclusion area boundary	3.03 mrad
Total Body Dose	5 mrem	Exclusion area boundary	0.38 mrem
Skin Dose	15 mrem	Exclusion area boundary	2.14 mrem
Radioiodines and Particulates			
Dose to any organ from all pathways	15 mrem	Varies[(a)]	2.21 mrem (child-bone)

Notes:
a) Locations of highest pathway doses off-site.

mrad = millirad

Add new Table 5.4-22:

Table 5.4-22 (Sheet 1 of 4)
Sector Average Atmospheric Dispersion Factors Input to GASPAR

	Downwind Distance (miles)									
	1.0	**2.0**	**3.0**	**4.0**	**5.0**	**10.0**	**20.0**	**30.0**	**40.0**	**50.0**
	Sector Average Annual χ/Q (m^3/sec)									
N	2.54E-06	8.97E-07	4.25E-07	2.63E-07	1.85E-07	9.31E-08	3.6E-08	1.82E-08	1.17E-08	8.40E-09
NNE	3.09E-06	1.10E-06	5.24E-07	3.26E-07	2.29E-07	1.16E-07	4.57E-08	2.30E-08	1.48E-08	1.07E-08
NE	2.87E-06	1.02E-06	4.88E-07	3.05E-07	2.16E-07	1.10E-07	4.35E-08	2.20E-08	1.42E-08	1.03E-08
ENE	3.09E-06	1.09E-06	5.25E-07	3.29E-07	2.34E-07	1.20E-07	4.79E-08	2.45E-08	1.59E-08	1.15E-08
E	2.35E-06	8.34E-07	4.11E-07	2.61E-07	1.86E-07	9.66E-08	3.94E-08	2.04E-08	1.33E-08	9.73E-09
ESE	2.96E-06	1.05E-06	5.23E-07	3.34E-07	2.40E-07	1.26E-07	5.19E-08	2.71E-08	1.78E-08	1.31E-08
SE	3.16E-06	1.11E-06	5.53E-07	3.53E-07	2.53E-07	1.32E-07	5.47E-08	2.86E-08	1.88E-08	1.38E-08
SSE	4.94E-06	1.74E-06	8.74E-07	5.61E-07	4.04E-07	2.13E-07	8.85E-08	4.65E-08	3.07E-08	2.26E-08
S	9.20E-06	3.25E-06	1.65E-06	1.07E-06	7.71E-07	4.08E-07	1.71E-07	9.04E-08	5.98E-08	4.41E-08
SSW	1.02E-05	3.58E-06	1.84E-06	1.19E-06	8.64E-07	4.59E-07	1.94E-07	1.03E-07	6.85E-08	5.06E-08
SW	6.91E-06	2.43E-06	1.24E-06	8.03E-07	5.82E-07	3.08E-07	1.30E-07	6.87E-08	4.56E-08	3.36E-08
WSW	3.83E-06	1.35E-06	6.77E-07	4.33E-07	3.11E-07	1.63E-07	6.75E-08	3.53E-08	2.32E-08	1.71E-08
W	2.50E-06	8.84E-07	4.41E-07	2.81E-07	2.02E-07	1.06E-07	4.35E-08	2.27E-08	1.49E-08	1.09E-08
WNW	1.86E-06	6.61E-07	3.25E-07	2.06E-07	1.47E-07	7.63E-08	3.11E-08	1.60E-08	1.05E-08	7.66E-09
NW	1.68E-06	5.96E-07	2.88E-07	1.81E-07	1.28E-07	6.57E-08	2.63E-08	1.34E-08	8.69E-09	6.31E-09
NNW	1.87E-06	6.63E-07	3.17E-07	1.97E-07	1.39E-07	7.05E-08	2.78E-08	1.40E-08	9.00E-09	6.50E-09

Table 5.4-22 (Sheet 2 of 4)
Sector Average Atmospheric Dispersion Factors Input to GASPAR

	Downwind Distance (miles)									
	1.0	2.0	3.0	4.0	5.0	10.0	20.0	30.0	40.0	50.0
	Sector Average Annual χ/Q (m^3/sec)									
N	6.58E-09	2.00E-09	7.94E-10	4.34E-10	2.76E-10	1.19E-10	3.68E-11	1.46E-11	7.78E-12	4.81E-12
NNE	7.14E-09	2.16E-09	8.61E-10	4.70E-10	2.99E-10	1.28E-10	3.98E-11	1.58E-11	8.43E-12	5.22E-12
NE	6.80E-09	2.06E-09	8.20E-10	4.48E-10	2.85E-10	1.22E-10	3.79E-11	1.50E-11	8.03E-12	4.97E-12
ENE	8.25E-09	2.50E-09	9.96E-10	5.44E-10	3.46E-10	1.49E-10	4.61E-11	1.83E-11	9.75E-12	6.04E-12
E	4.28E-09	1.30E-09	5.17E-10	2.82E-10	1.80E-10	7.71E-11	2.39E-11	9.48E-12	5.06E-12	3.13E-12
ESE	5.17E-09	1.57E-09	6.24E-10	3.41E-10	2.17E-10	9.31E-11	2.89E-11	1.14E-11	6.11E-12	3.78E-12
SE	6.31E-09	1.91E-09	7.62E-10	4.16E-10	2.64E-10	1.14E-10	3.52E-11	1.40E-11	7.46E-12	4.61E-12
SSE	7.99E-09	2.42E-09	9.65E-10	5.27E-10	3.35E-10	1.44E-10	4.46E-11	1.77E-11	9.44E-12	5.85E-12
S	1.25E-08	3.80E-09	1.51E-09	8.26E-10	5.25E-10	2.25E-10	6.99E-11	2.77E-11	1.48E-11	9.16E-12
SSW	1.23E-08	3.74E-09	1.49E-09	8.13E-10	5.17E-10	2.22E-10	6.88E-11	2.73E-11	1.46E-11	9.02E-12
SW	8.71E-09	2.64E-09	1.05E-09	5.74E-10	3.65E-10	1.57E-10	4.86E-11	1.93E-11	1.03E-11	6.37E-12
WSW	5.82E-09	1.76E-09	7.02E-10	3.84E-10	2.44E-10	1.05E-10	3.25E-11	1.29E-11	6.87E-12	4.25E-12
W	3.74E-09	1.13E-09	4.51E-10	2.47E-10	1.57E-10	6.73E-11	2.09E-11	8.28E-12	4.42E-12	2.73E-12
WNW	3.11E-09	9.43E-10	3.75E-10	2.05E-10	1.30E-10	5.60E-11	1.74E-11	6.88E-12	3.68E-12	2.27E-12
NW	3.34E-09	1.01E-09	4.03E-10	2.20E-10	1.40E-10	6.02E-11	1.87E-11	7.39E-12	3.95E-12	2.44E-12
NNW	4.32E-09	1.31E-09	5.22E-10	2.85E-10	1.81E-10	7.78E-11	2.41E-11	9.57E-12	5.11E-12	3.16E-12

Table 5.4-22 (Sheet 3 of 4)
Sector Average Atmospheric Dispersion Factors Input to GASPAR

	Downwind Distance (miles)									
	1.0	2.0	3.0	4.0	5.0	10.0	20.0	30.0	40.0	50.0
	Sector Average χ/Q 2.26 day decay (m^3/sec)									
N	2.52E-06	8.86E-07	4.16E-07	2.55E-07	1.78E-07	8.74E-08	3.21E-08	1.48E-08	8.78E-09	5.89E-09
NNE	3.07E-06	1.08E-06	5.12E-07	3.15E-07	2.20E-07	1.09E-07	4.01E-08	1.85E-08	1.10E-08	7.35E-09
NE	2.85E-06	1.00E-06	4.77E-07	2.95E-07	2.06E-07	1.02E-07	3.78E-08	1.75E-08	1.04E-08	6.96E-09
ENE	3.07E-06	1.07E-06	5.13E-07	3.18E-07	2.23E-07	1.11E-07	4.14E-08	1.93E-08	1.15E-08	7.71E-09
E	2.33E-06	8.21E-07	4.00E-07	2.51E-07	1.77E-07	8.89E-08	3.35E-08	1.56E-08	9.26E-09	6.20E-09
ESE	2.94E-06	1.03E-06	5.08E-07	3.20E-07	2.27E-07	1.15E-07	4.36E-08	2.04E-08	1.21E-08	8.13E-09
SE	3.14E-06	1.09E-06	5.37E-07	3.38E-07	2.40E-07	1.21E-07	4.60E-08	2.15E-08	1.28E-08	8.59E-09
SSE	4.89E-06	1.71E-06	8.48E-07	5.37E-07	3.82E-07	1.94E-07	7.40E-08	3.47E-08	2.07E-08	1.39E-08
S	9.12E-06	3.19E-06	1.60E-06	1.02E-06	7.27E-07	3.71E-07	1.42E-07	6.69E-08	3.99E-08	2.67E-08
SSW	1.01E-05	3.51E-06	1.78E-06	1.14E-06	8.12E-07	4.16E-07	1.60E-07	7.54E-08	4.49E-08	3.01E-08
SW	6.85E-06	2.39E-06	1.20E-06	7.66E-07	5.47E-07	2.80E-07	1.07E-07	5.05E-08	3.01E-08	2.01E-08
WSW	3.80E-06	1.33E-06	6.57E-07	4.15E-07	2.94E-07	1.49E-07	5.65E-08	2.64E-08	1.57E-08	1.05E-08
W	2.48E-06	8.68E-07	4.28E-07	2.70E-07	1.91E-07	9.66E-08	3.65E-08	1.71E-08	1.01E-08	6.78E-09
WNW	1.85E-06	6.50E-07	3.16E-07	1.98E-07	1.40E-07	7.02E-08	2.64E-08	1.23E-08	7.29E-09	4.87E-09
NW	1.67E-06	5.87E-07	2.81E-07	1.75E-07	1.23E-07	6.09E-08	2.26E-08	1.05E-08	6.22E-09	4.16E-09
NNW	1.85E-06	6.54E-07	3.10E-07	1.91E-07	1.33E-07	6.59E-08	2.43E-08	1.12E-08	6.67E-09	4.46E-09

Table 5.4-22 (Sheet 4 of 4)
Sector Average Atmospheric Dispersion Factors Input to GASPAR

	Downwind Distance (miles)									
	1.0	**2.0**	**3.0**	**4.0**	**5.0**	**10.0**	**20.0**	**30.0**	**40.0**	**50.0**
	Sector Average χ/Q depleted and 8 day decay (m^3/sec)									
N	2.27E-06	7.63E-07	3.43E-07	2.04E-07	1.38E-07	6.50E-08	2.21E-08	9.50E-09	5.40E-09	3.50E-09
NNE	2.77E-06	9.33E-07	4.22E-07	2.52E-07	1.72E-07	8.10E-08	2.77E-08	1.20E-08	6.82E-09	4.43E-09
NE	2.57E-06	8.64E-07	3.94E-07	2.36E-07	1.61E-07	7.64E-08	2.63E-08	1.14E-08	6.52E-09	4.24E-09
ENE	2.77E-06	9.24E-07	4.24E-07	2.55E-07	1.74E-07	8.31E-08	2.89E-08	1.26E-08	7.25E-09	4.73E-09
E	2.11E-06	7.08E-07	3.31E-07	2.02E-07	1.39E-07	6.70E-08	2.36E-08	1.04E-08	6.00E-09	3.92E-09
ESE	2.65E-06	8.88E-07	4.21E-07	2.58E-07	1.79E-07	8.69E-08	3.10E-08	1.38E-08	7.98E-09	5.23E-09
SE	2.84E-06	9.42E-07	4.45E-07	2.72E-07	1.89E-07	9.17E-08	3.26E-08	1.45E-08	8.41E-09	5.51E-09
SSE	4.42E-06	1.47E-06	7.03E-07	4.33E-07	3.01E-07	1.47E-07	5.27E-08	2.36E-08	1.37E-08	8.98E-09
S	8.25E-06	2.75E-06	1.33E-06	8.21E-07	5.73E-07	2.82E-07	1.02E-07	4.57E-08	2.66E-08	1.75E-08
SSW	9.12E-06	3.04E-06	1.48E-06	9.17E-07	6.42E-07	3.17E-07	1.15E-07	5.20E-08	3.03E-08	1.99E-08
SW	6.19E-06	2.06E-06	9.98E-07	6.19E-07	4.32E-07	2.13E-07	7.70E-08	3.47E-08	2.02E-08	1.33E-08
WSW	3.43E-06	1.15E-06	5.45E-07	3.34E-07	2.32E-07	1.13E-07	4.02E-08	1.79E-08	1.04E-08	6.80E-09
W	2.24E-06	7.50E-07	3.55E-07	2.17E-07	1.50E-07	7.30E-08	2.60E-08	1.16E-08	6.67E-09	4.37E-09
WNW	1.67E-06	5.61E-07	2.62E-07	1.59E-07	1.10E-07	5.29E-08	1.86E-08	8.21E-09	4.73E-09	3.09E-09
NW	1.51E-06	5.06E-07	2.32E-07	1.40E-07	9.58E-08	4.57E-08	1.58E-08	6.91E-09	3.95E-09	2.57E-09
NNW	1.67E-06	5.63E-07	2.55E-07	1.53E-07	1.04E-07	4.91E-08	1.68E-08	7.27E-09	4.14E-09	2.69E-09

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.5-1

Text of NRC RAI: Provide/clarify the construction worker exposure from Harris Lake drinking water.

In Section 4.5 "Radiation Exposure to Construction Worker", did not address the drinking water exposure pathway from Harris Lake. The drinking water for HNP workers is from Harris Lake, which is part of the liquid effluent discharge pathway for HNP. Explain where the water for the construction workers is from and impact to dose to the construction workers.

PGN RAI ID #: H-307

PGN Response to NRC RAI:

Doses to construction workers from the drinking water pathway from HNP operations were included in the initial submittal of ER Section 4.5. Doses from one additional operating unit (HAR 2) were not included in the initial submittal of ER Section 4.5. Doses to construction workers from the drinking water pathway from active HAR 2 operations have been estimated based on additional LADTAP modeling and the results will be included in a subsequent revision of the ER section.

Associated HAR COL Application Revisions:

Subsections of ER Section 4.5, "Doses to Construction Workers," will be revised as follows.

4.5.2 RADIATION SOURCES

During construction of the HAR 2 facility, construction workers may be exposed to direct radiation and to the radioactive effluents emanating from the routine operation of the HNP. During construction of the HAR 3 facility, construction workers may be exposed to direct radiation and to the radioactive effluents emanating from the routine operation of the HNP and HAR 2.

The design basis radiation source term is listed in Chapter 12 of the HNP FSAR (Reference 4.5-001).

The HNP facility releases airborne effluents via four gaseous effluent discharge points: Plant Vent Stack 1, Turbine Building Vent Stack 3A, and the Waste Processing Building Vent Stacks 5 and 5A (Figure 4.5-1). The expected radiation sources in the gaseous effluents are listed in Chapter 3 of the HNP's Annual Radioactive Effluent Release Report for 2004 (Reference 4.5-002).

Impacts to workers during construction of HAR 2 and HAR 3 from radiation sources associated with the ongoing operation of the HNP facility will be SMALL.

4.5.3.2.1.1 HNP Liquid Effluent Doses

Radioactive materials released in liquid effluents from the HNP to unrestricted areas are required to demonstrate compliance with 10 CFR 50 Appendix I (Off-site Dose Calculation Manual [ODCM] Operational Requirement 3.11.1.2 (Reference 4.5-004) and, on an annual average basis, to be limited to the concentrations specified in 10 CFR 20, Appendix B, Table 2, Column 2. For dissolved or entrained noble gases, the concentration shall be limited to 0.0002 microCurie per milliliter (μCi/ml) total activity. On an individual release basis, the release concentration for liquid effluents will be limited to ten times the concentrations specified in 10 CFR 20, Appendix B, Table 2, Column 2, Effluent Concentration (10 CFR 50 Appendix I, ODCM Operational Requirement 3.11.1.1) (Reference 4.5-004).

Radioactive liquids are routinely released as batches from the waste evaporator condensate tank and the treated laundry and hot shower tank. Batch releases may also originate from the secondary waste sample tank and the waste monitor tank at the HNP. Based on analysis of the tank contents, the tank release rate is adjusted, based on the cooling tower blowdown line flow rate, to dilute the tank activities to 50 percent of the allowable concentrations at the release point to Harris Reservoir (Reference 4.5-004).

The liquid effluent release point is at the point of discharge from the cooling tower blowdown line into Harris Reservoir. The cooling tower blowdown line provides liquid effluent dilution prior to release to Harris Reservoir. Concurrent batch releases do not occur at the HNP. The secondary waste sample tank and the normal service water system have a low potential for radioactive effluent releases. Effluent monitors on the secondary waste sample tank and the normal service water lines check these releases (Reference 4.5-004).

Two drain effluent lines exist (Reference 4.5-004):

- **Outdoor tank area drain effluent line**. The outdoor tank area drain effluent line routes rainwater collected in the outdoor tank area to the storm drain system and from there directly to Harris Lake. The line is monitored for radioactivity by the tank area drain transfer pump monitor. If the setpoint were exceeded, the discharge pump would be automatically secured. Effluent could then be diverted to the floor drain system for processing and eventual release.

- **Turbine building floor drains effluent line**. Water collected in the turbine building floor drains is normally routed to the yard oil separator for release to the environment via the waste neutralization system and then to the cooling tower discharge line. Tritium is expected to be detected in this pathway from sources such as background levels from Harris Lake. If the setpoint were exceeded, the release would be automatically terminated. Effluent could then be diverted to the secondary waste treatment system for processing and eventual release.

During the period of January 1, 2004 through December 31, 2004, the estimated maximum individual off-site dose due to radioactivity released in liquid effluents was

1.86E-02 millirem (mrem), whole body, as compared to a limit of 3.0 mrem, whole body. The estimated maximum individual off-site dose was 2.632E-02 mrem, Gastrointestinal tract (lower large intestine wall) (GI-LLI), as compared to a limit of 10.0 mrem, GI-LLI. (Reference 4.5-002) Doses were calculated using the methodology presented in ER Subsection 2.2.1 of the HNP ODCM (Reference 4.5-004).

4.5.3.2.1.2 HAR 2 Liquid Effluent Doses

In accordance with plant procedures, small amounts of liquid radioactive effluents (below regulatory limits) will be mixed with the cooling water and discharged to Harris Reservoir. Construction workers are assumed to use Harris lake as a drinking water source. The LADTAP II computer program, as described in Section 5.4, was used to calculate the construction worker doses from the liquid pathway via the ingestion of drinking water from Harris Lake. Calculations resulted in a whole body dose of 0.7 mrem/yr.

PEC maintains USEPA drinking water standards for water taken from Harris Lake for use as drinking water at the Harris Site. PEC will continue to maintain drinking water standards for use at the site.

4.5.4 ANNUAL CONSTRUCTION WORKER DOSES

Annual potential radiological dose impacts to construction workers have been conservatively estimated based on the following factors:

- The estimated maximum individual off-site dose due to radioactivity released in the HNP's liquid effluent release pathway (described in Subsection 4.5.3.2.1) was 1.86 E-02 mrem per year (mrem/yr), whole body, and 2.63E-02 mrem/yr, GI-LLI (Reference 4.5-002). The estimated maximum construction worker on-site dose due to the drinking water pathway from HAR 2 liquid effluent releases to Harris Lake was 7.00E-01 mrem per year (mrem/yr), whole body).

- The estimated radiological exposure to a construction worker from the operation of the HNP via the gaseous effluent release pathway (described in Subsection 4.5.3.2.2) was less than 2.38E-01 mrem/year (Reference 4.5-002). Even if doubled for two operating units (HNP and HAR 2) the doses would be negligible contributors.

- The direct radiation exposure, as presented in Subsection 4.5.3.3, was based on a 2080-hour work year and an exposure rate of 11.1 µrem/hr or 24 mrem/yr (Reference 4.5-005).

- Based on data from the 16 protected area fence line TLD locations shown on Figure 4.5-2, the annual collective dose to the construction workforce is estimated to be 72.8 person-rem (that is, the maximum individual dose multiplied by the number of people exposed). This estimate assumes 3150 persons based on 2080 working hours per year at an exposure rate of 11.1 µrem/hr (Reference 4.5-005).

- No credit for the reduction in potential dose rate is given for the distance from the HNP protected area fence line TLD locations to the HAR facility construction areas.

Table 4.5-2 compares the estimated doses to a HAR construction worker with the public dose criteria of 10 CFR 20.1301. This comparison demonstrates compliance with 10 CFR 20.1301 criteria and supports the conclusion that those who will construct the HAR facility would not need to be classified as radiation workers nor would they require monitoring.
The largest contributor to the TEDE would be the external dose assumed from active HNP operations (24 mrem/yr). Doses from the liquid and gaseous pathways are considered negligible contributors (well below those specified in 10 CFR 50 Appendix I). It is concluded that annual construction worker doses attributable to HNP operations for the proposed construction areas for HAR 2 and 3 are a small fraction of those limits specified in 10 CFR 20 and 10 CFR Appendix I. Impacts to workers during construction of HAR 2 and HAR 3 resulting from annual doses associated with the ongoing operation of the HNP facility will be SMALL.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.5-2

Text of NRC RAI: Provide references as referred to in ER:

4.5-005 Nuclear Generation Group, "Area Thermoluminescent Dosimeter (TLD) Monitoring, "DOS-NGGC-0010, Revision 7, 2006, Nuclear Generation Group Standard Procedure Volume 99 Book/Part 99, information obtained from the HNP TLD monitoring group via a request for information;

4.4-003 CH2M HILL, "Progress Energy — Harris Lake Infrastructure Impacts," Technical Memorandum prepared for Progress Energy Carolinas, Inc., May 16, 2007;

3.5-001 Progress Energy Carolinas, Inc., "Long Term X/Q Modeling Request," JVT – Request for Information (RFI) # 129, January 12, 2007;

3.6-001 Progress Energy Carolinas, Inc., "Carolina Power & Light Company, Harris Nuclear Plant and Harris Energy & Environmental Center National Pollutant Discharge Elimination System Permit Number NC0039586," January 30, 2006;

5.3-001 Sargent & Lundy, LLC, "Conceptual Design and Calculations for Harris Lake Makeup Water System for Harris Advanced Reactors Units 2 & 3," Calc. No.: HAG-XK01-ZOC-001, Rev. 2, June 22, 2007.

PGN RAI ID #: H-308

PGN Response to NRC RAI:

The following ER references are provided as attachments to this response:

009 Attachment 4.5-2A:

> 4.5-005 Nuclear Generation Group, "Area Thermoluminescent Dosimeter (TLD) Monitoring, "DOS-NGGC-0010, Revision 7, 2006, Nuclear Generation Group Standard Procedure Volume 99 Book/Part 99, information obtained from the HNP TLD monitoring group via a request for information.

010 Attachment 4.5-2B:

> 4.4-003 CH2M HILL, "Progress Energy — Harris Lake Infrastructure Impacts," Technical Memorandum prepared for Progress Energy Carolinas, Inc., May 16, 2007.

011 Attachment 4.5-2C:

3.5-001 Progress Energy Carolinas, Inc., "Long Term X/Q Modeling Request," JVT – Request for Information (RFI) # 129, January 12, 2007.

012 Attachment 2.4-1K:

3.6-001 Progress Energy Carolinas, Inc., "Carolina Power & Light Company, Harris Nuclear Plant and Harris Energy & Environmental Center National Pollutant Discharge Elimination System Permit Number NC0039586," January 30, 2006.

5.3-001 It is our practice not to provide calculations such as 5.3-001 for docketing; however, a summary of the information in the reference is available in the response to RAI 4.3.2-1 and the reference is available in the PEC-provided reading room.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 009 Attachment 4.5-2A.pdf, 010 Attachment 4.5-2B.pdf, 011 Attachment 4.5-2C.pdf, 012 Attachment 2.4-1K.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.3-1

Text of NRC RAI: Provide copies for docketing of an initial letter and all following correspondence with SHPO regarding the approval/concurrence of the following:

1. The changing scope of the APE due to project "fine tuning" and a commitment to keep SHPO informed each time a change is made.

2. A proposed post-licensing cultural resources procedure/plan, addressing protection and management of the resources.

3. A commitment to define and complete the following cultural resources work with a schedule for work start dates and expected completion dates.

   A. Areas proposed to be investigated in "Archaeological Survey Plan, Proposed Expansion of Harris Lake" written by New South Associates.

   B. Areas affected directly or indirectly by changes made in infrastructure (roads, bridges, overpasses etc.) to accommodate the addition of a new reactor. Additional changes include, but are not limited to logging associated with raised reservoir preparation, access to accommodate logging, and new access routes to the power plant.

4. A procedure or plan for evaluation and mitigation or avoidance of resources identified during any of the above mentioned investigations (if they are likely to be impacted).

PGN RAI ID #: H-309

PGN Response to NRC RAI:

1. The NRC asked PEC to submit a letter to the North Carolina State Historic Preservation Office (SHPO) confirming the commitment by PEC to ensure Section 106 compliance as the project progresses. On August 18, 2008, PEC submitted a letter to the SHPO describing the results of the summer 2008 NRC audit. PEC reaffirmed its commitment to notify the SHPO when additions to the APE are defined and to seek concurrence from the SHPO on any changes or additions to the APE. The letter directly referred to the changing nature of the project and the proposed undertaking. As a result of these changes, the previously defined APE would change, with the addition of access roads, transmission lines, lay-down yards, and other associated ground-disturbing activities to the APE areas as they are developed. A response from the SHPO was received on September 10, 2008. The SHPO concurred with the process PEC proposes for changing the scope of the APE

and future archaeological surveys as the project is further refined. These letters are provided in Attachment 2.5.3-1A.

2. The August 18, 2008 letter from PEC to the SHPO also described PEC's process for inadvertent discovery during post-licensing construction activities. The response from the SHPO was received on September 10, 2008. The SHPO approved the discovery process as described by PEC.

3. A. On November 3, 2008, PEC initiated the Phase I Archaeological Survey for the Proposed Expansion of Harris Lake as defined in the survey plan prepared by New South Associates and submitted to the SHPO on January 31, 2007. The Phase I survey was completed on January 9, 2009. Approximately 3 months after completion of the survey, a Management Summary describing the findings will be prepared and submitted to the SHPO.

   B. Areas affected directly or indirectly by changes made in infrastructure associated with the construction of the new reactor and new access roads to the power plant are not known at this time. When infrastructure alternatives are finalized, a revised APE will be provided to the SHPO for approval prior to the initiation of additional archaeological survey work.

   The current Phase I survey of Harris Lake includes the areas proposed to be logged. At this time, the plan for logging and the access roads necessary to accommodate logging have not been determined. When a logging plan is finalized, a revised APE will be provided to the SHPO for approval prior to the initiation of additional archaeological survey work.

4. Archaeological resources affected by the raising of Harris Lake cannot be avoided. PEC has initiated a Phase I survey to identify any National Register of Historic Places (NRHP)-eligible archaeological resources that would be inundated by the raising of the lake. Based on the results of the Phase I survey, a Phase II survey and possibly Phase III recovery work will be conducted to mitigate the impacts to archaeological resources from the increased water level. The Phase I survey work was completed on January 9, 2009. Once the findings of the survey are known, a plan for the Phase II and possibly Phase III investigations will be completed and submitted to the SHPO for approval. Any future Phase II and Phase III work needed will be completed prior to raising the water level of the lake.

5. As soon as alternatives are determined for the new infrastructure and access roads and for construction, logging, and operation of the new reactor, a revised, expanded APE for ground-disturbing activities will be defined. The expanded APE and a study plan will be submitted to the SHPO for approval, and appropriate Phase I, II or III archaeological survey work will be completed prior to the construction of new roads and infrastructure. Alternatives for infrastructure associated with construction and access roads will include alternatives to avoid NRHP-eligible archaeological resources. If the preferred alternative cannot avoid NRHP-eligible resources, appropriate mitigation will be planned and completed.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 013 Attachment 2.5.3-1A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.3-2

Text of NRC RAI: Outline and define all "preconstruction" areas and how cultural resources will be impacted by them.

PGN RAI ID #: H-310

PGN Response to NRC RAI:

Preconstruction areas, such as access roads and other construction-related areas, are not known at this time, so the impacts to cultural resources is not currently known. PEC has a policy to conduct a Cultural Resource Assessment on any project that might have the potential to affect cultural resources (for example, archaeological, historical, or architectural). The policy ensures appropriate identification of historic properties and consultation with the SHPO. This policy is consistent with the General Statutes of North Carolina designed to protect historic properties (North Carolina General Statute Chapter70, Article 1), and Section 106 of the National Historic Preservation Act (NHPA), 16 United States Code (USC) 470, to ensure the protection of known historic properties on PEC property (ER Reference 2.5-143 and ER Reference 2.5-144).

When the preconstruction area alternatives have been determined, a revised APE will be defined in consultation with the SHPO. A revised APE and the Phase I survey plan will be prepared and submitted to the SHPO for approval. Additional archaeological investigations will be determined based on the findings and conclusions of the Phase I work.

Once the archaeological surveys have been completed, an evaluation of impacts to cultural resources can be determined. Preconstruction area selection will include alternatives to avoid NRHP-eligible archaeological resources. If PEC is unable to avoid NRHP-eligible resources, then appropriate mitigation would be negotiated, planned, and completed according to regulatory compliance requirements and approval by the SHPO.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.3-3

Text of NRC RAI: Define the areas and associated cultural resources work with a schedule for work start dates and expected completion dates for the following:

1. Areas proposed to be investigated in "Archaeological Survey Plan, Proposed Expansion of Harris Lake".

2. Areas affected directly or indirectly by changes made in infrastructure (roads, bridges, overpasses etc.) to accommodate the addition of a new reactor. Additional changes include, but are not limited to logging associated with raised reservoir preparation, access to accommodate logging, and new access routes to the power plant.

PGN RAI ID #: H-311

PGN Response to NRC RAI:

1. On November 3, 2008, PEC initiated the Phase I archaeological survey for the Proposed Expansion of Harris Lake as defined in the survey plan prepared by New South Associates and submitted to the SHPO on January 31, 2007. The Phase I survey was completed on January 9, 2009. Approximately 3 months after completion of the survey, a Management Summary describing the findings of the survey will be prepared and submitted to the SHPO. The determination of Phase II work will be based on the findings and recommendations in the Management Summary and the concurrence of the SHPO. Phase III work, if necessary, will be determined based on the Phase II findings and conclusions submitted to the SHPO and their concurrence with the recommendations. Phase II and Phase III work will be completed prior to raising the water level of the lake.

2. Areas affected directly or indirectly by changes made in infrastructure associated with the construction of the new reactor and new access roads to the power plant are not known at this time. When infrastructure alternatives are finalized, a revised APE will be provided to the SHPO for approval prior to initiation of additional archaeological survey work.

   The current Phase I survey of Harris Lake includes the areas to be logged around the perimeter of the lake due to proposed lake level rise. At this time, the plan for logging and the access roads necessary to accommodate logging have not been determined. When a logging plan is finalized, a revised APE will be provided to the SHPO for approval prior to initiation of additional archaeological survey work.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 013 Attachment 2.5.3-1A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.1-1

Text of NRC RAI: Provide recent and current information identifying and documenting a complete listing of important terrestrial species found on Harris site. In addition, provide the complete text and maps from the following document:

"An Inventory of Significant Natural Areas in Wake County, North Carolina." Published by the North Carolina Natural Heritage Program in 2003.

Provide a listing and description of the relative abundance of the important terrestrial wildlife species (including game and/or recreationally important wildlife) found in the habitats existing on the Harris site. Provide any additional information describing the most recent ecological survey data that documents the presences/absence of important federal or state-listed species that potentially inhabit the site and information on the current presence, seasonality, habitat use and distribution of state listed plant or wildlife species likely to be found on the Harris site. At the site audit, staff discussed a revision of the CH2M HILL ecological observations report and addendum to address these issues. Provide the completed ecological observations report.

PGN RAI ID #: H-312

PGN Response to NRC RAI:

The executive summary of the requested document is being provided in digital format and is included as Attachment 2.4.1-1A to this response. The full document is not being provided due to possible copyright infringement. This document can be purchased by contacting the NCNHP.

Detailed information regarding terrestrial wildlife is limited. Table 1 summarizes the wildlife harvest of important terrestrial species in the four counties surrounding the Harris site. A report summarizing the ecological field observations collected at the Harris site in 2006 is provided as Attachment 2.4-1B. This report includes a description of terrestrial and aquatic ecology on the Harris site and has been updated to include an appendix of invertebrate and fish species collected during the summer of 2006 during sampling. Attachment 2.4.1-1B provides a summary of the environmental monitoring that has been performed on the Harris site since 1979.

Table 1
Wildlife Harvest for the Four Counties Surrounding the Harris Site

	Chatham	Harnett	Lee	Wake
		2005-2006		
Black Bear	0	0	0	0
White-tailed Deer	2,446	1,267	448	1,995
Wild Boar	0	0	0	0
Wild Turkey[1]	58	70	41	39
		2006-2007		
Black Bear	0	0	0	0
White-tailed Deer	2,507	1,310	482	2,284
Wild Boar	0	0	0	0
Wild Turkey[1]	89	65	49	49
		2007-2008		
Black Bear	0	0	0	0
White-tailed Deer	3,192	1,555	697	2,584
Wild Boar	0	0	0	0
Wild Turkey[1]	72	51	39	46

Notes:

[1] Wild turkey harvest estimates begin in the spring of the first year listed

Sources: Reference RAI 2.4.1-1 01, Reference RAI 2.4.1-1 02, Reference RAI 2.4.1-1 03

References

Reference RAI 2.4.1-1 01

North Carolina Wildlife Resources Commission. 2006. North Carolina Inland Hunting, Fishing, and Trapping Regulations Digest 2006-2007. Raleigh, NC.

Reference RAI 2.4.1-1 02

North Carolina Wildlife Resources Commission. 2007. North Carolina Inland Hunting, Fishing, and Trapping Regulations Digest 2007-2008. Raleigh, NC.

Reference RAI 2.4.1-1 03

North Carolina Wildlife Resources Commission. 2008. North Carolina Inland Hunting, Fishing, and Trapping Regulations Digest 2008-2009. Raleigh, NC.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 014 Attachment 2.4.1-1A.pdf, 015 Attachment 2.4-1B.pdf, and 016 Attachment 2.4.1-1B.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.1-2

Text of NRC RAI: Provide current information on wildlife potentially inhabiting the Harris site and using habitats that will be impacted. Provide the following reference:

Seamster, M. H. 1993. The wild turkey in North Carolina, NCWRC, Raleigh NC.

The site audit identified a data gap: current monitoring data for terrestrial wildlife and habitats are limited and the ER focuses primarily on a two-week survey of the shoreline area to be inundated. As discussed at the site audit, to address the data gap, provide data from historic environmental reports and monitoring data from all recent terrestrial surveys on Harris site. Provide a synthesis of these data along with current NC GAP analysis of potential suitable habitat to describe the likely abundance and distribution of important wildlife species by habitat type including:

• Migratory birds, shorebirds, waterfowl and address breeding bird populations

• Information describing and characterizing the relative abundance and habitat preferences and locations of the amphibians that are found or are likely to be found in or near the wetlands, streams, or open waters on the site.

• Information describing and characterizing the relative abundance and habitat preferences and locations of reptile species that are found or are likely to be found on the site

• Wildlife (including small and large mammals) use of shoreline habitat

• Data from historic environmental reports, and county game harvest reports to identify the important game species.

PGN RAI ID #: H-313

PGN Response to NRC RAI:

The requested reference is provided as Attachment 2.4.1-2A to this response.

Additional monitoring data for the site have been collected and are included in Attachment 2.4-1B "Ecological Field Observations Harris Nuclear Plant." This report includes a description of terrestrial and aquatic ecology on the Harris site and has been updated to include an appendix of invertebrate and fish species collected during the summer of 2006 during sampling. A summary of the terrestrial and aquatic species observed on the site since 1979 is included in Attachment 2.4.1-1B "HNP Environmental Monitoring Reports Summary."

A GAP analysis has also been performed to identify important habitats for terrestrial and aquatic species. This report, included as Attachment 2.4.1-2B "North Carolina Gap Project Analysis for Affected Project Areas," provides a summary of NC GAP analysis data for amphibian, avian, mammalian, and reptilian species with potential habitat in the project area.

Detailed information regarding terrestrial wildlife on the Harris site is limited. No information on game harvests only on the Harris site is available. Table 1 summarizes the wildlife harvest of important terrestrial species in the four counties surrounding the Harris site.

Table 1
Wildlife Harvest for the Four Counties Surrounding the Harris Site

	Chatham	Harnett	Lee	Wake
		2005-2006		
Black Bear	0	0	0	0
White-tailed Deer	2,446	1,267	448	1,995
Wild Boar	0	0	0	0
Wild Turkey[1]	58	70	41	39
		2006-2007		
Black Bear	0	0	0	0
White-tailed Deer	2,507	1,310	482	2,284
Wild Boar	0	0	0	0
Wild Turkey[1]	89	65	49	49
		2007-2008		
Black Bear	0	0	0	0
White-tailed Deer	3,192	1,555	697	2,584
Wild Boar	0	0	0	0
Wild Turkey[1]	72	51	39	46

Notes:

[1] Wild turkey harvest estimates begin in the spring of the first year listed

Sources: Reference RAI 2.4.1-2 01, Reference RAI 2.4.1-2 02, and Reference RAI 2.4.1-2 03

References

Reference 2.4.1-2 01

North Carolina Wildlife Resources Commission. 2006. North Carolina Inland Hunting, Fishing, and Trapping Regulations Digest 2006-2007. Raleigh, NC.

Reference 2.4.1-2 02

North Carolina Wildlife Resources Commission. 2007. North Carolina Inland Hunting, Fishing, and Trapping Regulations Digest 2007-2008. Raleigh, NC.

Reference 2.4.1-2 03

North Carolina Wildlife Resources Commission. 2008. North Carolina Inland Hunting, Fishing, and Trapping Regulations Digest 2008-2009. Raleigh, NC.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 017 Attachment 2.4.1-2A, 015 Attachment 2.4-1B, 016 Attachment 2.4.1-1B, and 018 Attachment 2.4.1-2B.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.1-3

Text of NRC RAI: Provide additional Information on delineation, characterization, and analysis of impacts to wetlands and terrestrial resources on the Harris site.

Two types of additional information are requested.

1. Detailed information is needed regarding the delineation and characterization methods and analyses conducted to infer limited loss of wetland habitat by raising the lake level. Provide information describing ephemeral wetlands connected to the reservoir and address whether vernal pools exist within the Harris reservoir shoreline. Provide information on the models, topographic and geographic data used to determine the impacts to wetlands and to support stated assumptions regarding new wetland formation. Provide a GIS analysis if necessary to support assumptions and describe the potential for new wetland formation.

2. Provide survey descriptions, survey results and maps describing potential impacts to wetlands or other terrestrial resources from temporary laydown areas, construction parking areas, cooling tower locations for units 2 and 3, and any roadway improvement projects outside the 220 to 240 contour.

PGN RAI ID #: H-314

PGN Response to NRC RAI:

Wetland delineation surveys were performed from November 10, 2008 through November 21, 2008. Delineation of emergent wetlands continued through December 5, 2008. This delineation effort addressed the complete Harris Reservoir shoreline and included planned temporary laydown areas, construction parking areas, cooling tower locations for HAR 2 and 3, and any roadway improvement projects outside the 220-ft. to 240-ft. contour. Attachment 2.4.1-3-10A describes the GIS analysis used to determine potential wetland formation related to an increased lake level.

All wetlands between 220-ft. and 240-ft. contours were delineated. All fringe wetlands within the reservoir were delineated to a depth of 2 meters. No vernal pools exist within the Harris Reservoir shoreline. Field delineations were verified with the USACE and NRC staff from December 17, 2008 through December 19, 2008. It is anticipated that a report summarizing the survey description, survey results, and maps depicting all delineated wetlands will be completed by February 2009. The delineation report will be provided to the NRC upon completion.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 019 Attachment 2.4.1-3-10A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.1-1

Text of NRC RAI: Provide additional information regarding potential impacts to terrestrial species and management procedures to avoid impacts to terrestrial resources in transmission corridors. Provide:

"Management of Rare Plant Sites on CP&L Power Line Rights of Way".

Provide information, maps and documents (in searchable pdf format if possible) describing the known locations of sensitive resources within existing and planned transmission corridors; provide information on management plans and procedures for transmission ROW and new/expanded corridors.

PGN RAI ID #: H-315

PGN Response to NRC RAI:

The following documents are provided as attachments to describe the management plans related to the transmission rights-of-way and corridors:

- Attachment 2.4-1T: T&E Species Procedure (EVC-SUBS-00011)
- Attachment 4.3.1-1A: Migratory Bird Permit
- Attachment 4.3.1-1B: Federal Depredation Permit
- Attachment 4.3.1-1C: Migratory Bird Procedure (EVC-SUBS-00017)
- Attachment 4.3.1-1D: Pesticides (EVC-SUBS-00021)
- Attachment 4.3.1-1E: Environmental Policy (EVC-HOCO-00001)
- Attachment 4.3.1-1F: Land disturbing activities (EVC-SUBS-00022)
- Attachment 4.3.1-1G: T4 Specification Section 15 Part 1 (Clearing), Part 2 (Erosion Control), and Part 3 (Re-seeding)
- Attachment 2.4-2D: Transmission/Vegetation Management Plan (MNT-TRMX-00176)
- Attachment 4.3.1-1H: The Memorandum of Understanding between PEC and NCDENR describing the management of rare, threatened and endangered species, sensitive or exemplary natural communities, and other significant natural features within power line rights-of-way. The document entitled "Management of Rare Plant

Sites on CP&L Power Line Rights of Way" contains sensitive information. Excerpts from this document are available in the reading room.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 020 Attachment 2.4-1T pdf, 021 Attachment 4.3.1-1A.pdf, 022 Attachment 4.3.1-1B.pdf, 023 Attachment 4.3.1-1C.pdf, 024 Attachment 4.3.1-1D.pdf, 025 Attachment 4.3.1-1E.pdf, 026 Attachment 4.3.1-1F.pdf, 027 Attachment 4.3.1-1G.pdf, 028 Attachment 2.4-2D.pdf, 029 Attachment 4.3.1-1H.pdf

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.1-2

Text of NRC RAI: Confirm the locations of various proposed construction project areas and activities and provide information from the most recent terrestrial and wetland surveys of areas that will be impacted during construction.

Also provide RFI-158 CH2M Hill or most current plan and design – for depiction of temporary construction areas.

Discussions held at the site audit indicated that there may be changes to the proposed locations of various construction activities and construction materials sites and/or that some construction and roadway improvement areas have not been surveyed to characterize the resources. Please provide information and figures describing the proposed locations of temporary construction and laydown areas. Provide recent survey data for wetlands and terrestrial habitats, including wildlife and plants that may be impacted by both temporary and permanent construction not addressed in the ER, including but not limited to: temporary laydown areas for unit 3, construction parking areas, cooling tower locations for units 2 and 3, Wastewater Treatment Plant (WWTP) and any expanded WWTP lines, and any roadway improvement or construction projects outside the 220 to 240 contour around the reservoir. Provide the number of acres to be affected and the dominant habitat types for each area.

PGN RAI ID #: H-316

PGN Response to NRC RAI:

Potentially disturbed areas related to temporary and permanent construction, including temporary laydown areas for HAR 3, construction parking areas, cooling tower locations for HAR 2 and 3, wastewater treatment plant (WWTP), any expanded WWTP lines, and any roadway improvement or construction projects outside the 220-ft. to 240-ft.contour around the reservoir, are shown in Attachment 4.3.1-2A. This set of figures was developed based on the information included in RFI-158, as well as available subsequent information regarding construction plans.

Wetland delineation surveys were performed from November 10, 2008 through November 21, 2008. Delineation of emergent wetlands continued through December 5, 2008. This delineation effort addressed the complete Harris Reservoir shoreline and included planned temporary laydown areas, construction parking areas, cooling tower locations for HAR 2 and 3, and any roadway improvement projects outside the 220-ft. to 240-ft. contour. It is anticipated that the results of this effort will be available in a summary report by April 2009.

Additional information related to wetland impacts will be developed as part of the Least Environmentally Damaging Practicable Alternative (LEDPA) analysis. PEC submitted a Request for Proposal (RFP) to perform additional analyses on the alternative sites. Responses to the RFP were received on December 17, 2008. The scope of this work is provided as Attachment 4.3.1-2B to this response. It is anticipated that the LEDPA evaluations will be completed by May 2009.

A desktop analysis will be performed as part of the LEDPA analyses using the wetlands surveys and potentially disturbed areas to quantify wetland and stream impacts. These important areas can be overlaid on the potentially disturbed areas shown in Attachment 4.3.1-2A to identify the areas that may be impacted. It is anticipated that specific information regarding impacts to wetlands from roadways, blow-down lines, inundation, and transmission lines will be evaluated as part of the analyses. Results of the LEDPA analyses will be provided to the NRC for review upon completion.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 030 Attachment 4.3.1-2A.pdf and 031 Attachment 4.3.1-2B.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.1-3

Text of NRC RAI: Provide additional information on the impacts of noise on wildlife on the site.

Additional information is needed to describe the expected noise levels and impacts related to blasting to develop the pipeline corridor and whether these methods will potentially affect important species.

PGN RAI ID #: H-317

PGN Response to NRC RAI:

Some blasting may be required to develop the pipeline corridor from the Cape Fear River to Harris Lake. The impacts to wildlife are expected to be SMALL. A number of studies indicate that impacts to wildlife are usually brief in duration and temporary, such as the flushing of birds or the startling of deer.

Limited information is available related to the impacts of blasting on wildlife. An approximation of the effects of blasting can be inferred from studies that looked at impacts from sonic booms, low level aircraft flyovers, and military training.

According to the paper *Effects of Noise on Wildlife and Other Mammals: Review of Research since 1971* (Reference RAI 4.3.1-3 01), the impact to wildlife from noise varies depending on the type of noise, duration of the sound, and the species of animal. However, the most typical response is that of startling or flushing. Cottereau (Reference RAI 4.3.1-3 02) concluded that no chronic direct effects are expected to wildlife from loud impact noise such as sonic booms. No altered behavior or changes in productivity were seen in wild turkey when exposed to sonic booms (Reference RAI 4.3.1-3 03).

In *Effects of Military Noise on Wildlife: A Literature Review* (Reference RAI 4.3.1-3 04), Larkin summarizes numerous studies related to impacts of noise to wildlife from military operations. This paper suggests that aircraft noise, gunfire and artillery fire have noise levels equivalent to mining operations. One study recorded sound levels up to 135dB while showing nest productivity near the national average (Reference RAI 4.3.1-3 05).

A study performed by Ward (Reference RAI 4.3.1-3 06) observed the response of elk to detonation of explosives for seismic exploration. As part of the study, 40-pound and 80-pound dynamite charges were exploded on the surface. The sound level for these explosions ranged from 39.4dB to 124.6dB depending on the size of charge, proximity, and vegetation. Sound levels for blasts less than a mile away ranged from 84dB to 124.6dB. The vegetation along the pipeline corridor (mixed pine and hardwood) is

expected to be comparable to aspen stands reported by Ward at noise reduction. Blasting to prepare the trench for the pipeline would use buried rather than surface detonations, which would further reduce the sound levels reaching potential receptors. The sound levels that would be expected along the proposed pipeline route would be expected to be of the same magnitude or slightly less as those presented by Ward. Ward concluded that no detrimental effects on elk as a result of blasting noise occurred during the 3-year study period.

A study performed by the USACE (Reference RAI 4.3.1-3 07) showed that the red-cockaded woodpecker would flush from nests as a result of the firing of artillery in proximity (<121.9 meters) but would quickly return to the nest. No significant differences in nesting success or productivity were found between experimentally disturbed and relatively undisturbed red-cockaded woodpecker groups.

While many studies indicate that the behavioral impacts are small, the basis of the conclusions is often limited. Some physiological effects have been seen in these studies, indicating that there is a potential for impacts if blasting is frequent or performed during critical life stages.

References

Reference 4.3.1-3 01

USEPA. 1980. *Effects of Noise on Wildlife and Other Mammals: Review of Research since 1971. US Environmental Protection Agency, Office of Noise Abatement and Control. Washington, DC.*

Reference 4.3.1-3 02

Cottereau, P. 1977. *Effect of Sonic Boom from Aircraft on Wildlife and Animal Husbandry* in Effects of Noise on Wildlife. Academic Press. pp 63-79.

Reference 4.3.1-3 03

Lynch, T.E. and D.W. Speake. 1977. *Eastern Wild Turkey Behavioral Response Induced by Sonic Boom* in Effects of Noise on Wildlife. Academic Press. pp 63-79.

Reference 4.3.1-3 04

Larkin, R.P., Pater, L.L., and Tazik, D.J. Effects of military noise on wildlife: a literature review. US Army Corps of Engineers. USACERL Technical Report 96/21. Champaign, IL.

Reference 4.3.1-3 05

Russell, W.A., JR. and N.D. Lewis. Quantification of Military Noise in Bald Eagle Habitat at Aberdeen Proving Ground, Maryland. Bioacoustic Division, U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.

Reference 4.3.1-3 06

Ward, A.L. 1984. The Response of Elk to Seismographic Activity in the Little Snake River Known Recoverable Coal Resource Area of Southcentral Wyoming. Rocky Mountain Forest and Range Experiment Station. Laramie, WY.

Reference 4.3.1-3 07

USACE. 2002. *Assessment of Training Noise Impacts on the Red-Cockaded Woodpecker: 1998 – 2000.* ERDC/CERL TR-02-32. US Army Corps of Engineers, Engineer Research and Development Center.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.1-4

Text of NRC RAI: Provide additional information regarding planned and potential mitigation required in accordance with local, state, and federal regulations.

Provide information and details of the identified mitigation requirements and mitigation plan when prepared and as available. Please identify and discuss any potential areas that have been identified for mitigation of wetlands and/or terrestrial wildlife habitats.

PGN RAI ID #: H-318

PGN Response to NRC RAI:

The development of the mitigation plan is ongoing. PEC is coordinating with the USACE Wilmington District, the USFWS, and the NCDENR (including NCWRC) to develop an appropriate mitigation plan for the impacts from the proposed project. The mitigation plan will be made available upon completion.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4-2

Text of NRC RAI: Provide ER References:

2.4-007 CH2M HILL, "Secondary and Cumulative Impacts Master Mitigation Plan: Apex, North Carolina," October 2005.

2.4-016 Blank, Gary B., Douglas S. Parker, and Scott M. Bode, "Multiple Benefits of Large, Undeveloped Tracts in Urbanized Landscapes: A North Carolina Example," *Journal of Forestry* (April/May 2002): 27-32.;

4.3-016 Carolina Power & Light Company, "Shearon Harris Wildlife Management Implementation Plan" CP&L Environmental Services Section, December 1984.

5.1-013 Progress Energy Carolinas, Inc., "Vegetation Management in Transmission Corridors," RFI 213, June 1, 2007.

6.5-016 Progress Energy Carolinas, Inc., Environmental Training: Endangered Species, EVC-SUBS-00062, Rev 0. January 2003.

PGN RAI ID #: H-319

PGN Response to NRC RAI:

The requested references are attached to this response as Attachment 2.4-2A through Attachment 2.4-2E.

Attachment 2.4-2A:

> Reference 2.4-007: CH2M HILL, "Secondary and Cumulative Impacts Master Mitigation Plan: Apex, North Carolina," October 2005.

Attachment 2.4-2B:

> Reference 2.4-016: Blank, Gary B., Douglas S. Parker, and Scott M. Bode, "Multiple Benefits of Large, Undeveloped Tracts in Urbanized Landscapes: A North Carolina Example," *Journal of Forestry* (April/May 2002): 27-32.

Attachment 2.4-2C:

> Reference 4.3-016: Carolina Power & Light Company, "Shearon Harris Wildlife Management Implementation Plan" CP&L Environmental Services Section, December 1984.

Attachment 2.4-2D:

Reference 5.1-013: Progress Energy Carolinas, Inc., "Vegetation Management in Transmission Corridors," RFI 213, June 1, 2007.

Attachment 2.4-2E:

Reference 6.5-016: Progress Energy Carolinas, Inc., Environmental Training: Endangered Species, EVC-SUBS-00062, Rev. 0. January 2003.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 032 Attachment 2.4-2A.pdf, 033 Attachment 2.4-2B.pdf, 034 Attachment 2.4-2C.pdf, 028 Attachment 2.4-2D.pdf, and 035 Attachment 2.4-2E.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.2-1

Text of NRC RAI: Provide construction plans for the proposed Harris Lake makeup water system intake structure on the Cape Fear River, including intake design, aquatic habitats likely to be impacted, information on proposed timing and length of the construction period, any predictions of the need for future dredging in the vicinity of the intake.

Species information for Gulf Creek and Cape Fear River were provided, but detailed information is needed to assess impacts from construction and operation.

PGN RAI ID #: H-320

PGN Response to NRC RAI:

The information included in the ER reflects the most up-to-date construction plans for the Harris Lake makeup water system. Subsection 3.1.4.1 is based on ER Reference 5.3-001 and describes the conceptual design of the makeup water system. This system includes a concrete-lined channel that extends into the Cape Fear River, a pump house on the bank of the Cape Fear River, and a 42-inch pipeline from the pumphouse to the discharge structure into Harris Lake. Figure 2.0-5 of the ER displays the location of the water intake channel and Attachment 4.3.2-1A to this response is a conceptual design of the makeup pumphouse and intake channel. Figure 3.3-4 of the ER displays the discharge structure that would be located in Harris Lake.

More detailed information regarding the intake design, potentially impacted aquatic habitats, construction period, and the need for dredging is not available at this time. These details will be provided to the NRC once they have been finalized.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 036 Attachment 4.3.2-1A.pdf

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.2-2

Text of NRC RAI: Provide information regarding characterization and dewatering methods to be used for the fire pond during construction activities.

Fire pond characterization was not performed; no management plan was available to describe impacts associated with filling in this water resource.

PGN RAI ID #: H-321

PGN Response to NRC RAI:

Wetland delineation surveys were performed from November 10, 2008 through November 21, 2008. Delineation of emergent wetlands continued through December 5, 2008. This delineation effort included planned temporary laydown areas, construction parking areas, cooling tower locations for HAR 2 and 3. The fire pond was characterized as part of these surveys. A report documenting the wetlands surveys will be provided to the NRC upon completion.

Dewatering methods used for the fire pond have not been determined at this time. The specific method used will be selected by the contractor who will be leading the construction activities. Once the methods for dewatering are known, they will be supplied to the NRC.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.2-3

Text of NRC RAI: Provide construction plans for the proposed Harris Lake makeup water discharge structure and blowdown cooling discharge structures, including discharge design, potential impact to aquatic biota, and information on proposed timing and length of the construction period.

Discharge structures likely to be similar to those for existing HAR unit 1; final plans and construction timeline should address this issue.

PGN RAI ID #: H-322

PGN Response to NRC RAI:

The information included in the ER reflects the most up-to-date construction plans for the Harris Lake makeup water system. More detailed information for the proposed Harris Lake makeup water discharge structure and blowdown cooling discharge structures, including discharge design, potential impact to aquatic biota, and information on proposed timing and length of the construction period, is not available at this time. These details will be provided to the NRC once they have been finalized.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.2-4

Text of NRC RAI: Provide construction plans for the proposed Harris Lake water system intake structure on Harris Lake for units 2 and 3, including intake design, aquatic habitats likely to be impacted, information on proposed timing and length of the construction period, any predictions of the need for future dredging in the vicinity of the intake. Maintenance reports from existing intake screens for unit 1 are needed to provide estimates for magnitude of potential impingement of new intakes for Harris Lake.

PGN RAI ID #: H-323

PGN Response to NRC RAI:

The information included in the ER reflects the most up-to-date construction plans for the Harris Lake water system intake structure. More detailed information regarding the intake design, potentially impacted aquatic habitats, construction period, and the need for dredging is not available at this time. These details will be provided to the NRC once they have been finalized. Additional detail on the ongoing characterization of wetlands is provided in the response to RAI 2.4.1-3. The 2008 monitoring results for the Cape Fear River and Harris Lake are in the process of being compiled into a summary report. It is anticipated that this report will be completed by February 2009. The summary report will be submitted to the NRC upon completion.

Recent intake structure maintenance reports are included as Attachments 4.3.2-4A through 4.3.2-4D. These reports are compiled on a regularly scheduled basis and focus primarily on condition of the screens and siltation at the intake. However, these reports would also include observations of any biological or non-biological matter trapped on the screens at the time of the inspection.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 037 Attachment 4.3.2-4A.pdf, 038 Attachment 4.3.2-4B.pdf, 039 Attachment 4.3.2-4C.pdf, and 040 Attachment 4.3.2-4D.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.2-1

Text of NRC RAI: Provide additional details regarding aquatic biota monitoring for both the Cape Fear River and Harris Lake; specifically any American eel observations, the 2008 monitoring reports for both water bodies, and the 2006 Harris Monitoring Report.

Reports are noted to be in progress for pre-construction monitoring, and should be submitted to NRC staff when available.

PGN RAI ID #: H-324

PGN Response to NRC RAI:

The 2006 Monitoring Report is attached to this response as Attachment 2.4.2-1A. Monitoring information for the American Eel in Harris Lake for the period from 1983 through 2004 is provided in Table 1. Transect locations are shown on Figure 1 of Attachment 2.4.2-1A.

Table 1
American Eel Collected in Harris Lake, 1983-2004

Transect	Station	Month	Year	Number	Length	Weight	Gear Type
E	1	5	1983	1	250	20	11
E	1	5	1983	1	400	150	11
P	3	5	1983	1	496	230	11
V	1	5	1983	1	300	70	11
H	3	8	1983	1	411	255	11
H	3	8	1983	1	483	203	11
P	3	8	1983	1	480	217	11
E	3	11	1983	1	420	160	11
H	1	5	1984	1	440	182	11
P		9	1984	1	540	317	50
E	1	11	1984	1	578	369	11
P	1	11	1984	1	605	539	11
P	3	11	1984	1	407	144	11

Table 1 (continued)
American Eel Collected in Harris Lake, 1983-2004

Transect	Station	Month	Year	Number	Length	Weight	Gear Type
P	3	11	1984	1	480	309	11
P	3	11	1984	1	620	454	11
V	3	11	1984	1	573	369	11
P	3	2	1985	1	480	400	11
P	1	4	1985	1	440	200	11
P	3	4	1985	1	510	500	11
P	1	5	1985	1	520	330	11
P	3	5	1985	1	530	250	11
E	1	7	1985	1	515	280	11
H	3	7	1985	1	435	178	11
P	3	11	1985	1	640	595	11
V	3	5	1986	1	598	470	11
E	1	8	1986	1	485	261	11
E		9	1986	1	587	475	50
P		9	1986	1	505	260	50
P		9	1986	1	600	410	50
P		9	1986	1	555	341	50
P	3	5	1987	1	440	480	11
V	1	8	1987	1	677	815	11
V	3	2	1991	1	682	760	11

Notes:
Transect locations are shown in Figure 1 of Attachment 2.4.2-1A.
Gear Types:
11 = boat electro-fisher, 50 = cove rotenone sampling

Source: Tom Thompson, Progress Energy Carolinas database. Downloaded 7/17/08

The 2008 monitoring results for the Cape Fear River and Harris Lake are in the process of being compiled into a summary report. It is anticipated that this report will be completed by February 2009. The summary report will be submitted to the NRC upon completion.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 041 Attachment 2.4.2-1A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 6.5.2-1

Text of NRC RAI: Provide detailed plans for construction and operation monitoring.

ESRP sections 6.5.2 states that monitoring programs should cover data collection and analytical methods where causal relationships between construction / operation and potential adverse change may occur (see pages 6.5.2-1 through 6.5.2-3 of NUREG-1555).

The monitoring plans for both of these phases (construction and operations) for aquatic resources in the Cape Fear River and Harris Lake are inadequate in the monitoring requirements were described only as "to be determined". Objectives and elements for monitoring plans need to be outlined with details such as measurement and sampling methods, frequency and duration of sampling.

PGN RAI ID #: H-325

PGN Response to NRC RAI:

As described in ER Subsection 6.5.2, PEC currently monitors biological communities and water quality characteristics in the Cape Fear River and Harris Lake on a quarterly basis. This monitoring includes measurement of field parameters and the collection of samples for laboratory analysis of water quality constituents for both Harris Lake and the Cape Fear River. Water quality monitoring in the vicinity of the HNP has been conducted since 1972. An example of the objectives, methods, locations, and schedules of the environmental monitoring program is provided in Attachment 2.4.2-1A.

This monitoring will continue through the construction and operation phases of HAR 2 and 3. Review of the historical monitoring and data collected during the construction and operation phases of HAR 2 and 3 can be used to evaluate changes in biological communities and water quality characteristics of the Cape Fear River and Harris Lake as a result of construction and operation. It is also anticipated that additional monitoring requirements may be specified as part of the permitting process. Water quality will be monitored at the locations expected to be most affected by construction and operation of the HAR. More detail on the specifics of this monitoring cannot be provided until additional discussions with state and federal agencies are held as part of the permitting process.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 041 Attachment 2.4.2-1A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.2-2

Text of NRC RAI: Provide updates on permitting activities regarding aquatic biota monitoring as they become available.

USFWS consultation on Cape Fear shiner needs to be provided.

PGN RAI ID #: H-326

PGN Response to NRC RAI:

As described in ER Subsection 6.5.2, PEC currently monitors biological communities and water quality characteristics in the Cape Fear River and Harris Lake on a quarterly basis. This monitoring includes measurement of field parameters and collection of samples for laboratory analysis of water quality constituents for both Harris Lake and the Cape Fear River. This monitoring will continue through the construction and operation phases of HAR 2 and 3.

It is anticipated that additional monitoring requirements may be specified as part of the permitting process. More details on the specifics of this monitoring are not currently available but will be provided as discussions with state and federal agencies are held. A list of the agencies contacted during the COLA process is provided in Table 1.

No details regarding consultation with the USFWS on the Cape Fear shiner are available at this time. If discussions regarding the Cape Fear shiner occur with the USFWS during the permitting process, the conclusions of the discussions will be provided to the NRC. However, as described in ER Subsection 2.4.2.3.2, the Cape Fear shiner likely does not occur in the vicinity of the proposed intake structure on the Cape Fear River:

> The Cape Fear shiner, *Notropis mekistocholas*, is a small minnow that prefers gravel, cobble, and boulder substrates in slow pools, riffles, and slow runs. It is endemic to the upper Cape Fear River Basin, known only in the Deep, Haw, and Rocky River subbasins. It has been extirpated to such an extent, that only five populations of the shiner are thought to exist (Reference 2.4-028). This fish likely does not occur in the vicinity of the proposed water intake structure, given the limited distribution of the species and habitat at the intake structure not being conducive for the shiner. The USFWS has identified critical habitat for this species, and the intake structure would not occur in the area of concern (Reference 2.4-037). The Cape Fear shiner is not known to exist in the portion of the Cape Fear River from Buckhorn Dam to Lock and Dam 3, and is thought to be extirpated in this area (Reference 2.4-028).

Table 1 HAR COLA Pre-Application Contacts with Government Officials and Agencies	
OFFICIALS	
Official	**Authority**
DENR Director, Water Quality	Water Quality
DENR Director, Water Resources	Water Resources
DENR Director, Environmental Health	Env Health, Radiation Protection
AGENCIES	
Agency	**Authority**
U.S. Fish & Wildlife	Federally listed Threatened and Endangered Species (T&E)
NC Wildlife Resources Commission	State listed T&E Wildlife (Game Lands, Boat Ramps)
NC Natural Heritage Program	State listed T&E
U.S. Army Corps of Engineers (USACE)	Waters of the U.S. (Dredge & fill permits (404))
NCDENR DWR Water Resources	Water Quantity (Withdrawal)
NCDENR	SEPA Coordinator
Wake County	Parks / Harris Lake Park

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.2-3

Text of NRC RAI: Provide a current T&E/SC species list for 4-county area.

Species list provided in Table 2.4-2 of the ER is not complete.

PGN RAI ID #: H-327

PGN Response to NRC RAI:

The complete T&E/SC species list is provided at the end of this response. This information is compiled from the federal Threatened and Endangered Species List (Reference RAI 2.4.2-3 01) and the North Carolina Threatened and Endangered Species List (Reference RAI 2.4.2-3 02) and reflects the most current information available on January 5, 2009. The revised table will be included in a future update of the ER.

References

Reference 2.4.2-3 01

USFWS, "Endangered Species, Threatened Species, Federal Species of Concern, and Candidate Species for North Carolina," http://www.fws.gov/nc-es/es/countyfr.html. U.S. Fish and Wildlife Service, Updated January 31, 2008 (Accessed January 6, 2009).

Reference 2.4.2-3 02

NCDENR, "North Carolina Natural Heritage Program," http://149.168.1.196/nhp/county.html. North Carolina Department of Environment and Natural Resources, Natural Heritage Program, Updated May 4, 2008 (Accessed January 6, 2009).

Associated HAR COL Application Revisions:

The complete threatened and endangered species list attached to this document will replace Table 2.4-2 shown in HAR ER Rev 0.

Attachments/Enclosures:

None.

Table 2.4-2 (Sheet 1 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Common Name	Scientific Name	State Status	Federal Status	County – Occurrence[1]
Plants				
Scale-leaf Gerardia	*Agalinis aphylla*	SR-P	None	Ha
Striped Garlic	*Allium cuthbertii*	SR-T	None	Ch (H)
Georgia Indigo-bush	*Amorpha georgiana var. georgiana*	E	FSC	Ha, Lee
Sandhills Milk-vetch	*Astragalus michauxii*	T	FSC	Ha
Thin-pod White Wild Indigo	*Baptisia albescens*	SR-P	None	Ch (H)
A Pygmy Moss	*Bruchia brevifolia*	SR-T	None	Ha (H)
A Pygmy Moss	*Bruchia carolinae*	SR-L	None	Lee (H)
A Pygmy Moss	*Bruchia fusca*	SR-T	None	Ha (H)
American Bluehearts	*Buchnera americana*	SR-P	None	Ha (H), Wa (H)
Oersted's Campylopus	*Campylopus oerstedianus*	SR-D	None	Wa (H)
Douglass's Bittercress	*Cardamine douglassii*	SR-P	None	Ha, Wa
Barratt's Sedge	*Carex barrattii*	E	None	Ha (H)
Coastal Sedge	*Carex exilis*	T	None	Ha
Ravine Sedge	*Carex impressinervia*	SR-T	FSC	Ha
James's Sedge	*Carex jamesii*	SR-P	None	Ha, Lee (H)
Necklace Sedge	*Carex projecta*	SR-P	None	Lee
Kidney Sedge	*Carex reniformis*	SR-P	None	Wa (H)
A Sedge	*Carex sp. 4*	SR-L	None	Ha
Rigid Sedge	*Carex tetanica*	SR-P	None	Wa (H)
Carolina Thistle	*Cirsium carolinianum*	SR-P	None	Wa (H)
Twig-rush	*Cladium mariscoides*	SR-O	None	Ha
A Moss	*Cleistocarpidium palustre*	SR-T	None	Wa
Piedmont Horsebalm	*Collinsonia tuberosa*	SR-P	None	Ch
Granite Flatsedge	*Cyperus granitophilus*	SR-T	None	Wa
Bog Oatgrass	*Danthonia epilis*	SR-T	FSC	Ha
A Witch Grass	*Dichanthelium annulum*	SR-P	None	Ch (H), Lee (H), Wa (H)
A Witch Grass	*Dichanthelium sp. 9*	SR-L	None	Ha, Wa (H)
Water Purslane	*Didiplis diandra*	SR-P	None	Ha (Obs), Wa

Table 2.4-2 (Sheet 2 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Common Name	Scientific Name	State Status	Federal Status	County - Occurrence
Robbins' Spikerush	*Eleocharis robbinsii*	SR-P	None	Ha
Eastern Isopyrum	*Enemion biternatum*	SR-P	None	Ch (H), Ha, Lee
Godfrey's Thoroughwort	*Eupatorium godfreyanum*	SR-P	None	Wa (H)
Pine Barren Boneset	*Eupatorium resinosum*	T-SC	None	Ha
Large Witch-alder	*Fothergilla major*	SR-T	None	Ch, Ha, Wa
Indian Physic	*Gillenia stipulata*	SR-P	None	Ch (H), Lee (H), Wa
Littleleaf Sneezeweed	*Helenium brevifolium*	E	None	Wa (H)
Crested Coralroot	*Hexalectris spicata*	SR-P	None	Ha
Sarvis Holly	*Ilex amelanchier*	SR-P	None	Ha (H)
Slender Blue Iris	*Iris prismatica*	SR-T	None	Ha
Piedmont Quillwort	*Isoetes piedmontana*	T	None	Wa
Virginia Quillwort	*Isoetes virginica*	SR-L	FSC	Ch (H)
Raven Rock Liverwort	*Lejeunea glaucescens var. acrogyna*	SR-L	None	Ha (H)
Earle's Blazing-star	*Liatris squarrulosa*	SR-P	None	Ha (Obs), Wa
Sandhills Lily	*Lilium pyrophilum*	E-SC	FSC	Ha, Lee
Bog Spicebush	*Lindera subcoriacea*	T	FSC	Lee, Wa
Carolina Birdfoot-trefoil	*Lotus helleri*	SR-T	FSC	Wa
Long Beach Seedbox	*Ludwigia brevipes*	SR-T	None	Ha (H)
Rough-leaf Loosestrife	*Lysimachia asperulifolia*	E	E	Ha
Carolina Bogmint	*Macbridea caroliniana*	T	FSC	Ha
Bigleaf Magnolia	*Magnolia macrophylla*	SR-P	None	Wa
Glade Milkvine	*Matelea decipiens*	SR-P	None	Wa
Sweet Pinesap	*Monotropsis odorata*	SR-T	FSC	Ch, Wa (H)
Carolina Grass-of-parnassus	*Parnassia caroliniana*	E	FSC	Ha, Lee (H)
Horsetail Crown Grass	*Paspalum fluitans*	SR-D	None	Ch (H), Ha
Buttercup Phacelia	*Phacelia covillei*	SR-T	FSC	Ch, Ha, Lee
A Moss	*Pleuridium sullivantii*	SR-O	None	Ha (H)

Table 2.4-2 (Sheet 3 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Common Name	Scientific Name	State Status	Federal Status	County - Occurrence
Seneca Snakeroot	*Polygala senega*	SR-D	None	Wa
Small's Portulaca	*Portulaca smallii*	T	None	Wa
Conferva Pondweed	*Potamogeton confervoides*	SR-D	None	Ha
Heller's Rabbit-Tobacco	*Pseudognaphalium helleri*	SR-P	None	Wa
Harperella	*Ptilimnium nodosum*	E	E	Ch, Lee (H)
Virginia Mountain-mint	*Pycnanthemum virginianum*	SR-P	None	Wa
Sandhills Pyxie-moss	*Pyxidanthera barbulata var. brevifolia*	E	FSC	Ha, Lee (H)
Michaux's Sumac	*Rhus michauxii*	E-SC	E	Wa
Southern White Beaksedge	*Rhynchospora macra*	E	None	Ha
Long-beak Baldsedge	*Rhynchospora scirpoides*	SR-O	None	Ha
Sun-facing Coneflower	*Rudbeckia heliopsidis*	E	FSC	Ha (H)
Low Wild-petunia	*Ruellia humilis*	T	None	Wa (H)
Pursh's Wild-petunia	*Ruellia purshiana*	SR-O	None	Wa
Grassleaf Arrowhead	*Sagittaria weatherbiana*	SR-T	FSC	Wa (H)
Swamp Saxifrage	*Saxifraga pensylvanica*	SR-P	None	Wa
Canby's Bulrush	*Schoenoplectus etuberculatus*	SR-P	None	Ha
Swaying Bulrush	*Schoenoplectus subterminalis*	SR-P	None	Ha
Southern Skullcap	*Scutellaria australis*	SR-P	None	Lee (H), Wa (H)
Veined Skullcap	*Scutellaria nervosa*	SR-P	None	Ch (H), Wa (H)
Prairie Dock	*Silphium terebinthinaceum*	SR-P	None	Wa (H)
Western Rough Goldenrod	*Solidago radula*	SR-P	None	Wa (H)
Spring-flowering Goldenrod	*Solidago verna*	T	FSC	Ha
Orange Peatmoss	*Sphagnum subsecundum*	SR-P	None	Wa (H)
Giant Peatmoss	*Sphagnum torreyanum*	SR-P	None	Ha (H)
Pickering's Dawnflower	*Stylisma pickeringii var. pickeringii*	E	FSC	Ha
Narrow-leaf Aster	*Symphyotrichum laeve var. concinnum*	SR-P	None	Wa (H)

Table 2.4-2 (Sheet 4 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Common Name	Scientific Name	State Status	Federal Status	County - Occurrence
Appalachian Golden-banner	*Thermopsis mollis*	SR-P	None	Ch (H), Wa
Pale Mannagrass	*Torreyochloa pallida*	SR-P	None	Ha
A Chain-teeth Moss	*Tortula plinthobia*	SR-O	None	Wa (H)
Virginia Spiderwort	*Tradescantia virginiana*	SR-P	None	Ha, Wa
Carolina Triodia	*Tridens carolinianus*	SR-T	None	Ha
Buffalo Clover	*Trifolium reflexum*	SR-T	None	Ch (H), Ha, Wa
Virginia Least Trillium	*Trillium pusillum var. virginianum*	E	FSC	Wa
Carolina Pineland-cress	*Warea cuneifolia*	E	None	Ha (H)
Chapman's Yellow-eyed-grass	*Xyris chapmanii*	SR-T	None	Ha
Harper's Yellow-eyed-grass	*Xyris scabrifolia*	SR-T	FSC	Ha
Animals				
Bachman's Sparrow	*Aimophila aestivalis*	SC	FSC	Ch, Ha, Wa (H)
Dwarf Wedgemussel	*Alasmidonta heterodon*	E	E	Wa
Triangle Floater	*Alasmidonta undulata*	T	None	Ch, Ha, Lee, Wa
Brook Floater	*Alasmidonta varicosa*	E	FSC	Ch
Roanoke Bass	*Ambloplites cavifrons*	SR	FSC	Wa
Eastern Tiger Salamander	*Ambystoma tigrinum*	T	None	Wa
American eel	*Anguilla rostrata*	None	FSC	Ch, Ha, Lee, Wa
Frosted Elfin	*Callophrys irus*	SR	None	Ha
Carolina Ladle Crayfish	*Cambarus davidi*	SR	None	Ch, Ha, Wa
Dismal Swamp Green Stink Bug	*Chlorochroa dismalia*	SR	None	Ha (H)
A Mayfly	*Choroterpes basalis*	SR	None	Ch
Star-nosed Mole - Coastal Plain Population	*Condylura cristata pop. 1*	SC	None	Wa
A Caddisfly	*Dibusa angata*	SR	None	Wa
Pod Lance	*Elliptio folliculata*	SC	None	Ha

Table 2.4-2 (Sheet 5 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Common Name	Scientific Name	State Status	Federal Status	County - Occurrence
Yellow Lance	*Elliptio lanceolata*	E	FSC	Wa
Roanoke Slabshell	*Elliptio roanokensis*	T	None	Cha, Ha, Lee, Wa
Mottled Duskywing	*Erynnis martialis*	SR	None	Wa
Carolina Darter - Eastern Piedmont Population	*Etheostoma collis pop. 2*	SC	FSC	Ch
Carolina darter	*Etheostoma collis lepidinion*	None	FSC	Ch, Wa
Two-spotted Skipper	*Euphyes bimacula*	SR	None	Ha
Atlantic Pigtoe	*Fusconaia masoni*	E	FSC	Ch, Ha, Wa
Spine-crowned Clubtail	*Gomphus abbreviatus*	SR	None	Ch (Obs), Lee (Obs)
Rapids Clubtail	*Gomphus quadricolor*	SR	None	Ch (Obs)
Septima's Clubtail	*Gomphus septima*	SR	FSC	Ch, Ha, Lee
Bald Eagle	*Haliaeetus leucocephalus*	T	None	Ch, Ha, Lee, Wa
Four-toed Salamander	*Hemidactylium scutatum*	SC	None	Ch, Wa
Southern Hognose Snake	*Heterodon simus*	SC	FSC	Wa (Obs)
Pine Barrens Treefrog	*Hyla andersonii*	SR	None	Ha, Lee (H)
Least Brook Lamprey	*Lampetra aepyptera*	T	None	Wa
Yellow Lampmussel	*Lampsilis cariosa*	E	FSC	Ch, Ha, Lee
Eastern Lampmussel	*Lampsilis radiata radiata*	T	None	Wa
Loggerhead Shrike	*Lanius ludovicianus*	SC	None	Ch, Ha, Lee, Wa
Green Floater	*Lasmigona subviridis*	E	FSC	Wa
Lemmer's Pinion	*Lithophane lemmeri*	SR	None	Wa (Obs)
Pinewoods shiner	*Lythrurus matutinus*	None	FSC	Wa
A Short-winged Melanoplus	*Melanoplus nubilus*	SR	None	Ha
Eastern Coral Snake	*Micrurus fulvius*	E	None	Ha (Obs)
Carolina Redhorse	*Moxostoma sp. 2*	SR [PE]	FSC	Ch, Ha, Lee

Table 2.4-2 (Sheet 6 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Common Name	Scientific Name	State Status	Federal Status	County - Occurrence
Southeastern Myotis	*Myotis austroriparius*	SC	FSC	Wa (H)
Northern Long-eared Myotis	*Myotis septentrionalis*	SC	None	Wa (H)
Neuse River Waterdog	*Necturus lewisi*	SC	None	Wa
Smoky Shadow Dragon	*Neurocordulia molesta*	SR	None	Ha (Obs)
Cinnamon Shadowdragon	*Neurocordulia virginiensis*	SR	None	Ch (Obs), Ha (Obs)
Cape Fear Shiner	*Notropis mekistocholas*	E	E	Ch, Ha (H), Lee
Carolina Madtom	*Noturus furiosus*	SC [PT]	FSC	Wa
North Carolina Spiny Crayfish	*Orconectes carolinensis*	SC	None	Wa (H)
Giant Swallowtail	*Papilio cresphontes*	SR	None	Wa (Obs)
Double-crested Cormorant	*Phalacrocorax auritus*	SR	None	Ch
Red-cockaded Woodpecker	*Picoides borealis*	E	E	Ch (H), Ha, Lee (H), Wa (H)
Northern Pine Snake	*Pituophis melanoleucus melanoleucus*	SC	FSC	Ha (H)
Diana fritillary (butterfly)	*Speyeria diana*	None	FSC	Wa
A New Prominent Moth	*Schizura sp. 1*	SR	None	Wa (Obs)
Eastern Fox Squirrel	*Sciurus niger*	SR	None	Ha, Wa
Sandhills Chub	*Semotilus lumbee*	SC	FSC	Ha
Pigmy Rattlesnake	*Sistrurus miliarius*	SC	None	Ha (Obs)
Creeper	*Strophitus undulatus*	T	None	Ch, Ha, Lee, Wa
Savannah Lilliput	*Toxolasma pullus*	E	FSC	Ch ,Lee
Notched Rainbow	*Villosa constricta*	SC	None	Ch, Ha, Lee (H), Wa
Eastern Creekshell	*Villosa delumbis*	SR	None	Ch
Carolina Creekshell	*Villosa vaughaniana*	E	FSC	Ch

Table 2.4-2 (Sheet 7 of 7)
Species with Potential to Utilize Habitats Occurring in the Four-County Area Surrounding Shearon Harris Nuclear Plant

Sources: References RAI 2.4.2-3 01 and RAI 2.4.2-3 02

Notes:
[1] All species listed have been observed in the County listed unless otherwise noted.
- Historic indicates the species was observed in the County in the last 50 years.
- Obscure indicates that the species observation date or location is uncertain.
- Probable/Potential indicates the species is considered to likely occur in this County based on the proximity of known observations, the potential for suitable habitat, or both.

Ch	Chatham
Ha	Harnett
Lee	Lee
Wa	Wake
H	Historic
Obs	Obscure
Pr	Probable/Potential
E	Endangered
T	Threatened
SC	Species of Concern
C	Candidate
SR	Significantly Rare
EX	Extirpated
-L	Limited
-T	Throughout
-D	Disjunct
-P	Peripheral
-O	Other
-SC	Species of Concern
P_	Proposed
BGPA	Bald and Golden Eagle Protection Act.
EXN	Endangered, nonessential experimental population.
EXP	Exponential Population
T (S/A)	Threatened due to Similarity of Appearance.
FSC	Federal "Species of Concern"
PE	Proposed Endangered
PD	Proposed De-listed
PT	Proposed Threatened

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4.2-4

Text of NRC RAI: Provide the Ecological Field Observations, August 2006 Report Appendix for Benthic Invertebrate and Species List.

Detailed sampling information at the species level was not provided in the ER, Subsection 2.4.2.1.3 and Table 2.4-5.

PGN RAI ID #: H-328

PGN Response to NRC RAI:

The complete 2006 Ecological Field Observations Harris Nuclear Plant report, including the detailed benthic invertebrate and species list, is provided as Attachment 2.4-1B to this response.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 015 Attachment 2.4-1B.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.3.1.2-1

Text of NRC RAI:

Clarify the estimate of the magnitude of the potential impingement and entrainment impacts on aquatic species populations and the aquatic ecosystems in Cape Fear River and Harris Lake. At the site audit, the impingement/entrainment study for the Cape Fear Power Plant was discussed in terms of understanding the magnitude of 29 million organisms impinged annually.

PGN RAI ID #: H-329

PGN Response to NRC RAI:

The discussion provided at the site audit referenced the written discussion provided in ER Subsection 5.3.1.2.3. A misunderstanding apparently resulted from the discussion of impingement and entrainment. The reference to 29 million organisms referred to a developed discussion of entrainment impacts, not impingement. The ER states that:

"The annual entrainment estimate under design flow at HAR is 29,760,111 shellfish and ichthyoplankton (Table 5.3-3) (Reference 5.3-004). Shellfish (Asiatic clam and fingernail clam) account for 59 percent of the estimated annual entrainment and ichthyoplankton comprise 41 percent of the estimated annual entrainment. Unidentified eggs, Dorosoma eggs, and Dorosoma larvae account for 88 percent of the ichthyoplankton entrainment estimate."

Table 5.3-3
Estimated Annual Entrainment at Design Flow at HAR

Taxa	Density[a] (No. per MG)	Estimated Annual Entrainment at Design Flow[b]
Total entrainment	945.63	29,760,111
Total shellfish	561.95	17,685,241
Total ichthyoplankton	383.68	12,074,870
Total eggs	159.54	5,020,915
Unidentified eggs	131.75	4,146,331
Dorosoma spp. egg	27.79	874,585
Total larvae	224.14	7,053,955
Dorosoma spp. larvae	179.24	5,640,898
Channel catfish larvae	5.92	186,310
Lepomis spp larvae	3.23	101,652
Other larvae	35.75	1,125,095

Notes:
a) Densities at the Cape Fear Power Plant

b) design annual intake volume = 86.4 mgd * 364.25 = 31,471.2 mg

The ER goes on to clarify the magnitude of expected impacts as follows:

> "The Cape Fear River entrainment effects are anticipated to be SMALL for several reasons. Resident fish species in the Cape Fear River in the vicinity of the proposed Harris Lake makeup water system pumphouse who are pelagic spawners and most susceptible to entrainment include only forage species with high regenerative rates. These species include the threadfin shad, white perch, and gizzard shad (Reference 5.3-007). These species are protected from entrainment impacts due to the fact that the seasonal periods with the highest concentrations of eggs and larvae correspond to the higher flow periods in the river. Also, since the proposed makeup water intake is located on one side of the Cape Fear River and will take only a very small portion of the total average flow during the spring spawning season for pelagic spawners, which generally corresponds to high river flows, potential impacts to local populations are anticipated to be too small to be measured. Most other riverine species are either nest builders or prefer hard rocky substrates for egg deposition, and the larvae and young-of-the-year (yoy) for these nest builders and substrate spawners will not generally be present at the Harris Lake makeup water system pumphouse, except for very localized and limited populations."

Additionally, the study for the Cape Fear Power Plant (ER Reference 5.3-004) states that:

"Nearly all of the fish species entrained or impinged were younger, non-reproducing life stages, especially for gizzard shad and channel catfish. This is an important point to consider in any assessment of the overall possible adverse effects of entrainment and impingement on the fish populations in the area. Cooling water withdrawal did not significantly affect the spawning-aged individuals required for future generations of fish. In addition, Progress Energy Carolinas, Inc biologist were required to collect fish tissue samples just downstream in the vicinity of the Buckhorn Dam as part of the Harris Nuclear Plant technical specification requirements. Observation while conducting the sampling indicated very healthy and abundant shad, sunfish, and catfish populations."

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.2-5

Text of NRC RAI: Provide detailed information regarding locations of wetlands and perennial/intermittent streams to be impacted by construction in ROW.

At the site audit, there was discussion of using existing transmission corridors, but final details such as the need for widening corridors and that impact to wetlands and streams had not yet been determined.

PGN RAI ID #: H-330

PGN Response to NRC RAI:

Specific information regarding the locations of rights-of-way has not been determined at this time. These details will be provided to the NRC once they have been finalized. Wetland delineation and perennial and intermittent stream surveys were performed from November 10, 2008 through December 5, 2008, on these areas and the area to be impacted related to raising the lake level. The areas delineated are shown in Attachment 4.3.1-2A Figure 1 Potentially Disturbed Areas. These delineations were verified with the USACE and NRC staff from December 17, 2008 through December 19, 2008. It is anticipated that a report summarizing the survey description, survey results, and maps will be completed by April 2009. This report will be provided to the NRC upon completion.

Once the rights-of-way are available, a desktop analysis can be performed using the stream and wetlands delineations to quantify wetland and stream impacts. If additional areas of potential disturbance are identified during final design of the rights-of-way, wetlands surveys will be conducted and the information sent to NRC at that time. The final locations of the potentially disturbed areas can be overlaid on the wetland delineations and perennial and intermittent stream locations to identify the areas that may be impacted. This information will be used to minimize disturbances to wetlands and perennial and intermittent streams during construction activities associated with new transmission corridors.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 030 Attachment 4.3.1-2A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.3.2-6

Text of NRC RAI: Provide management plan for locations, number of logging roads required, and duration of land clearing activities around Harris Lake.

PGN RAI ID #: H-331

PGN Response to NRC RAI:

A separate document describing HAR project timber-related activities has been completed for the land clearing activities that will occur around Harris Lake. This plan describes the current condition and the forest management practices that will be employed to support development of the PEC HAR site. A copy of this document is provided as Attachment 4.3.2-6A to this response. Specific details regarding the location and number of roads is not known at this time; however, the attached document describes considerations for the planning, construction, and maintenance of roads. The duration of the land clearing activities is also not known at this time; however, it is anticipated that clearing activities could require up to 3 years to complete. The exact duration of activities will depend on a variety of factors, including regulatory requirements, weather, contractor limitations, and market conditions.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 042 Attachment 4.3.2-6A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 5.3.4-1

Text of NRC RAI:

Provide documentation of any correspondence with the following state agencies in support of evaluation of thermophilic microorganisms in Harris Lake and surrounding vicinity: North Carolina Department of Health and Human Services, Division of Public Health; North Carolina Department of Environment and Natural Resources, Environmental Health Division; North Carolina Department of Environment and Natural Resources, Division of Public Water Supply; North Carolina Department of Environment and Natural Resources, Division of Water Quality; Wake County Public Health Department; and Chatham County Public Health Department. ER Section 5.3.4.1 indicates letters of inquiry were sent out, but no information regarding responses by these agencies was referenced.

PGN RAI ID #: H-332

Response to NRC RAI:

The ER did not indicate that letters of inquiry were sent out and no expectation exists that contacted state agencies will submit written responses. The referenced agencies were contacted by phone and the ER conclusion was based on the verbal responses received during the phone contacts. The relevant ER language is as follows:

"Contact was made with several North Carolina state and local agencies, as well as the CDC, to inquire if past outbreaks of thermophilic pathogenic organisms have occurred in the immediate vicinity of the site and in the two counties (Wake and Chatham counties) surrounding the HNP. The agencies and divisions contacted include the following:

- North Carolina Department of Health and Human Services, Division of Public Health.
- North Carolina Department of Environment and Natural Resources, Environmental Health Division.
- North Carolina Department of Environment and Natural Resources, Division of Public Water Supply.
- North Carolina Department of Environment and Natural Resources, Division of Water Quality.
- Wake County Public Health Department.
- Chatham County Public Health Department.

No one contacted in the CDC or the listed state and local agencies had knowledge of recorded outbreaks or incidents of thermophilic pathogenic organisms in the vicinity of the HNP or the surrounding two counties."

To provide written documentation, as requested, the named health agencies were contacted again, and the information is presented as follows:

- North Carolina Department of Environment and Natural Resources, *Division of Public Water Supply and Division of Water Quality,* Administration - 919-733-4984 - Staff: Contact recommended we contact Health and Human Services, Epidemiology Section

- North Carolina Department of Health and Human Services, Division of Public Health, Administrative Office: Contact in the office reviewed request for information and recommended we contact Dr. Engel, Epidemiology Section.

- N.C. Department of Health and Human Services, Division of Public Health, Epidemiology Section,
  Main Phone: (919) 733-3421 Dr. Engel, January 9, 2009: Not aware of any outbreaks in Wake and Chatham counties related to the existing HNP. Also recommended that Dr. Zack Moore be contacted.

- N.C. Department of Health and Human Services, Epidemiology Section,
  Main Phone: (919) 733-3421 Dr. Zack Moore, January 9, 2009: Not aware of any outbreaks in Wake and Chatham counties related to the existing HNP.

- Wake County: Gibbie Harris, MSPH, FNP, Health Director, Wake County Human Services, January 9, 2009, (919) 250-1474: Not aware of any such outbreaks in Wake County.

- Chatham County: Holly Coleman, Health Director: (919) 542-8215, January 12, 2009: Not aware of any outbreaks in Chatham County

It should be noted that the same conclusion was reached as originally stated in the ER: no one contacted in the listed state or local health agencies had knowledge of recorded outbreaks or incidents of thermophilic pathogenic organisms related to the operation of the existing HAR facility.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.4-1

Text of NRC RAI: Provide ER References:

2.4-002 Progress Energy Carolinas, Inc., "Harris Nuclear Plant 2004 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, December 2005.;

2.4-003 CH2M-HILL, "Ecological Field Observations: Harris Nuclear Plant," August 2006.

2.4-004 North Carolina Department of Environment and Natural Resources, Division of Water Quality, "Basinwide Assessment Report: Cape Fear River Basin," August 2004.

2.4-006 Kiker Forestry & Realty, Inc., "Forest Management," prepared for Progress Energy, June 2004.

2.4-015 North Carolina Department of Environment and Natural Resources, Letter from Harry E. LeGrand, Jr., NCDENR Natural Heritage Program, to Dave Corlett, Progress Energy Carolinas, Inc., responding to request for information on listed, 2006.

2.4-018 North Carolina Wildlife Resources Commission, "Response to Information Request," Letter to Bob Kitchen, Progress Energy Carolinas, Inc., February 27, 2007.

2.4-019 U.S. Fish and Wildlife Service, "Response to Information Request," Letter to Bob Kitchen, Progress Energy Carolinas, Inc., January 29, 2007.

2.4-024 Progress Energy Carolinas, Inc., "Harris Nuclear Plant 2000 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, September 2001.

2.4-027 Carolina Power & Light Company, "Harris Nuclear Power Plant 1992 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, 199.;

2.4-029 Bogan, Arthur E., *Workbook and Key to the Freshwater Bivalves of North Carolina*, Raleigh: North Carolina Freshwater Mussel Conservation Partnership, 2002.

2.4-034 Carolina Power & Light Company, "National Pollutant Discharge Elimination System Permit Application," January 12, 2006.

2.4-035 Middle Cape Fear River Basin Assessment, "Annual Report (January 2004 – December 2004)," 2004.

2.4-036 Camp Dresser & McKee, Inc., Hazen and Sawyer, and CH2M HILL, "Draft Environmental Impact Statement: Western Wake Regional Wastewater Facilities," Prepared for Towns of Apex, Cary, Holly Springs, and Morrisville," 2006;

2.4-037 U.S. Fish and Wildlife Service, "Recovery Plan for Cape Fear Shiner (*Notropis mekistochlas*)," prepared by R. Biggins, 1988.

4.3-002 Sargent & Lundy, LLC, "Construction Input for Makeup Water Line and HAR Units 2 & 3," Joint Venture Team – Request For Information 158, January 2007.;

4.3-003 CH2M HILL, "Ecological Field Observations: Harris Nuclear Plant," prepared for Progress Energy Carolinas, Inc., August 14-15, 2007.

4.3-004 North Carolina Wildlife Resources Commission, "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality," August 2002.

4.3-005 Progress Energy Carolinas, Inc., "Progress Energy Carolinas, New Facility Licensing, Harris Nuclear Plant, Wake County, NC – Request of Information on Listed Species and Important Habitats," January 10, 2007, Prepared for the North Carolina Natural Heritage Program, U.S. Fish and Wildlife Service, and the North Carolina Wildlife Resources Commission.

4.3-014 North Carolina Department of Environment and Natural Resources, "Basinwide Assessment Report – Cape Fear River Basin," August 2004, Division of Water Quality, Environmental Sciences Section.

4.3-028 Progress Energy Carolinas, Inc., "Harris Nuclear Plant 2004 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, December, 2005.

4.3-033 Spragins, Lewis, Progress Energy, "Workforce Assumptions and Construction Timeframe – HAR 2 & 3," Joint Venture Team – Request for Information 175, March 8, 2007.

4.3-036 U.S. Fish and Wildlife Service, "Cape Fear Shiner Recovery Plan," 1988.

4.3-037 Rabon, D., U.S. Fish and Wildlife Service, Personal Communication, Email Message "Re: Western Wake Project," April 6, 2006.

4.3-039 Progress Energy Carolinas, Inc., "Endangered and Threatened Species," EVCSUBS-00011, Rev. 2, February 2005.

5.3-001 Sargent & Lundy, LLC, "Conceptual Design and Calculations for Harris Lake Makeup Water System for Harris Advanced Reactors Units 2 & 3," Calc. No.: HAG-XK01-ZOC-001, Rev. 2, June 22, 2007.

5.3-002 U.S. Environmental Protection Agency, "40 CFR Parts 9, 122, et al. NPDES: Regulations Addressing Cooling Water Intake Structures for New Facilities; Final Rule, December 18, 2001.

5.3-004 Progress Energy Carolinas, Inc., Environmental, Health & Safety Services Section, "Cape Fear Plant Impingement Mortality and Entrainment Characterization, September 2005 – August 2006" February 2007.

5.3-005 McLean, Richard, John Beauchamp, Victor Kane, and Paul Singley, "Impingement of Threadfin Shad: Effects of Temperature and Hydrography," Environmental Management Vol.6, No.5 (1982): 431-439, 1982.

5.3-006 Henderson, P.A., and R.M.H. Seaby, "Technical Evaluation of US Environmental Protection Agency Proposed Cooling Water Intake Regulations for New Facilities," Pisces Conservation Ltd., November 2000.;

5.3-007 Dixon, D, "Evaluating the Effects of Power Plant Operations on Aquatic Communities, Summary of Impingement Survival Studies," Electric Power Research Institute, October 2003.

5.3-008 ENSR Consulting & Engineering (INC), Inc., "Progress Energy Carolinas, Inc., Clean Water Act Section 316(b) Proposal for Information Collection Cape Fear Steam Electric Plant, NPDES NC0003433," June 2005.

5.3-009 Murdy, Edward O., Ray S. Birdsong, and John A. Musick, "Fishes of Chesapeake Bay." 1997.

5.3-011 Carolina Power & Light Company, "Shearon Harris Nuclear Power Plant Units 1, 2, 3, & 4, Environmental Report," January 29, 1982.

5.3-012 Sargent & Lundy, LLC, "Recommendations for Conceptual Design of the Harris Lake Makeup Water Intake," S&L Letter No. SLPEC-2006-005, Project No. 11940-013, June 26, 2006.

5.3-013 North Carolina Administrative Code, "Location of Sampling Sites and Mixing Zones" 15A NCAC 02B.0204.

5.3-016 Progress Energy Carolinas, Inc., "Engineering and Economic Evaluation of the Integrated Heat Rejection Study, Harris Location- Proposed Two Unit AP1000," Final Issue, Not-Safety Related, Report No. HAG-G2-GER-001, Rev.0, 2007.

5.3-019 Progress Energy Carolinas, Inc., "Carolina Power & Light Company, Harris Nuclear Plant and Harris Energy & Environmental Center, National Pollutant Discharge Elimination System, Permit Number NC0039586", January 30, 2006.

5.3-025 U.S. Food and Drug Administration, "Foodborne Pathogenic Microorganisms and Natural Toxins 1992 (Bad Bug Book)," Center for Food Safety and Applied Nutrition, 1996.

5.3-026 Center for Disease Control and Prevention, "Surveillance for Waterborne-Disease Outbreaks – United States, 1993-1994," M.H. Kramer, G.F. Craun, R.L. Calderon, D.D. Juranek, Source: MMWR 45 (SS-1): 1-33, April 12, 1996.

5.6-002 Sargent & Lundy, LLC "230-kV Switchyard Conceptual Design Report, Harris Advanced Reactors Units 2 and 3, HAG-ZBS-GER-001 Rev. 2," June 22, 2007.

5.6-006 Progress Energy Carolinas, Inc., "Request of Information on Listed Species and Important Habitats," January 10, 2007.

PGN RAI ID #: H-333

PGN Response to NRC RAI:

The requested references are included with this response as Attachments 2.4-1A through 2.4-1AG, with the exception of four references that could not be provided due to possible copyright infringements.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

043 Attachment 2.4 -1A.pdf: Reference 2.4-002 Progress Energy Carolinas, Inc., "Harris Nuclear Plant 2004 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, December 2005.

015 Attachment 2.4 -1B.pdf: Reference 2.4-003 CH2M-HILL, "Ecological Field Observations: Harris Nuclear Plant," August 2006.

044 Attachment 2.4 -1C.pdf: Reference 2.4-004 North Carolina Department of Environment and Natural Resources, Division of Water Quality, "Basinwide Assessment Report: Cape Fear River Basin," August 2004.

045 Attachment 2.4 -1D.pdf: Reference 2.4-006 Kiker Forestry & Realty, Inc., "Forest Management," prepared for Progress Energy, June 2004.

046 Attachment 2.4 -1E.pdf: Reference 2.4-015 North Carolina Department of Environment and Natural Resources, Letter from Harry E. LeGrand, Jr., NCDENR Natural Heritage Program, to Dave Corlett, Progress Energy Carolinas, Inc., responding to request for information on listed, 2006.

047 Attachment 2.4 -1F.pdf: Reference 2.4-018 North Carolina Wildlife Resources Commission, "Response to Information Request," Letter to Bob Kitchen, Progress Energy Carolinas, Inc., February 27, 2007.

048 Attachment 2.4 -1G.pdf: Reference 2.4-019 U.S. Fish and Wildlife Service, "Response to Information Request," Letter to Bob Kitchen, Progress Energy Carolinas, Inc., January 29, 2007.

049 Attachment 2.4 -1H.pdf: Reference 2.4-024 Progress Energy Carolinas, Inc., "Harris Nuclear Plant 2000 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, September 2001.

050 Attachment 2.4 -1I.pdf: Reference 2.4-027 Carolina Power & Light Company, "Harris Nuclear Power Plant 1992 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, 199.

051 Attachment 2.4 -1J.pdf: Reference 2.4-029 Bogan, Arthur E., *Workbook and Key to the Freshwater Bivalves of North Carolina*, Raleigh: North Carolina Freshwater Mussel Conservation Partnership, 2002.

012 Attachment 2.4 -1K.pdf: Reference 2.4-034 Carolina Power & Light Company, "National Pollutant Discharge Elimination System Permit Application," January 12, 2006.

052 Attachment 2.4 -1L.pdf: Reference 2.4-035 Middle Cape Fear River Basin Assessment, "Annual Report (January 2004 – December 2004)," 2004.

053 Attachment 2.4 -1M.pdf: Reference 2.4-036 Camp Dresser & McKee, Inc., Hazen and Sawyer, and CH2M HILL, "Draft Environmental Impact Statement: Western Wake Regional Wastewater Facilities," Prepared for Towns of Apex, Cary, Holly Springs, and Morrisville," 2006.

054 Attachment 2.4 -1N.pdf: Reference 2.4-037 U.S. Fish and Wildlife Service, "Recovery Plan for Cape Fear Shiner (*Notropis mekistochlas*)," prepared by R. Biggins, 1988.

055 Attachment 2.4 -1O.pdf: Reference 4.3-002 Sargent & Lundy, LLC, "Construction Input for Makeup Water Line and HAR Units 2 & 3," Joint Venture Team – Request For Information 158, January 2007.

015 Attachment 2.4 -1B.pdf: Reference 4.3-003 CH2M HILL, "Ecological Field Observations: Harris Nuclear Plant," prepared for Progress Energy Carolinas, Inc., August 14-15, 2007.

056 Attachment 2.4 -1P.pdf: Reference 4.3-004 North Carolina Wildlife Resources Commission, "Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality," August 2002.

057 Attachment 2.4 -1Q.pdf: Reference 4.3-005 Progress Energy Carolinas, Inc., "Progress Energy Carolinas, New Facility Licensing, Harris Nuclear Plant, Wake County, NC – Request of Information on Listed Species and Important Habitats," January 10,

2007, Prepared for the North Carolina Natural Heritage Program, U.S. Fish and Wildlife Service, and the North Carolina Wildlife Resources Commission.

044 Attachment 2.4 -1C.pdf: Reference 4.3-014 North Carolina Department of Environment and Natural Resources, "Basinwide Assessment Report – Cape Fear River Basin," August 2004, Division of Water Quality, Environmental Sciences Section.

043 Attachment 2.4 -1A.pdf: Reference 4.3-028 Progress Energy Carolinas, Inc., "Harris Nuclear Plant 2004 Environmental Monitoring Report," Environmental Services Section, New Hill, North Carolina, December, 2005.

058 Attachment 2.4 -1R.pdf: Reference 4.3-033. Spragins, Lewis, Progress Energy, "Workforce Assumptions and Construction Timeframe – HAR 2 & 3," Joint Venture Team – Request for Information 175, March 8, 2007.

054 Attachment 2.4 -1N.pdf: Reference 4.3-036 U.S. Fish and Wildlife Service, "Cape Fear Shiner Recovery Plan," 1988.

059 Attachment 2.4 -1S.pdf: Reference 4.3-037 Rabon, D., U.S. Fish and Wildlife Service, Personal Communication, Email Message "Re: Western Wake Project," April 6, 2006.

020 Attachment 2.4 -1T.pdf: Reference 4.3-039 Progress Energy Carolinas, Inc., "Endangered and Threatened Species," EVCSUBS-00011, Rev. 2, February 2005.

Reference 5.3-001 The relevant information to the design of the makeup water system has been summarized in the response to RAI 4.3.2-1. This reference has not been provided.

060 Attachment 2.4 -1U.pdf: Reference 5.3-002 U.S. Environmental Protection Agency, "40 CFR Parts 9, 122, et al. NPDES: Regulations Addressing Cooling Water Intake Structures for New Facilities; Final Rule, December 18, 2001.

061 Attachment 2.4 -1V.pdf: Reference 5.3-004 Progress Energy Carolinas, Inc., Environmental, Health & Safety Services Section, "Cape Fear Plant Impingement Mortality and Entrainment Characterization, September 2005 – August 2006" February 2007.

Reference 5.3-005 is not provided due to possible copyright infringement.

062 Attachment 2.4 -1W.pdf: Reference 5.3-006 Henderson, P.A., and R.M.H. Seaby, "Technical Evaluation of US Environmental Protection Agency Proposed Cooling Water Intake Regulations for New Facilities," Pisces Conservation Ltd., November 2000.

Reference 5.3-007 is not provided due to possible copyright infringement.

063 Attachment 2.4 -1X.pdf: Reference 5.3-008 ENSR Consulting & Engineering (INC), Inc., "Progress Energy Carolinas, Inc., Clean Water Act Section 316(b) Proposal for

Information Collection Cape Fear Steam Electric Plant, NPDES NC0003433," June 2005.

Reference 5.3-009 is not provided due to possible copyright infringement.

064 Attachment 2.4 -1Y.pdf: Reference 5.3-011 Carolina Power & Light Company, "Shearon Harris Nuclear Power Plant Units 1, 2, 3, & 4, Environmental Report," January 29, 1982.

065 Attachment 2.4 -1Z.pdf: Reference 5.3-012 Sargent & Lundy, LLC, "Recommendations for Conceptual Design of the Harris Lake Makeup Water Intake," S&L Letter No. SLPEC-2006-005, Project No. 11940-013, June 26, 2006.

066 Attachment 2.4 -1AA.pdf: Reference 5.3-013 North Carolina Administrative Code, "Location of Sampling Sites and Mixing Zones" 15A NCAC 02B.0204.

067 Attachment 2.4 -1AB.pdf: Reference 5.3-016 Progress Energy Carolinas, Inc., "Engineering and Economic Evaluation of the Integrated Heat Rejection Study, Harris Location- Proposed Two Unit AP1000," Final Issue, Not-Safety Related, Report No. HAG-G2-GER-001, Rev.0, 2007.

068 Attachment 2.4 -1AC.pdf: Reference 5.3-019 Progress Energy Carolinas, Inc., "Carolina Power & Light Company, Harris Nuclear Plant and Harris Energy & Environmental Center, National Pollutant Discharge Elimination System, Permit Number NC0039586", January 30, 2006.

069 Attachment 2.4 -1AD.pdf: Reference 5.3-025 U.S. Food and Drug Administration, "Foodborne Pathogenic Microorganisms and Natural Toxins 1992 (Bad Bug Book)," Center for Food Safety and Applied Nutrition, 1996.

070 Attachment 2.4 -1AE.pdf: Reference 5.3-026 Center for Disease Control and Prevention, "Surveillance for Waterborne-Disease Outbreaks – United States, 1993-1994," M.H. Kramer, G.F. Craun, R.L. Calderon, D.D. Juranek, Source: MMWR 45 (SS-1): 1-33, April 12, 1996.

071 Attachment 2.4 -1AF.pdf: Reference 5.6-002 Sargent & Lundy, LLC "230-kV Switchyard Conceptual Design Report, Harris Advanced Reactors Units 2 and 3, HAG-ZBS-GER-001 Rev. 2," June 22, 2007.

072 Attachment 2.4 -1AG.pdf: Reference 5.6-006 Progress Energy Carolinas, Inc., "Request of Information on Listed Species and Important Habitats," January 10, 2007.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.1.1-1

Text of NRC RAI: Please provide citable information summarizing the extent of preconstruction activities including the activity description, and associated land area impacted, volume of soil or earthen material affected (cuts, fills, spoils, barrow, etc.) for the following construction activities:

Clearing the site;

Rail modifications;

Excavation;

Compacted fill;

Riprap Protection;

Onsite disposal of excess material;

Excavation of stormwater ditches;

Stone lining of stormwater ditches;

Storm sewer piping;

Storm manholes;

Access roads, plant roads, and miscellaneous site roads;

Construction and surfacing of construction parking lots and laydown areas;

New saddle dikes;

Sewage treatment plant (new or expanded existing);

Flood protection for HEEC;

Remedial work for plant foundation;

Transport pad, haul road, and assembly Pad;

Transmission towers affected by lake raising;

CWS make-up and discharge piping.

Information provided off-the-record provides details on each of these activities that are not fully characterized in the ER. The staff would like to cite PEC's characterization of these activities as affects land use and land requirements.

PGN RAI ID #: H-334

PGN Response to NRC RAI:

Response to RAI 4.1-1 provides estimates of the percentage of impacts attributable to "construction" and to "preconstruction," as well as a summary of the basis for the estimates. Detailed design has not been completed at this time. Therefore, specific information on areas that will be impacted and volumes of materials associated with preconstruction activities will be available as the detailed design progresses.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 3.7-1

Text of NRC RAI: Provide (or clarify in ER Section 3.7) the following information in reference to the projected transmission line construction and operation:

1. Identification of the permitting authority for transmission line construction, a description of the transmission line siting procedures that were or are to be followed, and a schedule for environmental reviews that will be conducted as part of the siting procedure.

2. Standards/procedures for the interconnection operation, and the right-of-way maintenance.

3. Identification of basic electrical design parameters, including transmission design voltage or voltages, minimum conductor clearances to ground, and the maximum induced current to ground from vehicles or obstacles under the transmission line.

4. Predicted noise levels resulting from transmission-system operation.

5. Description of land use limitations within the transmission line corridors.

6. General methods of construction for the proposed new lines and upgrades (e.g., tower foundations, stringing, location of access roads, span length, and clearing of rights-of-way).

PGN RAI ID #: H-335

PGN Response to NRC RAI:

1. Identification of the permitting authority for transmission line construction, a description of the transmission line siting procedures that were or are to be followed, and a schedule for environmental reviews that will be conducted as part of the siting procedure are discussed in the following paragraphs.

   Per Rule R8-62, the NC Utilities Commission (NCUC) requires a certificate of Environmental Compatibility and Public Convenience and Necessity to construct certain transmission lines. A certificate is not required if:

   - The line is designed to operate at 161kV or less.
   - The new line is a replacement or expansion of an existing line with a similar line in substantially the same location or it is rebuilding, upgrading, modifying,

modernizing or reconstructing an existing line for the purpose of increasing capacity or widening an existing right-of-way.

- The FERC has licensing jurisdiction and the NCUC determines that the agency will conduct proceedings substantially equivalent to the proceedings required by Rule R8-62.
- Twenty-five percent or more of the required right-of-way was acquired prior to March 6, 1989.

PEC has implemented a process for determining transmission line routes. The objective of the process is to find an economical route that minimizes social and environmental impacts, while meeting the engineering requirements of the project. The process involves:

1) Defining the project study area.

2) Investigating the study area.

3) Obtaining input from community planners and leaders.

4) Identifying constraints.

5) Developing evaluation criteria.

6) Developing alternative routes.

7) Conducting public workshop(s).

8) Performing route analysis.

9) Selecting the final route.

10) Preparing the environmental report.

11) Notifying landowners of the selected route.

12) Preparing the application for a certificate of Environmental Compatibility and Public Convenience and Necessity.

13) Conducting public hearings if required by the NCUC.

14) Obtaining required environmental permits.

Upon approval of the proposed line by the NCUC, PEC will initiate the permitting in Item 14 above. Following the line route selection process described above, PEC staff will meet with regulators to describe the project, the route, the construction process and sequence, and the steps that will be taken to minimize environmental impacts.

Following those meetings, PEC will prepare and submit appropriate permit applications. Typically, those include an erosion control plan, which includes construction stormwater in NC, to NCDENR, Division of Land Resources; a

"wetlands/crossing" (Clean Water Act Section 404 and Rivers & Harbors Act Section 10) permit application to the USACE and jointly to NCDENR, Division of Water Quality, for review (under CWA Section 401).

As conditions of those permits, PEC ensures compliance with other related laws, including the Endangered Species Act (through consultation with the US Fish & Wildlife Service) and the National Historic Preservation Act (through consultation with the SHPO). PEC would also consult with the NCWRC, to the extent the proposed line corridors impact "Game Lands" (private and/or public property managed by the NCWRC through agreements with the underlying property owners).

PEC uses right-of-way clearing and transmission line construction techniques that minimize permitting requirements and ultimately minimize impacts to the environment. For instance, PEC does not remove stumps or grade rights-of-way. Instead, vegetation is cut to near-ground level, so that the remaining root mat can help prevent erosion and can re-sprout so native vegetation can re-populate the right-of-way. Woody debris (non-merchantable cut timber) is chipped, and chips are distributed across the right-of-way to further prevent erosion. Debris and chips are not placed in wetlands or streams. Wetlands are hand-cut to avoid rutting, and stream crossings are avoided if possible. Where stream or wetlands crossings are necessary, mats or portable bridging are used to avoid filling these areas. Structures are "direct embedded" (no concrete foundations) where possible.

Through this process, PEC frequently avoids the need for the above-mentioned CWA 404/401 permits, since there is no "discharge" as defined in CWA Section 404. Such permitting determinations are made in consultation with the USACE.

2. Standards/procedures for the interconnection operation has been requested from PEC and is answered in the following paragraphs:

   Progress Energy Carolinas (PEC) evaluates proposed generation additions to the PEC transmission system via our Standard Large Generator Interconnection Procedures (LGIP). The LGIP is documented as Attachment P to the PEC Open Access Transmission Tariff (OATT) procedure. A copy of this procedure can be found at (Attachment P is on page 486 of the pdf file): http://www.oatioasis.com/CPL/CPLdocs/OATT_Effective_Sept_08_2008.pdf

   PEC evaluates the impact that proposed generation additions will have on the transmission grid with respect to line loading, short circuit contribution, and transient and dynamic stability. The purpose of this evaluation is to ensure continued compliance with NERC Reliability Standards, particularly NERC Standards TPL-001 through TPL-004 (system performance). A copy of these NERC Standards can be found at: http://www.nerc.com/page.php?cid=2|20. Right-of-way maintenance will be in accordance with PEC standard operating procedures and is discussed in ER Subsection 3.7.5. In addition NUREG 1437, Supplement 33, Sections 2.1.7 and 4.2 of the GEIS discusses this subject in detail.

3. Identification of basic electrical design parameters, including transmission design voltage or voltages, is illustrated in ER Tables 3.7-1 and 3.7-2. Identification of basic electrical design parameters, including the minimum conductor clearances to ground, is discussed in ER Subsection 3.7.2. Identification of basic electrical design parameters, including the maximum induced current to ground from vehicles or obstacles under the transmission line, is discussed in ER Subsection 3.7.5. In addition NUREG 1437, Supplement 33, paragraph 4.2.1, of the GEIS discusses this subject in detail:

   "By using a computer code called ACDCLINE (Rev. 3.0) that was produced by the Electric Power Research Institute (Progress Energy 2006b), Progress Energy calculated electric field strength and induced current that is produced by its transmission lines. The results of this computer program have been field-verified through electrostatic field measurements by several utilities. Input parameters included the design features of the limiting-case scenario, the NESC requirement that line sag be determined at 120°F conductor temperature, and the maximum vehicle size under the lines as a tractor-trailer. The analysis determined that none of the transmission lines has the capacity to induce as much as 5 mA in a vehicle parked beneath the lines. The calculated induced currents ranged from 1.1 to 3.1 mA (Progress Energy 2006b), but in reality, the induced currents would be lower because the calculations were performed with the conservative assumption that the line sag was determined at 212°F conductor temperature, instead of at the required 120°F.

   In the GEIS (NRC 1999), the NRC staff found that electrical shock is of SMALL significance for transmission lines that are operated in adherence with the NESC criteria for limiting hazards."

4. Predicted noise levels resulting from transmission-system operation are briefly discussed in ER Subsection 3.7.3. There are no requirements for noise levels for transmission lines in North Carolina. Transmission lines are very quiet during normal operating conditions. Audible noise from transmission lines are related to Corona effect during humid conditions and are very difficult to predict. Transmission lines are designed to reduce Corona effects. The Corona noise is reduced to extremely low levels at the edge of the right-of way.

5. A description of land use limitations within the transmission line corridors is discussed in ER Subsection 3.7.1.2.

6. General methods of construction for the proposed new lines and upgrades (for example, tower foundations, stringing, location of access roads, span length, and clearing of rights-of-way) are discussed in ER Subsection 3.7.2. and ER Tables 3.7-1 and 3.7-2.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.2-1

Text of NRC RAI: Provide the following tax-related information in annual terms:

1. Proportion of Wake County government's annual expenditures that PEC's tax payments over 1998-2007 period.

2. Proportion of Chatham County government's annual expenditures that PEC's tax payments represent over 1998-2007 period.

PGN RAI ID #: H-336

PGN Response to NRC RAI:

Information relating to county government annual expenditures was obtained from 1998 to 2007 for Chatham County and from 1999 to 2007 for Wake County (Table 1). The information was obtained from the following sources:

- Wake County website: Wake County publishes annual budget information on their website from 2002 to present (available at: http://www.wakegov.com/budget/pastbudgets/).
- Chatham County website: Chatham County publishes annual budget information on their website from 2006 to present (available at: http://www.chathamnc.org/Index.aspx?page=529).
- Wake and Chatham County finance and budget offices were contacted by telephone and email to request annual budget information for years prior to those available on the county websites. The following county offices were contacted:

  Chatham County Finance Department (919-542-8200)
  Wake County Budget Office (919-856-6160)

PEC provided annual tax payments (specific to HNP) to each county during the period 1998/1999 to 2007 (Table 1). Table 1, included at the end of this response, summarizes the HNP property tax payments made to each county during this period, as well as the relative contribution of these tax payments to the county government's annual expenditures. The information in Table 1 allows us to make the following observations:

1. During the period 1998 to 2007, PEC paid between $7,003,821 and $8,261,467 annually in real and personal property taxes to Wake County. The property tax payments attributable directly to the Harris Plant represent approximately 1.6 percent to 3.1 percent of the total property tax receipts collected by Wake County over this period. Relative to total expenditures in Wake County, the Harris Plant tax payments represent approximately 1.1 percent to 1.4 percent of the county expenditures.
2. During the period 1999 to 2007, PEC paid between $114,106 and $134,596 annually in real and personal property taxes to Chatham County. The property tax payments attributable directly to the Harris Plant represent less that 1 percent of the total property tax receipts collected by Chatham County over this period. Relative to total expenditures in Chatham County, the Harris Plant tax payments represent less than 1 percent of the county expenditures.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

Table 1 Progress Energy Carolinas, INC.
North Carolina Property Taxes – Shearon Harris Nuclear Plant (HNP)

Plant	Percent	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Total HNP Property Tax Payments	100.00	$7,767,475	7,926,407	7,390,892	7,651,625	7,424,030	8,396,063	7,117,927	7,887,664	7,457,186	7,225,826
Chatham County	1.60	$124,519	127,067	118,482	122,662	119,013	134,596	114,106	126,446	119,545	115,836
Wake County	98.40	$7,642,956	7,799,340	7,272,410	7,528,963	7,305,017	8,261,467	7,003,821	7,761,218	7,337,641	7,109,990
Chatham County Property Tax Receipts	-	$39,175,512	37,329,723	36,014,454	31,911,680	31,116,312	29,516,281	27,100,868	24,117,565	22,596,251	21,080,386
HNP Contribution to Chatham County Property Tax Receipts	-	0.3%	0.003	0.003	0.004	0.004	0.005	0.004	0.005	0.005	0.005
Wake County Property Tax Receipts	-	$482,653,000	442,344,883	421,422,321	403,881,212	368,005,319	266,180,656	351,415,000	326,250,000	297,014,616	NA
HNP Contribution to Wake County Property Tax Receipts	-	0.016	0.018	0.017	0.019	0.020	0.031	0.020	0.024	0.025	NA
Chatham County Expenditures	-	$73,149,728	60,406,973	62,503,033	54,440,695	49,173,603	48,668,178	45,972,172	43,102,459	39,968,499	38,141,973
HNP Contribution to Chatham County Expenditures	-	0.2%	0.002	0.002	0.002	0.002	0.003	0.002	0.003	0.003	0.003
Wake County Expenditures	-	$719,234,164	664,792,452	618,587,017	575,346,237	657,594,780	638,061,265	619,928,392	578,122,521	531,502,916	NA
HNP Contribution to Wake County Expenditures	-	1.1%	0.012	0.012	0.013	0.011	0.013	0.011	0.013	0.014	NA

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.2-2

Text of NRC RAI: Provide the following: 1. Basis for the final statement in Section 2.5.2.7, asserting that the projected capacity of public services is adequate and is expected to expand to meet the demands of slight population growth in the region; 2. Current and projected capacities of local hospital and burn units.

PGN RAI ID #: H-337

PGN Response to NRC RAI:

The basis for the final statement in Subsection 2.5.2.7, asserting that the projected capacity of public services is adequate and is expected to expand to meet the demands of slight population growth in the region, is provided below.

1. Water: There are four water treatment plants (WTPs) that serve the area, each of which has pending expansion plans that will be capable of accommodating the relatively minor increase in population attributable to the expansion at the HNP facility. The Cary/Wake County WTP anticipates an increase in average daily demand (ADD) from 15.8 to 25 mgd for an expected population of 197,000 in 2020. Apex/Wake County WTP also anticipates an increase in ADD from 3.1 to 6.3 mgd in 2020 for a projected population of 75,000 people. The Cary/Apex WTP is expected to expand to 56 mgd by 2015 to meet the expected increase in ADD for the two areas. The Chatham County WTP will be expanded to 6 mgd with the ability to be expanded to 8 mgd by 2020 (ER Reference 2.5-096), and the City of Sanford will need to expand to 19 mgd to meet a projected 2020 demand. Harnett County WTP is expected to require expansion by 2012, with the potential for expansion of the existing facility from 18 to 24 mgd. In October 2001, the NCDENR, Division of Water Resources, published a report entitled "Jordan Lake Water Supply Storage Allocation Recommendations - Round Three" (ER Reference 2.5-092), which concluded that the capacity of the watershed (Cape Fear River Basin) was sufficient for projected population demands through at least 2030. Copies of ER Reference 2.5-092 and ER Reference 2.5-096 have been provided in the reading rooms.

2. Wastewater: Five WWTPs serve the project area. Each of the three largest facilities (Utley Creek, Harnett County, and the Western Wake Regional Water Reclamation Facility [WRF]) have plans for either substantial expansion or the development of facilities that will provide adequate capacity to accommodate the relatively modest increase in demand attributable to the expansion of the HNP, as described below.

The Utley Creek (Town of Holly Springs) WWTP's planned expansion is described in a report entitled "Environmental Assessment of Direct Impacts: Wastewater System Improvements, Holly Springs, North Carolina," prepared by Green Engineering, P.L.L.C. (August 19, 2005, Revised February 2, 2006 [ER Reference 2.5-097]). The report indicates that the town of Holly Springs plans to expand the Utley Creek WWTP from the current 1.75 mgd capacity to 6.0 mgd. The expansion will cover the expected capacity increase required by Holly Springs until the new Western Wake Regional WRF comes online in 2011.

The proposed Western Wake Regional WRF will serve the municipalities of Cary, Apex, Morrisville and Holly Springs and will have a 30 mgd capacity by 2020. A Draft Environmental Impact Statement entitled "Draft Environmental Impact Statement: Western Wake Regional Wastewater Facilities," was prepared in 2006 for the municipalities of Apex, Cary, Holly Springs, and Morrisville" (ER Reference 2.5-098). The Draft EIS concluded that the capacity of the Phase 2 facilities will meet the needs of the Project Partners until 2030.

The Chatham County Bynum WWTP currently serves only 26 customers and has no plans for expansion.

The City of Sanford reports only 7,714 customers and has no plans for expansion. This information is provided in ER Reference 2.5-093.

The Harnett County WWTP reports only 3475 customers and plans to expand in 2012. This information is provided in ER Reference 2.5-094.

3. Police, EMS and Fire: Contacts were made with the local fire departments, emergency management agencies, and hospitals regarding current level of service and whether increases were planned. As provided in ER Subsection 5.8.2.7, PEC has consulted with emergency management services (EMS) for Wake, Lee, Chatham, and Harnett counties regarding the proposed expansion of the Harris facility in early 2007. The four county EMS organizations are able to support the emergency plan for the proposed expansion of HAR. Current public services and facilities are sufficient to absorb any incremental growth associated with a small workforce in-migration. As stated in ER Subsection 2.5.2.7.1, the Apex Fire Department is composed of three fire stations that are within a 16-km (10-mi.) radius of the HAR site (ER Reference 2.5-101). Apex Fire Station 2 is the closest fire station to the HAR site at approximately 5 km (3 mi.) from the site in New Hill, North Carolina. The Apex Fire Department is staffed by 27 full-time and 4 part-time operations staff, and 40 volunteer firefighters (ER Reference 2.5-102). The closest police station is the Holly Springs Police Station at 11.1 km (6.9 mi.) from the HAR (ER Reference 2.5-103). The Cape Fear Volunteer Fire Department is the closest fire department to the site in Lee County (ER Reference 2.5-104). The N.W. Harnett Fire Department is the closest fire department to the site in Harnett County (ER Reference 2.5-105). Overall, 238 fire stations and 50 police stations are located in the region. Therefore, existing public facilities will be capable of absorbing any minor increase in demand from increased security needs related to the construction and operation of the

HNP when the expansion is complete. ER Subsection 5.8.2.7.1 states that the closest police station is the Holly Springs Police Station, which is located approximately 11.0 km (6.9 mi.) from the HAR site (ER Reference 5.8-004). Existing police, EMS, and fire facilities are expected to be capable of absorbing any small increase in demand related to the operation of the HAR facilities.

4. Current and projected capacities of local hospital and burn units: The closest burn center is the North Carolina Jaycee Burn Center in Chapel Hill, NC. The burn center has 21 beds available in 2009; however, beds from other sections of the North Carolina Memorial Hospital in which the burn unit is located can be used. ER Subsection 2.5.2.7 "Public Service and Facilities" notes that the closest hospital to the HNP is WakeMed Cary Hospital, which is approximately 19 km (12 mi.) from the site.

5. The following table provides the percent capacity of the total number of beds that were in use in 2007 in the local hospitals. Based on the percent of the total capacity and the expansion plans at the local hospitals, it was determined that there is sufficient capacity to meet the demands of slight population growth in the region that will occur as a result of the expansion of the HNP.

Hospital Name	Number of Beds	Number in Use	% of Capacity in Use	Expansion Plans
WakeMed Cary Hospital	156	92	59%	42 new beds were added in 2008/2009
WakeMed Raleigh	515	449	87%	102 (82 medical/surgical and 20 ICU) new beds in 2010
WakeMed North Healthplex	14 (no Acute care)	-	-	61 new beds in 2011
Rex Hospital	388	266	69%	
Duke Raleigh Hospital	186	-	-	
NC Jaycee Burn Center	21	-	-	

Sources:

ER Reference 2.5-110, Reference RAI 2.5.2-2 01, Reference RAI 2.5.2-2 02, and Reference 2.5.2-2 03

References

Reference RAI 2.5.2-2 01

WakeMed, "WakeMed Cary Hospital," Website, http://www.wakemed.org/body.cfm?id=54&oTopID=51, accessed January 16, 2009.

Reference RAI 2.5.2-2 02

WakeMed, "WakeMed Raleigh Campus," Website, http://www.wakemed.org/body.cfm?id=52&oTopID=51, accessed January 16, 2009.

Reference RAI 2.5.2-2 03

Duke Raleigh Hospital, "Facts and Figures," Website, http://www.dukeraleighhospital.org/about_us/facts, accessed January 16, 2009.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.4-1

Text of NRC RAI: Provide discussion of the research approach used to search for the following:

1. Groups that were contacted to search for local subsistence practices or resource dependencies among the population in the immediate vicinity of the Harris site;

2. Extent that the academic literature was searched in the effort to identify either special local environmental justice populations or to identify subsistence practices or special resource dependencies among the population in the immediate vicinity of the Harris site.

PGN RAI ID #: H-338

PGN Response to NRC RAI:

The following research approach was used to identify local subsistence practices or resource dependencies among the population in the immediate vicinity of the HAR site:

- The analysis and assessment performed for ER Subsection 2.5.4, Environmental Justice (EJ), was used as an initial screening tool to identify those census block groups with low income or minority populations. Following the methodology described in this subsection, ER Figures 2.5-10 and 2.5-11 illustrate that no significant low income or minority populations occur in the 6-mile immediate vicinity of the HAR site.
- Consultations with PEC staff were held to identify any groups with local subsistence practices or resource dependencies.
- A search of the Internet and published academic literature sources was performed to identify any additional sources of information about these populations. Efforts were also made to identify local African American colleges and staff that might focus their research on environmental justice.

The Internet searches for environmental justice and subsistence-related information did not uncover any special populations or subsistence practices in the vicinity of the project site. Based on this finding, no additional efforts were made to make local telephone contacts, consistent with the guidance provided in NUREG-1555 (that is, this level of additional community outreach/scoping is not typically required by the NRC staff in its review of and applicant's ER).

The initial investigation of environmental justice and subsistence practices that was conducted in 2007 and reported in the HAR ER was revisited in 2008. The information that was obtained and evaluated in the 2008 investigation is listed below:

- NC WARN (www.ncwarn.org, accessed 7/2/2008) – News release issued by NC WARN entitled "Nuke Revival Hits Quicksand at Harris, other Plants" (June 24, 2008); Letter from Congressman David Price to NRC Chairman Dale Klein regarding NRC's oversight of Hemyc Fire Barriers (letter dated Feb. 15, 2008); Letter from Attorney John Runkle to NRC Commissioner Gregory Jaczko regarding the Enforcement of Fire Protection regulations at Shearon Harris (letter dated April 28, 2008); Letter from Jim Warren (Executive Director of NC WARN), Paul Gunter (Director, Beyond Nuclear), and David Lochbaum (Director, Union of Conerned Scientists) Congressman David Price's letter regarding Chairman Klein's Letter on Fire Protection (letter dated April 24, 2008); a news release entitled "New Fire Program at Nuclear Plant is in Shambles"; and an NC WARN news release dated April 22, 2008 entitled "It's efficiency or chaos."
- National Register of Historic Places – Chatham and Harnett county subsistence farming locations (http://www.nationalregisterofhistoricplaces.com/NC/Chatham/vacant.html, and http://www.nationalregisterofhistoricplaces.com/NC/Harnett/state.html, both sites accessed 7/2/2008).
- Chatham Journal Weekly – "New North Carolina Laws go into Effect in 2006" (http://www.chathamjournal.com/weekly/news/government/new-nc-laws-60105.shtml, accessed 7/2/2008).
- General Google Searches – "Subsistence Fishing, Farming, and Hunting in Chatham, Harnett, and Lee Counties in North Carolina" (www.google.com, accessed 7/3/2008).
- Shaw University, Raleigh NC – historically black university – searched environmental justice and subsistence fishing, farming, and hunting (http://www.googlesyndicatedsearch.com/u/Shaw?q=Environmental+Justice&domains=sha, accessed 7/3/2008).
- Chatham County Economic Development Corporation – "New!- Chatham County Economic Development Strategic Plan Recommendations" (http://www.chathamedc.org/resource-center/stategic-plan, accessed 7/3/2008).
- General Google Search – "2008 Environmental Justice Issues for Progress Energy Shearon Harris" (www.google.com, accessed 7/3/2008).
- Raleigh Eco News – "Progress Energy Halts spent-fuel shipments to Shearon Harris nuke plant" (www.raleigheconew.com, accessed 7/3/2008).
- Facing South – "NRC shuts public out of meeting on Progress Energy nuke" (http://southernstudies.org/facingsouth/labels/energy%20policy.asp, accessed 7/3/2008)
- "No New Nukes Campaign" Nuclear Information and Resource Service (www.nirs.org, accessed 7/3/2008)

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.4.2-1

Text of NRC RAI: Provide economic information about commercial timber harvesting activities expected, specifically:

1. Volume of merchantable timber that is expected to be harvested for commercial use from the proposed transmission corridor upgrades;

2. Stumpage rates that can be expected for merchantable timber in North Carolina;

3. Duration of timber harvesting and related activities along the lake.

PGN RAI ID #: H-339

PGN Response to NRC RAI:

Preliminary information on commercial timber harvesting activities has been developed for the proposed project. Detailed design and construction information for the proposed transmission corridor upgrades has not yet been finalized. The following information is provided:

1. Timber Volume - The approximate volume of merchantable timber that could be harvested for commercial use from the proposed transmission corridor upgrades was estimated based on the amount of forested land falling within 50 ft. of each side of the existing transmission corridor. The following table provides a summary of the current status of the proposed transmission line corridors, in terms of the type of vegetation or land use, and the relative area associated with each. The information in the table indicates that approximately 782 ac. are either deciduous forest, evergreen forest, or mixed forest lands. This represents approximately 63 percent of the total area associated with the transmission line upgrades.

Transmission Corridor Characteristics	Area		% of Total Area
	(Acres)	(Hectares)	
Bare Rock/Sand/Clay	0.5	0.2	0.0%
Commercial/Industrial/Transportation	16.9	6.9	1.4%
Deciduous Forest	577.2	233.6	46.3%
Emergent Herbaceous Wetlands	2.7	1.1	0.2%
Evergreen Forest	99.6	40.3	8.0%

Transmission Corridor Characteristics	Area		% of Total Area
	(Acres)	(Hectares)	
High Intensity Residential	3.0	1.2	0.2%
Low Intensity Residential	23.8	9.6	1.9%
Mixed Forest	104.9	42.4	8.4%
Open Water	18.3	7.4	1.5%
Pasture/Hay	39.6	16.0	3.2%
Row Crops	273.1	110.5	21.9%
Transitional	29.9	12.1	2.4%
Urban/Recreational Grasses	0.7	0.3	0.1%
Woody Wetlands	57.6	23.3	4.6%
Total	1,247.8	505.0	

Source: Multi-Resolution Land Characteristics (MRLC) Consortium. National Land Cover Database (North Carolina). 2005.

Assuming that all of the 782 ac. of forest land are available for harvesting and using the stumpage rates (see Item 2 below for additional details) and an estimated 46 tons per acre provided by PEC's staff forester, an approximate volume of 35,972 tons of timber and a commercial value of $ 641,370 are estimated. The types of timber assumed to be harvested and their corresponding tons per acre and stumpage values are noted in the table below.

Transmission Corridor Characteristics	Assumed Wood/Forest Type	Area (acres)	% of Total Forested Land	Estimated Tons per Acre	Stumpage Values ($/ton)	Total Value
Deciduous Forest	Hardwood Saw Timber	577.2	73.8%	46	$18.92	$502,349
Evergreen Forest	Pine Saw Timber	99.6	12.7%	46	$24.34	$111,516
Mixed Forest	Pine Pulpwood	104.9	13.4%	46	$5.7	$27,505
Total Corridor		1,247.8				
Total Forested		781.7				$641,370

2. Stumpage Rates – Since many variables, such as raw material demand, mill inventories, buyer competition, quality, topography and weather, play key roles in determining local prices, the *Forest2Market Market Guide for Timber Owners* is updated regularly and divides the country into regions and micro market areas. The following stumpage rates were developed by PEC based on aggregated individual timber sale stumpage data presented in the May/June 2008 Market Guide. The stumpage rates represent an

average of rates from Areas 5 and 6 since the Harris Plant lands are situated on or near the convergence of two micro-market areas.

	Pine Pulpwood	Pine Chip-and-Saw	Pine Saw Timber	Hardwood Pulpwood	Hardwood Saw Timber
Stumpage Values per Ton	$ 5.70	$16.19	$24.34	$4.57	$18.92

3. Duration of Timber Harvesting Activities - The duration and timing of timber harvesting and related activities have not yet been determined. A separate document describing HAR project timber-related activities has been completed for the land clearing activities that will occur around Harris Lake. This document describes the current condition and the forest management practices that will be employed to support development of the PEC HAR site. A copy is provided as an attachment to this response.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 042 Attachment 4.3.2-6A.pdf.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.2-3

Text of NRC RAI: Provide more detailed description of the specific facilities impacts expected from the lake level increase, specifically:

1. Facilities at Harris Lake County Park that will be impacted and to what extent.

2. Specific mitigation that will be implemented for facilities permanently removed from public service as a result of raising the reservoir pool elevation.

3. Specific time span that is considered "temporary" in the context of impacts to affected recreation facilities. For example, how long will recreation facilities not be available to the public?

4. Baseline recreation usage statistics for the affected recreation facilities including Harris Lake County Park and the four affected boat ramps.

5. Impacts that can be expected on State Gamelands bordering the reservoir as a result of a raising reservoir.

PGN RAI ID #: H-340

PGN Response to NRC RAI:

The following additional information is provided concerning impacts that will be associated with the lake level increase:

1. Facilities at Harris Lake County Park that will be impacted and to what extent.

   The Harris Lake Infrastructure Impacts Technical Memorandum (ER Reference 10.3-003) identified significant impacts to Harris Lake County Park since most of the facilities are below 240 ft. and will be inundated. The following facilities at Harris Lake County Park would be affected by a change in reservoir level:

   - Three shelters
   - Fishing pier
   - Harris Lake County Park Amphitheater
   - Public lavatory building
   - Playground and picnic area

- Car-top boat launch
- Sections of County Park Drive
- Most of the recreational areas, including the Buckhorn Disc Golf Course, the Peninsula Hiking Trail, three Hog Run mountain bike trails (beginner, intermediate, and advanced), a portion of the volleyball court, and the flower gardens

2. Specific mitigation that will be implemented for facilities permanently removed from public service as a result of raising the reservoir pool elevation.

   Mitigation for the recreational facilities and services that will be affected by raising the elevation of Harris Lake is currently being discussed by PEC and Wake County. Specific mitigation activities and related information are not yet available; however, during the construction phase of the HAR facility (as described in ER Chapter 4), boat launch facilities on Harris Reservoir that will be impacted by the increased water level will be relocated. One boat launch is located in Harris Lake County Park (car-top boat launch) and will be relocated with the park. PEC will relocate the Holleman's Crossing and a portion of the Highway NC-42 boat launch facilities as described in ER Reference 5.1-009. PEC will modify the Highway NC-42 boat launch facility (that is, the two ramps and approximately half of the 66-space parking lot) during construction as described in ER References 5.1-001, 5.1-010, and 5.1-011. The boat ramps will be relocated to higher ground as described in ER Reference 5.1-009. The relocated boat launch facilities will be designed to accommodate fluctuating lake levels as described in ER Reference 5.1-009.

3. Specific time span that is considered "temporary" in the context of impacts to affected recreation facilities. For example, how long will recreation facilities not be available to the public?

   As described in ER Chapter 5 (page 5-11), "temporary" is intended to mean the time period necessary for relocating the park amenities. While the total length of time that the county park will be affected is dependent on a variety of factors, it is primarily influenced by the speed at which the lake fills. It originally took approximately 28 months for Harris Lake to fill to an elevation of 220 ft. with a storage capacity of 73,000 ac-ft. Upon reaching 240-ft. elevation, Harris Lake will have a capacity of 177,563 ac-ft, an increase of 104,563 ac-ft or 143 percent. Assuming similar rainfall conditions, it is estimated that it would take at least 40 months to reach an elevation of 240 ft. However, it is assumed that recreational facilities will be unavailable for a much shorter time period, likely much less than and no more than one to two recreation seasons during which they are being relocated. For example, the level of effort to relocate a disc golf course is much lower than that of constructing a new amphitheater, playground, and restroom. The timing, location, nature, and extent of the mitigation measures will continue to be coordinated with Wake County staff and will be further developed as part of the mitigation plan. All relocation and mitigation will occur during the construction phase and there will be no impact on the recreational use of Harris Lake County Park once Harris Lake is increased

to 240 ft.-elevation because the park amenities presently located below 73.2 m (240 ft.) NGVD29 will have been relocated during construction of the HAR site (ER Reference 5.1-009).

4. Baseline recreation usage statistics for the affected recreational facilities including Harris Lake County Park and the four affected boat ramps.

   As described in ER Reference 5.1-007, Harris Lake County Park received 107,000 visitors during fiscal year 2005 to 2006, with a peak of approximately 1000 visitors per day. Recreation is the primary reason people visit the park. Recreational activities at the park include playing disc golf, mountain biking, using the playground, and fishing (ER Reference 5.1-008). Baseline boat dock/launch usage statistics are not formally tracked.

5. Impacts that can be expected on State Gamelands bordering the reservoir as a result of a raising reservoir.

   PEC has enrolled 5353 ha (13,227 ac. or 20.67 $mi.^2$) of the area surrounding Harris Lake in the North Carolina Game Lands Program through the NCWRC, as shown in ER Figure 4.3-1 and described in ER Reference 5.1-012. It can be determined from Figure 4.3-1 that approximately 818 ha (2022 ac. or 3.16 $mi.^2$) or 15 percent of the total game lands will be inundated, resulting in the USGS land use classification to change from forested to water body. ER Subsection 2.4.1.2.3.4 notes that these game lands offer the public a variety of opportunities for hunting deer, turkey, small game, and waterfowl. Additionally, ER Table 2.5-1 indicates that 13 percent of all deer and 16 percent of all turkey are killed on the state game lands in the region. Since over 80 percent of hunting occurs on non-game lands and since similar hunting and fishing opportunities exist at nearby Jordan and Lee game lands, minimal impact is expected from removing 15 percent of these game lands from public use. PEC continues to coordinate with the NCWRC regarding potential impacts to the HNP-owned game lands.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.4.1-2

Text of NRC RAI: Describe the additional impacts expected to be associated with logging and other construction related transport on existing roadways.

PGN RAI ID #: H-341

PGN Response to NRC RAI:

Additional traffic on local roadways will occur due to logging and other construction-related activities during the development of the HAR facility. While this increase in traffic will result in additional impacts to the surrounding community, these impacts will be intermittent and temporary in nature. The majority of construction traffic will be due to the transportation of the construction work force to and from the construction site. Trucks delivering materials and equipment to the site may represent a visible impact to the communities surrounding the site; however, the delivery of the heaviest equipment to the site is expected to be by rail.

During the initial periods of construction, logging activities will result in some additional truck traffic on local roadways, much of which will be similar in nature to what occurs as a result of ongoing logging operations on the 8000 ac. site. However, the amount and duration of traffic related to logging activity is expected to be much less than for the general construction of the plant. Estimates of the timber resources in the area to be cleared for the HAR project are approximately 228,000 tons of forest products. The ability to market products and the resulting values are dependent on market conditions at the time of the timber harvest. It is expected that the harvest and removal of vegetation in this area will take up to 36 months. While the actual time to remove the vegetation will vary according to many factors, this estimate is based on the time it took for clearing activities related to the original construction of Harris Lake. Factors influencing timing could include, but are not limited to, weather (hurricanes and tropical storms often interrupt the timber supply markets from decreasing operability on certain sites and flooding the markets with storm salvaged wood), equipment breakdowns and availability.

The intensity of the logging operations required to remove resources from the site in the estimated time period will be approximately 12 to 13 trucks per day, if all timber is transported off-site. These estimates are based on fully loaded trucks (80,000 pound weight limit due to Federal Bridge Gross Weight limits) and 150 operating days per year and are subject to change due to markets, weather, or other factors. (227,606 tons of timber/40 ton weight limit of trucks = 5690 truckloads required; 150 operating days/year*3 years=450 operating days; 5690 truckloads/450 days = 12.6 truckloads per day). Land clearing related to the plant and related structures will involve the removal of some forested areas necessary

for construction; however, it is expected that much of the material will be ground up and redistributed as mulch on the site or burned in accordance with open burning regulations. Recyclable pulpwood or timber will be transported off-site by truck.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.4.1-3

Text of NRC RAI: Please provide citable information summarizing potential mitigation of all local recreational infrastructure impacts (apart from transportation infrastructure requested elsewhere) expected as a result of raising the level of Harris Reservoir. Please include the costs of expected mitigation activities.

For example, information provided off-the-record suggests that Progress Energy is considering mitigation options for the Harris Park infrastructure. The staff would like to reference such information regarding all affected infrastructure in the preparation of the EIS.

PGN RAI ID #: H-342

PGN Response to NRC RAI:

As noted during the July 2008 ER audit, PEC has been and continues to be involved in discussions with the County regarding the impact to recreational facilities that will result from raising the elevation of Harris Lake, as well as potential mitigation measures that could be undertaken to reduce these impacts. Since these issues have not yet been fully resolved, citable information summarizing specific impacts, the potential mitigation measures that are being considered, and the corresponding costs associated with the mitigation of recreation impacts are not yet available.

ER Section 5.1 explains that there will be no impact on the recreational use of Harris Lake County Park once the HAR facility becomes fully operational, since infrastructure in the park that is presently located below 73.2 m (240 ft.) NGVD29 will have been relocated to higher ground during construction of the HAR site (ER Reference 5.1-009). Beyond this commitment, the details related to the timing, location, nature, and extent of the new design will depend upon ongoing discussions with the County.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 2.5.2-4

Text of NRC RAI: Provide a geographic summary of the most recent refueling outage workforce sufficient to permit the staff to determine the county of residence for NC workers and the state of residence for non-NC workers, without identifying individual employees.

PGN RAI ID #: H-343

PGN Response to NRC RAI:

The following tables provide the geographic summaries by county (Table 1) and state (Table 2) based on information compiled by PEC.

Table 1
HNP 2007 North Carolina-based Outage Contractor Workforce Residence by County

STATE	COUNTY	TOTAL PER COUNTY	% of TOTAL
NC	BRUNSWICK	89	24%
NC	COLUMBUS	60	16%
NC	WAKE	35	9%
NC	ROBESON	24	6%
NC	BLADEN	14	4%
NC	CUMBERLAND	12	3%
NC	LEE	12	3%
NC	NEW HANOVER	12	3%
NC	PENDER	11	3%
NC	CABARRUS	7	2%
NC	DURHAM	7	2%
NC	DUPLIN	6	2%
NC	HARNETT	5	1%
NC	GUILFORD	4	1%
NC	MECKLENBURG	4	1%
NC	RANDOLPH	4	1%

Table 1
HNP 2007 North Carolina-based Outage Contractor Workforce Residence by County

STATE	COUNTY	TOTAL PER COUNTY	% of TOTAL
NC	SAMPSON	4	1%
NC	BEAUFORT	3	1%
NC	HOKE	3	1%
NC	JOHNSTON	3	1%
NC	LENOIR	3	1%
NC	MOORE	3	1%
NC	RUTHERFORD	3	1%
NC	CHATAM	2	1%
NC	CLEVELAND	2	1%
NC	CRAVEN	2	1%
NC	DARE	2	1%
NC	DAVIDSON	2	1%
NC	FORSYTH	2	1%
NC	HALIFAX	2	1%
NC	IRENDELL	2	1%
NC	MARTIN	2	1%
NC	NASH	2	1%
NC	ONSLOW	2	1%
NC	PITT	2	1%
NC	ROWAN	2	1%
NC	UNOIN	2	1%
NC	WAYNE	2	1%
NC	ALAMANCE	1	0%
NC	ASHE	1	0%
NC	CAMDEN	1	0%
NC	CHEROKEE	1	0%
NC	GASTON	1	0%
NC	HAYWOOD	1	0%
NC	LINCOLN	1	0%

Table 1
HNP 2007 North Carolina-based Outage Contractor Workforce Residence by County

STATE	COUNTY	TOTAL PER COUNTY	% of TOTAL
NC	MCDOWELL	1	0%
NC	ORANGE	1	0%
NC	RICHMOND	1	0%
NC	SCASWELL	1	0%
NC	STANLY	1	0%
NC	WILKES	1	0%
NC	YADKIN	1	0%
	Total	**372**	

Table 2
HNP 2007 Outage Contractor Workforce Residence by State

State	Count	Percent
AK	1	0.11%
AL	13	1.48%
AR	18	2.05%
AZ	8	0.91%
CA	4	0.46%
CO	2	0.23%
CT	7	0.80%
FL	53	6.04%
GA	37	4.21%
ID	3	0.34%
IL	5	0.57%
IN	2	0.23%
KS	10	1.14%
KY	1	0.11%
LA	14	1.59%
MA	3	0.34%

Table 2
HNP 2007 Outage Contractor Workforce Residence by State

State	Count	Percent
MI	3	0.34%
MO	12	1.37%
MS	14	1.59%
MT	1	0.11%
NC	372	42.37%
NE	3	0.34%
NH	4	0.46%
NJ	1	0.11%
NY	13	1.48%
OH	14	1.59%
OK	11	1.25%
OR	2	0.23%
PA	31	3.53%
SC	115	13.10%
TN	22	2.51%
TX	32	3.64%
VA	31	3.53%
WA	4	0.46%
WI	3	0.34%
WV	8	0.91%
WY	1	0.11%
Total	**878**	

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 10.4.2-1

Text of NRC RAI: Provide additional explanation and discussion of projected construction costs reported in Section 10.4.2.2 of the ER. For example, the staff notes that costs appear significantly lower for construction of AP 1000 units at the Harris site as compared to Progress Energy Florida's reporting of projected costs for similar units at the Levy site. Please explain factors that account for internal construction costs of $4.4 billion at Harris in the context of similar costs amounting to $16.6 billion at Levy.

PGN RAI ID #: H-344

PGN Response to NRC RAI:

The same type of AP 1000 nuclear units being constructed for the Levy project will be constructed at for the HAR project, which accounts for similar construction costs between the two projects. Per PEC Letter NPD-NRC-2008-039 of October 3, 2008 (Reference RAI 10.4.2-1 01), it is noted that HAR ER Subsection 10.4.2.2 would be revised to use the Levy site cost estimates as bounding values for the HAR Site. Therefore, the overnight cost estimate for the Levy site is $9.3 billion, not the $16.6 billion implied in the NRC response. However, there are other cost differences between the two projects. Unlike the Levy project, the HAR project does not have significant costs for the transmission corridors. For the Levy project, the transmission costs are estimated at $2.5 billion, whereas transmission costs for the HAR project could potentially be $20 to $30 million. Other differences in the project's cost estimates are attributed to including Allowance for Funds Used During Construction (AFUDC) (8.48 percent) and an escalation factor of approximately 3 percent in the Levy cost estimate.

Additional explanation and discussion on the projected HAR 2 and HAR 3 construction costs can be found in ER Subsection 4.4.2.1.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 10.4.2-2

Text of NRC RAI: Provide additional explanation and discussion of projected operation costs reported in Section 10.4.2.3 of the ER. For example, the staff notes that costs appear significantly higher for operation of AP 1000 units at the Harris site as compared to Progress Energy Florida's reporting of projected operating costs for similar units at the Levy site. Please explain factors that account for operations costs of 3.1-4.6 cents/kWh at Harris in the context of similar costs amounting to 1.68 cents/kWh at Levy.

PGN RAI ID #: H-345

PGN Response to NRC RAI:

At the time that HAR ER Subsection 10.4.2.3 was written, the projected operating costs were of 3.1-4.6 cents/kWh. Since that time, however, the Nuclear Energy Institute indicated in a February 6, 2008 news release, that nuclear energy has the lowest production costs of any major source of electricity, including coal and natural gas-fired power plants. The nuclear industry's average production – encompassing fuel, operations, and maintenance – set a record low in 2007 of 1.68 cents per kWh (Reference RAI 10.4.2-2 01).

Regarding the affordability of nuclear energy, 2007 marked the ninth straight year that the industry's average electricity production cost has been below two cents/kwh, and the seventh straight year that nuclear plants have had the lowest production costs of any major source of electricity, including coal- and natural gas-fired power plants.

Nuclear energy provides reliable, affordable and clean electricity at a time when consumers are confronted with rising oil and gas prices and an increased reliance on foreign energy sources. Nuclear energy emits no greenhouse gases during the production of electricity, and it is available today to meet rising electricity demand and fight global warming (Reference RAI 10.4.2-2 01).

Subsection 10.4.2.3 will be revised to contain the operating costs of 1.68 cents per kWh described above.

References

Reference 10.4.2-2

Nuclear Energy Institute, 2008. The U.S. Nuclear Power Plants Set Record Highs For Electricity Production, Efficiency in 2007; accessed December 23, 2008, via: http://www.nei.org/newsandevents/newsreleases/setrecordhighs/

Associated HAR COL Application Revisions:

The information contained in the above Response will be incorporated into Subsection 10.4.2.3 in a future revision of the ER.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 10.4.1-1

Text of NRC RAI: Provide estimates of the expected annual tax benefits expected to be paid as a result of constructing and operating two new operating units to the Harris site over the lifetime of the new plants. Include expected property taxes paid to Wake County and Chatham County, expected annual sales taxes paid to the State of North Carolina, and any expected corporate taxes paid to jurisdictions affected by the Harris site.

PGN RAI ID #: H-346

PGN Response to NRC RAI:

Information on the annual tax benefits expected to be paid as a result of constructing and operating two new operating units to the HAR site over the lifetime of the new plants, including property taxes paid to Wake and Chatham counties, annual sales taxes paid to the State of North Carolina, and corporate taxes paid to jurisdictions, can be found within ER Subsections 4.4.2.2.1, 4.4.2.2.2, 4.4.2.2.3, and 5.8.2.2 and are summarized below.

4.4.2.2.1 State Income Tax Revenue

Construction jobs and salaries will generate state income tax revenue. North Carolina state collects a personal income tax in the range of 6.0 - 7.75 percent of taxable income (Reference RAI 10.4.1-1 01). However, it is assumed that most of the construction workers will already live in the existing communities. Therefore, there will be no significant change in state income tax revenue generated from salaries paid to HAR construction workers. A small proportion of skilled craftsman are anticipated to relocate to the region during the construction period. A small increase in state income tax revenue will be generated from the salaries paid to these skilled craftsmen. The skilled craftsman jobs will account for a very small proportion of the overall workforce in the region, so no major state income tax revenue impact is anticipated. The North Carolina state corporate income tax rate is 6.90 percent of net taxable income (Reference RAI 10.4.1-1 02). The new units at the HAR site will not begin generating net income until the operations phase.

4.4.2.2.2 Sales Tax Revenue

Sales taxes will be levied on materials purchased for the HAR as well as on goods and services purchased by workers. Retail sales of tangible personal property not subject to a reduced rate of tax are subject to the 4.5 percent general state rate of sales or use tax. In addition, most counties collect about 2.25 - 2.5 percent in sales and use taxes bringing the total rate to 6.75 - 7 percent (Reference RAI 10.4.1-1 03). Sales taxes on such purchases are expected to be a small but beneficial impact to the local economy. Similarly, there may

be small direct and indirect beneficial economic impacts from sales tax revenue generated from goods and services purchased by workers who do not currently work in the region.

4.4.2.2.3 Property Tax Revenue

PEC estimates it will pay additional property taxes to North Carolina for the new units at the HAR site in relation to dollars allocated for the construction work in progress. Following the pattern of allocating construction costs over the 7-year construction period and assuming that property tax payments will continue to be split between Wake County (98.4 percent) and Chatham County (1.6 percent), this would lead to a gradual increase in property tax payments as shown Table 1. The Wake County government tax rate was 0.634 (or $0.634 per $100 of property value) as of 2006 (Reference RAI 10.4.1-1 04). The County calculated a gradual increase of 2.0 cents to pay for the operation of newly constructed buildings. As identified in Table 1, in 2008 the operating impact would be 0.9 cents, with the total impact by 2011 being 2.0 cents (Reference RAI 10.4.1-1 05). Thus, for the purpose of calculating the future property tax revenue for Wake County due to the construction of the two new units at the HAR site, the higher tax rate of .654 is used. As identified in Table 1, Chatham County has a tax at the rate of 65.3 cents ($0.653) per one-hundred dollars ($100.00) valuation of property (Reference RAI 10.4.1-1 06). Applying these tax rates to the HNP 7-year construction period and associated pro-rated increase in property value indicates that property tax revenues for Wake County would increase by $7.2 million in the first year of construction and steadily rise thereafter until it reaches $59.8 million in the last year of construction. These changes in property taxes represent a substantial increase above current property tax payments at the HNP. The HAR site property tax payments to Wake County will represent a moderate benefit to the County.

The share of HNP property taxes paid to Chatham County is small. Nonetheless, the change in property tax payments to Chatham County will reach $1 million by the end of the construction period.

From 2001 to 2004, PEC paid between $7,061,685 and $8,396,063 annually in total real and personal property taxes to Wake County. This averages out to about 2.0 percent of Wake County's total property tax annual revenues (Table 1 of RAI 2.5.2-1). Thus the more than seven-fold increase in property tax payments by PEC to Wake County will provide a moderate benefit to Wake County. A portion of these funds is retained for county operations and the remainder is disbursed to the 12 cities and municipalities in the county to fund their respective operating budgets. Approximately 1.4 percent of the Wake County General Fund is revenue from real and personal property tax generated by HNP (Table 1 of RAI 2.5.2-1). This share will increase substantially with the addition of the two new units. Dispersal of General Fund revenues is as follows: Education: 32.2 percent;, Human services: 26.6 percent; Capital and debt: 20.2 percent; General administration: 6.6 percent; Sheriff: 5.7 percent; Public safety: 2.7 percent; Community services: 2.7 percent; Environmental services: 1.0 percent; and Other: 1.3 percent. Once HAR is constructed, PEC will be subject to additional state and Wake County taxes. The current property tax payments to Chatham County represent less than 1 percent of total property tax receipts. After construction is

completed, there will be a small addition to property tax receipts for Chatham County. This will represent a small benefit to Chatham County.

5.8.2.2 Tax Impacts

The proposed project will be subject to North Carolina state income taxes, Wake County and Chatham County property taxes, and sales and use taxes at both the state and county levels. Therefore, the proposed project will result in an increase in the overall tax revenue for these jurisdictions.

North Carolina collects a personal income tax in the range of 6.0 - 7.5 percent of taxable income (Reference RAI 10.4.1-1 01). A small increase in state income tax revenue will be generated from the salaries paid to new operations workers employed at the new facilities. In addition, a small increase in state income tax revenue will be generated from the indirect salaries created by operation of the new facility.

The North Carolina state corporate income tax rate is 6.90 percent of net taxable income (Reference RAI 10.4.1-1 02). The new units at the HAR site will contribute corporate income tax revenue for the state for the duration of the operations phase.

Sales taxes will be levied on materials purchased during operation of the new facilities, as well as on goods and services purchased by new workers. Purchases are subject to the 4.5 percent general state rate of sales or use tax. In addition, most counties collect about 2.25 - 2.5 percent in sales and use taxes bringing the total rate to 6.75 - 7 percent (Reference RAI 10.4.1-1 03). Sales taxes on such purchases for operations of the new facilities and by new workers who would otherwise not be working in the region are expected to be a SMALL but beneficial impact to the local economy.

Because HNP is located in Wake County, PEC pays the majority of its annual property tax to Wake County. Chatham County receives the remaining portion of the annual property tax. The average amount of taxes paid between 2001 and 2004 ranged from $50,000 to $60,000 annually. From 2001 and 2004, PEC paid between $7,061,685 and $8,396,063 annually in total real and personal property tax revenues to Wake County. As per ER Subsection 4.4.2.2.3, upon commencement of plant operations, annual property taxes paid to Wake County will increase by almost $60 million, while the additional annual property taxes paid to Chatham County will amount to about $1 million. In 2007, Wake County collected about $483 million in property taxes. The additional $60 million in future property taxes paid at the HNP site will represent an increase of more than 10 percent. A portion of these funds is retained for county operations and the remainder is disbursed to the Wake County's 12 cities or municipalities to fund their respective operating budgets. Dispersal of General Fund revenues are as follows: Education: 32.2 percent; Human services: 26.6 percent; Capital and debt: 20.2 percent; General administration: 6.6 percent; Sheriff: 5.7 percent; Public safety: 2.7 percent; Community services: 2.7 percent; Environmental services: 1.0 percent; and Other: 1.3 percent. The cumulative impact of property taxes contributes to the overall beneficial economic impact described above in Subsection 5.8.2.1. The Wake County Public School System (WCPSS) will also benefit from this project as described in

Subsection 2.5.2.2. A 2006 WCPSS school bond passed in 2006 that includes a 2.7 cent increase in taxes per $100 assessed property value. Hence, in 2008, the owner of a $150,000 home would pay $54 more a year in property taxes or a little more than 15 cents a day (Reference RAI 10.4.1-1 05). The additional school tax paid to the WCPSS for the improvements to the HNP site would amount to almost $2.5 million (i.e., $9.15 billion x .00027). This is expected to be a benefit to the local community.

Chatham County property tax receipts were about $39 million in 2007. The future increase of $1 million paid to Chatham County will thus contribute a small percentage to total property taxes.

References

Reference 10.4.1-1 01

www.dor.state.nc.us/taxes/individual accessed on 1/12/2009.

Reference 10.4.1-1 02

www.dor.state.nc.us/taxes/corporate, accessed on 1/12/2009.

Reference 10.4.1-1 03

http://www.dor.state.nc.us/taxes/sales/salesanduse.html, accessed on 1/12/2009.

Reference 10.4.1-1 04

Wake County Government, "Tax Rates," www.wakegov.com/NR/rdonlyres/AC8EA9E6-C572-4C65-8B15-8AC9CAB2D1B0/0/TaxRates2008.pdf, accessed 1/12/2009.

Reference 10.4.1-1 05

Wake County Public School System, "Blueprint for Excellence 2006: Frequently Asked Questions," www.wcpss.net/bond/faqs.html, accessed 1/12/2009.

Reference 10.4.1-1 06

Chatham County FY 2009 Approved Budget Appendix A: FY 2008-09 Budget Ordinance, Page 219. http://www.chathamnc.org/Modules/ShowDocument.aspx?documentid=5417, accessed 1/12/2009.

Reference 10.4.1-1 07

Wake County Budget and Finance – County Budgets 2000-2007. http://www.wakegov.com/budget/default.htm, accessed 7/16/2008

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

Table 1
Property Tax

	Share	Tax Rate ($ per $1000)	Change Property Value Year 1 (billions)	Share Change	Change Property Tax year 1 ($millions)	Change Property Value Year 2 (billions)	Share Change	Change Property Tax Year 2 ($millions)	Change Property Value Year 3 (billions)	Share Change	Change Property Tax Year 3 ($millions)	Change Property Value Year 4 (billions)	Share Change	Change Property Tax Year 4 ($millions)
Wake	0.984	6.54	1.12	1.10208	7.2076032	2.24	2.20416	14.4152064	4.1	4.0344	26.384976	5.96	5.8646	38.3547456
Chatham	0.016	6.53	1.12	0.01792	0.1170176	2.24	0.03584	0.2340352	4.1	0.0656	0.428368	5.96	0.0954	0.6227008

	Share	Tax Rate ($ per $1000)	Change Property Value Year 5 (billions)	Share Change	Change Property Tax Year 5 ($millions)	Change Property Value Year 6 (billions)	Share Change	Change Property Tax Year 6 ($millions)	Change Property Value Year 7 (billions)	Share Change	Change Property Tax Year 7 ($millions)
Wake	0.984	6.54	7.82	7.6949	50.3245152	8.56	8.42304	55.0866816	9.3	9.1512	59.848848
Chatham	0.016	6.53	7.82	0.1251	0.8170336	8.56	0.13696	0.8943488	9.3	0.1488	0.971664

Notes:

The Wake County Government tax rate was 0.634 (or $0.634 per $100 of property value) as of 2006 (Reference RAI 10.4.1-1 04). The county calculated a gradual increase of 2.0 cents to pay for the operation of newly constructed buildings. In 2008, the operating impact would be 0.9 cents, with the total impact by 2011 being 2.0 cents. (Reference RAI 10.4.1-1 05)

Section 3: Tax Levy Rate.

For Chatham County, there is hereby levied a tax at the rate of 65.3 cents ($0.653) per one-hundred dollars ($100.00) valuation of property listed for taxes as of January 1, 2008. This rate is based on an estimate total valuation of property, for the purpose of taxation, of $7,449,804,063 which is 100% of the total assessed property tax valuation, and upon a collection rate of 97.5% for real and personal property and 89.7% for motor vehicles. (Reference RAI 10.4.1-1 06)

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 10.4.2-3

Text of NRC RAI: Provide additional explanation and discussion of Federal incentives mentioned in Section 10.4.2.3 of the ER. Please describe how the provisions of the Energy Policy Act of 2005 specifically mitigate projected construction and operations costs over the life of the proposed facilities. Quantify the anticipated amount of Federal incentives likely to apply to the proposed action from the following:

- Production tax credit for the first advanced reactors brought on line in the United States;
- Federal risk insurance benefits expected as part of the Nuclear Power 2010 Partnership.

Describe the expected impact of these incentives in terms of their role in making the project economically viable, and the impact on the proposed action in case PEC does not qualify for some or all of the incentives.

PGN RAI ID #: H-347

PGN Response to NRC RAI:

The federal Energy Policy Act of 2005 (EPAct 2005), signed into law in August 2005, provided the nuclear industry with a variety of financial incentives for new nuclear power plants. One of the incentives in the EPAct 2005 is the authorization of an 8-year production tax credit of 1.8 cents per kilowatt-hour (kWh) for up to 6000 megawatts (MW) of capacity from new, qualified advanced nuclear power facilities. The credit is further limited to $125 million annually per thousand MW of capacity allocated to the facility. To qualify for the credit, a facility must be of a design first approved by the NRC after 1993 and facilities must be newly in service prior to January 1, 2021 (Reference RAI 10.4.2-3 01).

The EPAct 2005 provided an innovative form of insurance for the first six reactors while the new process is being tested. The federal government, specifically the U.S. Department of Energy (DOE) will provide insurance policies to cover debt service for the first six new plants ($500 million for the first two plants; $250 million for the next four) if commercial operation is delayed for reasons beyond the company's control, such as litigation or a failure by the NRC to meet license review schedules (Reference RAI 10.4.2-3 01). Specifically, the EPAct 2005 authorizes the DOE to develop the Nuclear Power 2010 program to encourage new nuclear power plants (Reference RAI 10.4.2-3 01). It is a cost-share program with industry to reduce the uncertainty in the decision-making process for building new nuclear power plants.

PEC considers this project economically viable and expects to continue with licensing and construction of HAR regardless of the project's eligibility for financial incentives available through the EPAct 2005.

In addition to the financial incentives discussed above, the EPAct 2005 provides for the following additional financial incentives for new nuclear power plants (Reference RAI 10.4.2-3 01):

- Loan guarantees for up to 80 percent of project costs for advanced nuclear energy facilities.
- Extended Price-Anderson Act protection until December 31, 2025, which establishes an insurance system for nuclear plants in the case of accidents.
- A total of $1.25 billion for fiscal 2006 through 2015 for a prototype next-generation nuclear power plant at the Idaho National Laboratory that will produce both electricity and hydrogen.
- An advanced fuel recycling technology, research, development and demonstration program for proliferation-resistant fuel recycling and transmutation technologies.

Reference

Reference 10.4.2-3 01

Congressional Research Service (CRS), 2006, "Energy Policy Act of 2005: Summary and Analysis of Enacted Provisions," The Library of Congress, CRS Report for Congress, Order Code RL33302, March 8, 2006.

Associated HAR COL Application Revisions:

None

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 10.4.3-1

Text of NRC RAI: Provide additional discussion relative to ER Section 10.4.3. Identify the important conclusions to be drawn from the summary in Table 10.4.1. Identify and discuss the balancing of all internal and external benefits and costs and provide a determination of the net economic benefit (or cost) to society of the proposed action, based on this assessment. For costs and benefits that cannot be precisely determined at this time, provide additional discussion of them in relative terms compared to the expected internal construction and operation costs – to facilitate amplified discussion of the benefit/cost balance.

PGN RAI ID #: H-348

PGN Response to NRC RAI:

The important conclusions to be drawn from Table 10.4-1 are as follows:

- Each unit of the new plant will provide approximately 1037 MWe that will help meet the growing power demand in PEC's service territory.
- The local economy will experience a large beneficial impact through the creation of jobs and from additional tax revenues.
- The location of the new units is a benefit since the site was selected based on the planned construction of multiple units.
- Nuclear power generation results in significant local and national air quality benefits.
- Nuclear reactors offer the benefit of not contributing to smog.
- The new plant will add needed power in state without generating significant amounts of air pollutant emissions, compared with a coal-fired generating plant.
- Given concerns in the state about climate change and carbon emissions, the new plant will reduce carbon emissions in the state.
- There will be some temporary impacts to recreation on and around Harris Lake, but some recreational uses, such as boating, will be enhanced in the long term.
- The cost of the plant and associated transmission lines will be approximately $16 billion.
- Consumptive water use will be approximately 1.7 cubic meters per second during operation of the new units, but NPDES permit conditions will be required and monitored.

- The HAR Reservoir, with the 20-ft. increase in the lake level, provides an adequate source of cooling water for the plant.
- Wetland impacts will occur on the site, primarily due to the increase in the level of Harris Lake. Impacts will be minimized and mitigated as required by permit conditions.
- Impacts on traffic and infrastructure will be localized and limited in nature.

The balancing of all internal and external benefits and costs and the benefit to society can be characterized as follows:

> The need for additional power is clearly documented in PEC's service territory. The careful evaluation of alternative sites and the planning associated with the HAR site have resulted in a location for the new plant that will meet power needs and minimize environmental and socioeconomic impacts. While some impact to local land use and habitat will occur, a large economic benefit will be realized by local economies in the form of long-term tax revenue and job growth. Overall, the benefits of the plant outweigh the costs associated with construction and operation.

Costs that cannot be precisely determined at this time include the cost of storage, transportation, disposal of spent fuel from the plant, and the commitment of land around the Harris Reservoir. These costs will likely increase with time, and while they can be estimated in present dollar values, the precise costs in the future are not known as transportation and disposal costs increase. As stated above, the benefit of the proposed plant related to the generation of new power to meet growing demand and the economic benefits of the project outweigh the environmental and socioeconomic costs of construction.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

None.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 4.1-1

Text of NRC RAI: Distinguish between the environmental impacts of construction activities (as defined in 10 CFR 50.10(a) or in 10 CFR 51.4) at the site and the cumulative impact of preconstruction and construction activities. Interim NRC staff guidance concerning this evaluation is available in COL/ESP-ISG-4, available at http://www.nrc.gov/reading-rm/doccollections/isg/col-esp-isg-4.pdf on the NRC's public Web site.

Only some of the activities associated with the construction of a nuclear power plant are part of the NRC action to license the plant. Activities for which an NRC license is required are defined as "construction" in 10 CFR 50.10(a) and 10 CFR 51.4. Activities associated with building the plant that are not licensed by the NRC as part of the proposed action are grouped under the term "preconstruction". The ER should distinguish between the impacts of these two categories of activities.

PGN RAI ID #: H-349

PGN Response to NRC RAI:

A description of the cumulative impacts attributable to the construction of the HAR facility is provided in ER Section 4.6 "Measures and Controls to Limit Construction-Related Adverse Impacts" and a summary of impacts for each of the environmental elements identified in NUREG-1555 (Section 4.6) is provided in ER Table 4.6-1. Estimates of the relative impacts of preconstruction and construction activities for each of the sections of the ER that are referenced in Table 4.6-1 will be included in a future amendment to the ER in Section 4.6.

The proposed revisions to ER Section 4.6 to clarify the cumulative impacts of preconstruction and construction activities are provided below.

Associated HAR COL Application Revisions:

ER Section 4.6 will be revised as follows:

Insert the following sentence at the beginning of the second paragraph of Subsection 4.6.2 "Adverse Environmental Impacts":

"Table 4.6-1 provides a summary of the impacts attributable to the cumulative impacts associated with the construction of the HAR facilities."

Insert the following text at the end of ER Subsection 4.6.2:

"In addition to the cumulative impacts attributable to the construction of the entire HAR facility that are summarized in Table 4.6-1, a breakdown or separation of "construction" and "preconstruction" environmental impacts has been estimated in Table 4.6-2 for the purpose

of assessing impacts attributable specifically to the construction of "safety-related structures, systems, or components (SSCs)" as defined in 10 CFR 50.10(a)(1) and 10 CFR 50.2, "Definitions". All other construction activities can be considered to be either "preconstruction" or "other than construction" as defined in 10 CFR 50.10(a)(2) and 10 CFR 50.2.

Table 4.6-2 provides estimates of the percentage of impacts attributable to "construction" and "preconstruction," as well as a summary of the basis for the estimates. The estimated construction-related impacts presented in the table were based primarily on two factors, the area associated with the construction of SSCs and the labor hours associated with the construction of SSCs. Information related to these two factors is provided as follows:

Construction Area —The HAR facility will be constructed on approximately 400 ac. of the existing site, approximately 200 ac. of which have not been disturbed by prior development of the HNP. Approximately 50 ac. of the HAR development will be dedicated to the construction of SSCs (25 ac. each for HAR 2 and HAR 3). Construction activity in the approximately 200-ac. undisturbed area will consist primarily of HAR 3 and its associated facilities, which will occupy approximately 25 ac. of the total HAR development area. The 25 ac. area of "construction," therefore, represents approximately 12.5 percent of the total undisturbed area that will ultimately be affected by the development of the HAR facility (excluding electric transmission lines and the extensive acreage of Harris Lake that will be inundated when the lake level is raised from 220 ft. to 240 ft.). Because this estimate does not include these two areas, it is considered to be a highly conservative estimate. For the purposes of this assessment, the impacted area associated with SSC construction is considered to be less than 13 percent.

Labor Hours — Based on preliminary construction estimates for all phases of development of the HAR facility, the estimated labor hours associated with the construction of SSCs are approximately 62 percent of the total labor hours associated with the development of the entire HAR facility. For the purpose of this assessment, the labor hours associated with SSC construction is considered to be 60 percent."

A new Table 4.6-2 "Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components" will be added to the end of ER Section 4.6, immediately following Table 4.6-1. The new Table 4.6-2 is provided at the end of this response.

No revisions to the FSAR will be required.

Attachments/Enclosures:

None.

Table 4.6-2 (Sheet 1 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Section 4.1 Land Use Impacts				
ER Subsection 4.1.1.1 Land Use Directly Affected by Construction	S – Land Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.1.1.2 Land Use Secondarily Affected by Construction	S – Land Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.1.1.4 HAR Site Restoration and Management Actions	S – Land Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.1.2 Appurtenant Facilities and Off-Site Areas	S – Land Use	0	100	Appurtenant facilities and off-site areas are not included in the definition of construction of SSCs.
ER Subsection 4.1.2.1 Blowdown Pipelines	S – Land Use	0	100	Cooling water blowdown pipelines are not included in the definition of construction of SSCs.
ER Subsection 4.1.2.2 Transmission Line Construction	S – Land Use	0	100	The expansion of the existing transmission corridors is not included in the definition of construction of SSCs.

Table 4.6-2 (Sheet 2 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.1.2.3 Main Dam Modifications	S – Land Use	0	100	The main dam modifications will not affect surrounding land use and are not included in the definition of construction of SSCs.
ER Subsection 4.1.2.4 Cape Fear River Intake Structure and Pumphouse	S – Land Use	0	100	The Cape Fear intake structure and pumphouse is not included in the definition of construction of SSCs.
ER Subsection 4.1.2.5 Pipeline Corridor	S – Land Use	0	100	The cooling water pipeline corridor is not included in the definition of construction of SSCs
ER Subsection 4.1.2.6 Potential Physical Impacts to Land Use from Construction	S – Land Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.1.3.3 Post-Application Activities	S – Other (Site Specific)	0	100	Post application activities such as site surveys and monitoring, are not included in the definition of construction of SSCs.
ER Section 4.2 Water-Related Impacts				
ER Subsection 4.2.1.1 Freshwater Streams and Harris Lake	S – Erosion and Sediment S – Surface Water	0	100	Construction activities on Harris Lake and its tributaries are not included in the definition of construction of SSCs

Table 4.6-2 (Sheet 3 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.2.1.2 Cape Fear River	S – Erosion and Sediment S – Surface Water	0	100	Construction of the new intake structure on the Cape Fear River is not included in the definition of construction of SSCs.
ER Subsection 4.2.1.3 Other Impacts to Harris Lake from Surface Disturbance	S – Erosion and Sediment S- Effluents and Wastes S – Surface Water	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.2.1.4 Other Impacts to Harris Lake from Subsurface Excavation Activities	S – Erosion and Sediment S – Surface Water	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.2.1.5 Other Impacts to Harris Lake from Initial Increase in Lake Level from 220 to 240	S – Surface Water	0	100	Construction activities that will facilitate the increase in the level of Harris Lake are not included in the definition of construction of SSCs.
ER Subsection 4.2.1.6 Groundwater	S – Groundwater	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).

Table 4.6-2 (Sheet 4 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.2.2.1 Freshwater Streams and Cape Fear River	S – Water Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.2.2.2 Lakes and Impoundments	S – Water Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.2.2.3 Groundwater Use	S – Land Use	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Section 4.3 Ecological Impacts				
ER Subsection 4.3.1.1 Plant Site	S – Terrestrial Ecosystems	0	100	Ecological impacts will occur during preconstruction activities and mobile wildlife species are expected to vacate the site until construction is complete. Native plants may be impacted in limited areas; however, impacts will occur during land clearing and preparation.

Table 4.6-2 (Sheet 5 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.3.1.2 Harris Reservoir Perimeter	S to M – Terrestrial Ecosystem	0	100	Ecological impacts will occur during preconstruction activities and mobile wildlife species are expected to vacate the site until construction is complete. Native plants may be impacted in limited areas; however, impacts will occur during land clearing and preparation.
ER Subsection 4.3.1.3 Intake Structure and Pumphouse	S – Terrestrial Ecosystem	0	100	All impacts attributable to the installation of these components will occur as a result of preconstruction activities that are not associated with the construction of any SSC.
ER Subsection 4.3.1.4 Pipeline Corridor	S – Terrestrial Ecosystem	0	100	All impacts attributable to the installation of these components will occur as a result of preconstruction activities that are not associated with the construction of any SSC.
ER Subsection 4.3.1.5 Transmission Corridors	S – Terrestrial Ecosystem	0	100	All impacts attributable to the installation of these components will occur as a result of preconstruction activities that are not associated with the construction of any SSC.
ER Subsection 4.3.2.1 Plant Site	S – Aquatic Ecosystem	0	100	Ecological impacts will occur during preconstruction activities and mobile wildlife species are expected to vacate the site until construction is complete. Native plants may be impacted in limited areas; however, impacts will occur during land clearing and preparation.
ER Subsection 4.3.2.2 Harris Reservoir Perimeter	S – Aquatic Ecosystem	0	100	Ecological impacts will occur during preconstruction activities and mobile wildlife species are expected to vacate the site until construction is complete. Native plants may be impacted in limited areas; however, impacts will occur during land clearing and preparation.

Table 4.6-2 (Sheet 6 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.3.2.3 Intake Structure and Pumphouse	S – Aquatic Ecosystem	0	100	All impacts attributable to the installation of these components will occur as a result of preconstruction activities that are not associated with the construction of any SSC.
ER Subsection 4.3.2.4 Pipeline Corridor	S – Aquatic Ecosystem	0	100	All impacts attributable to the installation of these components will occur as a result of preconstruction activities that are not associated with the construction of any SSC.
ER Subsection 4.3.2.5 Transmission Corridor	S – Aquatic Ecosystem	0	100	All impacts attributable to the installation of these components will occur as a result of preconstruction activities that are not associated with the construction of any SSC.
ER Section 4.4 Socioeconomic Impacts				
ER Subsection 4.4.1.1 Noise	S – Noise	38	62	Most perceptible noise impacts at off-site locations will occur during the most intense operations in the power block area and will include pile driving for SSCs. Estimates are based on the average of the percent of labor hours dedicated to safety-related structures, systems, or components (SSCs) (62%) and the percent of land dedicated to SSCs (<13%). (Average stated as 38%).
ER Subsection 4.4.1.2 Air Quality	S – Air Quality	38	62	Air emissions will occur in the vicinity of the SSCs (power block area) during construction. Estimates are based on the average of the percent of labor hours dedicated to constructing safety-related structures, systems, or components (SSCs) (62%) and the percent of land dedicated to SSCs (<13%). (Average stated as 38%).
ER Subsection 4.4.1.3 Visual Aesthetic Disturbances	S – Other (Site-Specific)	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).

Table 4.6-2 (Sheet 7 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.4.2 Social and Economic Impacts	S - Socioeconomic	13	87	Estimates are based on the area of previously undisturbed land that will be dedicated to safety-related structures, systems, or components (SSCs) and the assumption that the construction of SSCs will occur on no more than approximately 25 acres (HAR Unit 3) of the previously undisturbed project area being developed (that is, 200 acres, excluding off-site electric transmission lines and inundated lake acreage) (12.5%, restated as 13%).
ER Subsection 4.4.2.1 Economic Characteristics	S to M - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.2 Tax Impacts	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.3 Social Structure	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR3 (62%, restated as 60%).
ER Subsection 4.4.2.4 Housing	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.5 Educational System	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).

Table 4.6-2 (Sheet 8 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.4.2.6 Recreation	S – Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.7 Public Services and Facilities	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.8 Transportation Facilities	S – Traffic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.9 Distinctive Communities	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.10 Agriculture	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.11 Environmental Justice	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Subsection 4.4.2.12 Racial, Ethnic, and Special Groups	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).

Table 4.6-2 (Sheet 9 of 9)
Summary of Construction- and Preconstruction-Related Impacts for Safety-Related Structures, Systems, or Components

Section Reference	Potential Impacts and Significance [a]	Estimated Impacts (%)		Basis of Estimate
		Construction [b]	Preconstruction	
ER Subsection 4.4.2.13 Income Characteristics	S - Socioeconomic	60	40	Estimates are based on the percent of total project labor hours that will be dedicated to the construction of safety-related structures, systems, or components (SSCs), all of which will be in the power block areas for HAR 2 and HAR 3 (62%, restated as 60%).
ER Section 4.5 Radiation Exposure to Construction Workers				
ER Subsection 4.5.2 Radiation Sources	S – Rad Exp to Construction Workers	30	70	Estimates are based on 50% of the workforce remaining during the completion of the SSCs for HAR 3 (half of 62%, restated as 30%).
ER Subsection 4.5.3.1 Tritium Releases from the HNP	S – Effluents and Wastes	30	70	Estimates are based on 50% of the workforce remaining during the completion of the SSCs for HAR 3 (half of 62%, restated as 30%).
ER Subsection 4.5.3.2 Gaseous and Liquid Releases from the HNP Facility	S – Effluents and Wastes	30	70	Estimates are based on 50% of the workforce remaining during the completion of the SSCs for HAR 3 (half of 62%, restated as 30%).
ER Subsection 4.5.3.3 Direct Radiation Measurements	S – Rad Exp to Construction Workers	30	70	Estimates are based on 50% of the workforce remaining during the completion of the SSCs for HAR 3 (half of 62%, restated as 30%).
ER Subsection 4.5.4 Annual Construction Worker Doses	S – Rad Exp to Construction Workers	30	70	Estimates are based on 50% of the workforce remaining during the completion of the SSCs for HAR 3 (half of 62%, restated as 30%).

Notes:

a) The assigned potential impact significance levels of (S)MALL, (M)ODERATE, or (L)ARGE are based on the assumption that mitigation measures and controls would be implemented.

b) "Construction," as defined in 10 CFR 50.10(a)(1) and 10 CFR 50.2 refers to the construction of "safety-related structures, systems, or components (SSCs) of a facility.

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

NRC Letter Date: November 13, 2008

NRC Review of Environmental Report

NRC RAI #: 1.2-1

Text of NRC RAI: Provide copies in appropriate format for docketing of all correspondence (including enclosures) resulting from consultations with all Federal, State, regional, local, and affected Native American tribal agencies. For example, the correspondence should include PEC letters dated January 10, 2007; April 18, 2007; February 28, 2008; May 2, 2008 and reply letters from NCDENR DWR dated August 28, 2007, USFWS dated January 29, 2007, NCWRC dated February 27, 2007, NCDENR NHP email dated March 25, 2007 along with any correspondence exchanges with the NC SHPO and any more recent exchanges of information with the above listed agencies.

The Staff needs to document in the DEIS the consultations PEC has pursued with Federal, State, regional, local, and affected Native American tribal agencies to properly document 1) current status of each authorization, 2) environmental concerns of the authorizing agency that are to be addressed by the DEIS section reviewers, and 3) potential problems that may affect granting of any other Federal, State, regional, local, and affected Native American tribal agencies' authorizations.

PGN RAI ID #: H-350

PGN Response to NRC RAI:

The requested correspondence is provided as Attachment 1.2-1A.

Associated HAR COL Application Revisions:

None.

Attachments/Enclosures:

See 073 Attachment 1.2-1A.pdf.

Listing of Files Included on CD Provided as Attachment 1

Filename	Description
001 Attachment 5.2.1.3-1A.pdf	Buckhorn Creek Drainage Basin Topography
002 Attachment 2.3.1.3-1A Part 1 of 4.pdf 003 Attachment 2.3.1.3-1A Part 2 of 4.pdf 004 Attachment 2.3.1.3-1A Part 3 of 4.pdf 005 Attachment 2.3.1.3-1A Part 4 of 4.pdf	Harding Law
006 Attachment 9.2-1A.pdf	U.S. Environmental Protection Agency, AP-42, Fifth Edition, Volume I
007 Attachment 9.4-1A.pdf	PEC Exclusionary Areas
008 Attachment 9.4-1B.pdf	PEC Candidate Areas
009 Attachment 4.5-2A.pdf	Area Thermoluminescent Dosimeter (TLD) Monitoring
010 Attachment 4.5-2B.pdf	Harris Lake Infrastructure Impacts 5/16/07
011 Attachment 4.5-2C.pdf	Long Term X/Q Modeling Request
012 Attachment 2.4-1K.pdf	EPA Gen Info Cape Fear Steam Electric Plant 1/12/06
013 Attachment 2.5.3-1A.pdf	letter to Peter Sandbeck, SHPO 8/18/08
014 Attachment 2.4.1-1A.pdf	An Inventory of Significant Natural Areas in Wake County NC (Executive Summary)
015 Attachment 2.4-1B.pdf	Ecological Field Observations
016 Attachment 2.4.1-1B.pdf	Env Mon Reports Summary
017 Attachment 2.4.1-2A.pdf	Wild turkey in NC
018 Attachment 2.4.1-2B.pdf	Gap Project Analysis
019 Attachment 2.4.1-3-10A.pdf	Future Wetlands Impact Analysis
020 Attachment 2.4-1T.pdf	Endangered and Threatened Species
021 Attachment 4.3.1-1A.pdf	Special Migratory Bird Permit
022 Attachment 4.3.1-1B.pdf	Federal Fish and WIldlife Permit
023 Attachment 4.3.1-1C.pdf	Migratory Birds
024 Attachment 4.3.1-1D.pdf	Pesticides
025 Attachment 4.3.1-1E.pdf	Progress Energy, Inc. Environmental Policy
026 Attachment 4.3.1-1F.pdf	Land Disturbing Activities
027 Attachment 4.3.1-1G.pdf	Progress Energy Transmission Dept. Transmission Projects Section T4 Specification ROW Prep
028 Attachment 2.4-2D.pdf	Transmission Vegetation Management Program
029 Attachment 4.3.1-1H.pdf	MOU between CP&L and NCDENR
030 Attachment 4.3.1-2A.pdf	Potentially Disturbed Areas
031 Attachment 4.3.1-2B.pdf	Support for Clean Water 404 Permitting and Alternatives Analysis
032 Attachment 2.4-2A.pdf	Apex SCI Master Plan
033 Attachment 2.4-2B.pdf	Multiple Benefits of Large, Undeveloped Tracts in Urbanized Landscapes
034 Attachment 2.4-2C.pdf	Shearon Harris Wildlife Management Implementation Plan
035 Attachment 2.4-2E.pdf	Environmental Training: Endangered Species

Filename	Description
036 Attachment 4.3.2-1A.pdf	HAR lake pump
037 Attachment 4.3.2-4A.pdf	Emergency Service Water Intake and Screening Structures inspection rev 7 screening structure bay 8 12/13/06
038 Attachment 4.3.2-4B.pdf	Emergency Service Water Intake and Screening Structures inspection rev 8 bay 8 main reservoir A esw 5/20/08
039 Attachment 4.3.2-4C.pdf	Emergency Service Water Intake and Screening Structures inspection rev 8 ctmu bay b 3/4/08
040 Attachment 4.3.2-4D.pdf	Emergency Service Water Intake and Screening Structures inspection rev 8 bay 6 (Btrain) main reservoir 9/3/08
041 Attachment 2.4.2-1A.pdf	2006 Env Mon Report
042 Attachment 4.3.2-6A.pdf	Harris Site Timber Management Plan
043 Attachment 2.4-1A.pdf	2004 Env Mon Report
044 Attachment 2.4-1C.pdf	Basinwide Assessment Report
045 Attachment 2.4-1D.pdf	Kiker Forestry
046 Attachment 2.4-1E.pdf	ER Appendix C -NCNHP
047 Attachment 2.4-1F.pdf	NCWRC letter to Bob Kitchen
048 Attachment 2.4-1G.pdf	USFWS letter to Bob Kitchen
049 Attachment 2.4-1H.pdf	2000 Env Mon Report
050 Attachment 2.4-1I.pdf	1992 Env Mon Report
051 Attachment 2.4-1J.pdf	Workbook and Key to Freshwater Bivalves of NC
052 Attachment 2.4-1L.pdf	MCFRBA 2004 Annual Report
053 Attachment 2.4-1M.pdf	DEIS Western Wake Section 2.0
054 Attachment 2.4-1N.pdf	Cape Fear Shiner Recovery Plan
055 Attachment 2.4-1O.pdf	RFI 158 Attachment C Construction Parking Lots
056 Attachment 2.4-1P.pdf	NCWRC Guidance Memo for SCI
057 Attachment 2.4-1Q.pdf	Letter to Harry LeGrand, NCNHP
058 Attachment 2.4-1R.pdf	RFI 175 Spragins
059 Attachment 2.4-1S.pdf	USFWS email from David Rabon
060 Attachment 2.4-1U.pdf	EPA Cooling Water Intake Structures
061 Attachment 2.4-1V.pdf	CF Impingement
062 Attachment 2.4-1W.pdf	Eval of cooling water intake regs
063 Attachment 2.4-1X.pdf	Overview of cape fear power plant
064 Attachment 2.4-1Y.pdf	SHNPP units 1,2,3,4 env report operating license stage
065 Attachment 2.4-1Z.pdf	Sargent Lundy letter to Garry Miller
066 Attachment 2.4-1AA.pdf	15A NCAC 02B.0204
067 Attachment 2.4-1AB.pdf	Engineering and economic evaluation of the integrated heat rejection cycle
068 Attachment 2.4-1AC.pdf	NPDES permit
069 Attachment 2.4-1AD.pdf	Bad Bug Book
070 Attachment 2.4-1AE.pdf	Surveillance for Waterborne Disease Outbreaks
071 Attachment 2.4-1AF.pdf	230kV Switchyard Conceptual Design Rev 3 8/8/07
072 Attachment 2.4-1AG.pdf	USFWS communication with Pete Benjamin
073 Attachment 1.2-1A.pdf	Cultural Resources Correspondence

Enclosure 3

Pre-Flight Report for Files Included on CD Provided as Attachment 1

HAR ENVIRONMENTAL RAI ATTACHMENTS PREFLIGHT REPORT

This table serves as a pre-flight report for the HAR ER RAI submittal in support of the HAR COLA. The following files where checked for items related to pre-flight/electronic submittal acceptance. The results of the review are shown below. For files that do not pass pre-flight, the reason for the error is provided, however all files within this submittal are deemed compliant with the NRC electronic submittal checklist as noted below. For files that do not pass pre-flight the text is word searchable and clarity/legibility is of high quality. Most of the files that do not pass pre-flight, either have photos embedded into the documents or have been rescanned and had OCR run.

		Acceptance Review			Preflight Review		
Item #	File Name	Word Searchable? (Y/N)	Fast Web View? (Y/N)	Fonts Embedded? (Y/N)	Preflight (Pass/Fail)	Failure Reason (<300 ppi or unembedded fonts)	Comments
1	001 Attachment 5.2.1.3-1A.pdf	Y	Y	Y	PASS	N/A	N/A
2	002 Attachment 2.3.1.3-1A Part 1 of 4.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI [FILE BROKEN INTO MULTIPLE PIECES DUE TO FILE SIZE]
3	003 Attachment 2.3.1.3-1A Part 2 of 4.pdf	Y	Y	N	FAIL	SAME AS ABOVE	SAME AS ABOVE [FILE BROKEN INTO MULTIPLE PIECES DUE TO FILE SIZE]
4	004 Attachment 2.3.1.3-1A Part 3 of 4.pdf	Y	Y	N	FAIL	SAME AS ABOVE	SAME AS ABOVE [FILE BROKEN INTO MULTIPLE PIECES DUE TO FILE SIZE]
5	005 Attachment 2.3.1.3-1A Part 4 of 4.pdf	Y	Y	N	FAIL	SAME AS ABOVE	SAME AS ABOVE [FILE BROKEN INTO MULTIPLE PIECES DUE TO FILE SIZE]
6	006 Attachment 9.2-1A.pdf	Y	Y	Y	FAIL	<300 PPI	WEB DOCUMENT THAT CONTAINS COLORED LOGOS AND COLORED BULLET POINTS (TEXT IS BLACK) THAT ARE LESS THAN <300 PPI; ALL OTHER ITEMS PASS 300 PPI; CLEAR AND LEGIBLE.
7	007 Attachment 9.4-1A.pdf	Y	Y	Y	PASS	N/A	N/A
8	008 Attachment 9.4-1B.pdf	Y	Y	Y	PASS	N/A	N/A
9	009 Attachment 4.5-2A.pdf	Y	Y	Y	PASS	N/A	N/A
10	010 Attachment 4.5-2B.pdf	Y	Y	Y	PASS	N/A	N/A
11	011 Attachment 4.5-2C.pdf	Y	Y	Y	PASS	N/A	N/A
12	012 Attachment 2.4-1K.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME TEXT, HANDWRITING, AND EMBEDDED MAP REMAINS AT <300 PPI
13	013 Attachment 2.5.3-1A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, LOGO AND SOME PAGES REMAIN AT <300 PPI
14	014 Attachment 2.4.1-1A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	DOCUMENT CONTAINS A BITMAP IMAGE SCANNED AT 300 PPI- SOME PARTS OF THE IMAGE REMAIN AT <300 PPI; CLEAR AND LEGIBLE
15	015 Attachment 2.4-1B.pdf	Y	Y	Y	PASS	N/A	N/A
16	016 Attachment 2.4.1-1B.pdf	Y	Y	Y	FAIL	<300 PPI	FIGURES WITH EMBEDDED MAPS FAIL FOR <300 PPI, SCANNING REDUCES QUALITY, RETAINED ORIGINAL

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17	017 Attachment 2.4.1-2A.pdf	Y	Y	Y	FAIL	<300 PPI	SCANNING PHOTOGRAPHS DID NOT INCREASE PPI TO 300; RETAINED ORIGINAL DOCUMENT FOR CLARITY
18	018 Attachment 2.4.1-2B.pdf	Y	Y	Y	FAIL	<300 PPI	COLOR IMAGES FAIL FOR <300 PPI, SCANNING REDUCES QUALITY, RETAINED ORIGINAL
19	019 Attachment 2.4.1-3-10A.pdf	Y	Y	Y	FAIL	<300 PPI	COLOR IMAGES FAIL FOR <300 PPI, SCANNING REDUCES QUALITY, RETAINED ORIGINAL
20	020 Attachment 2.4-1T.pdf	Y	Y	Y	PASS	N/A	N/A
21	021 Attachment 4.3.1-1A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, LOGOS REMAIN AT <300 PPI
22	022 Attachment 4.3.1-1B.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SIGNATURES AND SOME TEXT REMAIN AT <300 PPI
23	023 Attachment 4.3.1-1C.pdf	Y	Y	Y	PASS	N/A	N/A
24	024 Attachment 4.3.1-1D.pdf	Y	Y	Y	PASS	N/A	N/A
25	025 Attachment 4.3.1-1E.pdf	Y	Y	Y	PASS	N/A	N/A
26	026 Attachment 4.3.1-1F.pdf	Y	Y	Y	PASS	N/A	N/A
27	027 Attachment 4.3.1-1G.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI (UNEMBEDDED FONTS), SIGNATURES REMAIN AT <300 PPI
28	028 Attachment 2.4-2D.pdf	Y	Y	Y	FAIL	<300 PPI	SCAN OF EMBEDDED FIGURES STILL <300 PPI; LEFT IN ORIGINALS FOR EMBEDDED FONTS AND BETTER QUALITY
29	029 Attachment 4.3.1-1H.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI; SIGNATURES <300 PPI
30	030 Attachment 4.3.1-2A.pdf	Y	Y	Y	PASS	N/A	N/A
31	031 Attachment 4.3.1-2B.pdf	Y	Y	Y	PASS	N/A	N/A
32	032 Attachment 2.4-2A.pdf	Y	Y	Y	FAIL	<300 PPI	SCAN OF COLOR IMAGES IN DOCUMENTS REMAIN AT <300 PPI; RETAIN ORIGINAL DOCUMENT
33	033 Attachment 2.4-2B.pdf	Y	Y	Y	FAIL	<300 PPI	NOT RESCANNED; RESCAN WOULD DAMAGE QUALITY OF DOCUMENT; COLOR IMAGES AND PHOTOGRAPHS ARE THE ONLY ITEMS THAT ARE LESS THAN <300 PPI
34	034 Attachment 2.4-2C.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SIGNATURES AND OLD PENCIL DRAWINGS STILL AT <300 PPI
35	035 Attachment 2.4-2E.pdf	Y	Y	Y	FAIL	<300 PPI	EMBEDDED DRAWINGS <300 PPI, SCANNING IN AT 300 PPI DOES NOT INCREASE PPI IN DRAWINGS AND UNEMBEDS FONTS, RETAINED ORIGINALS

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36	036 Attachment 4.3.2-1A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	EMBEDDED DRAWINGS <300 PPI, SCANNING IN AT 300 PPI DOES NOT INCREASE PPI IN DRAWINGS, RETAINED ORIGINAL
37	037 Attachment 4.3.2-4A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME HANDWRITTEN TEXT REMAINS AT <300 PPI
38	038 Attachment 4.3.2-4B.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME HANDWRITTEN TEXT REMAINS <300 PPI
39	039 Attachment 4.3.2-4C.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME HANDWRITTEN TEXT REMAINS <300 PPI
40	040 Attachment 4.3.2-4D.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME HANDWRITTEN TEXT REMAINS <300 PPI
41	041 Attachment 2.4.2-1A.pdf	Y	Y	Y	PASS	N/A	N/A
42	042 Attachment 4.3.2-6A.pdf	Y	Y	Y	PASS	N/A	N/A
43	043 Attachment 2.4-1A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI
44	044 Attachment 2.4-1C.pdf	Y	Y	Y	FAIL	<300 PPI	PHOTOS IN DOCUMENT, SCANNING NOT SUCCESSFUL TO INCREASE TO 300 PPI; RETAINED ORIGINAL DOCUMENT FOR CLARITY
45	045 Attachment 2.4-1D.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI
46	046 Attachment 2.4-1E.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI
47	047 Attachment 2.4-1F.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI
48	048 Attachment 2.4-1G.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, PAGES REMAIN AT <300 PPI
49	049 Attachment 2.4-1H.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI
50	050 Attachment 2.4-1I.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS, SIGNATURES, AND TEXT REMAIN AT <300 PPI

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Item #	File Name	Word Searchable? (Y/N)	Fast Web View? (Y/N)	Fonts Embedded? (Y/N)	Preflight (Pass/Fail)	Failure Reason (<300 ppi or unembedded fonts)	Comments
51	051 Attachment 2.4-1J.pdf	Y	Y	Y	FAIL	<300 PPI	SCANNED DRAWINGS AT 300 PPI, BUT DRAWINGS IN DOCUMENT REMAIN AT <300 PPI; RETAINED ORIGINAL DOCUMENT
52	052 Attachment 2.4-1L.pdf	Y	Y	Y	FAIL	<300 PPI	SCANNED AT 300 PPI, BUT COLORED LINE DRAWINGS IN DOCUMENT REMAIN AT <300 PPI, RETAINED ORIGINAL
53	053 Attachment 2.4-1M.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED COVER PAGE AT 300 PPI (UNEMBEDDED FONTS), LOGOS, SIGNATURES REMAIN <300 PPI
54	054 Attachment 2.4-1N.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SOME LOGOS AND DRAWN MAPS REMAIN AT <300 PPI
55	055 Attachment 2.4-1O.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, STILL PART OF MAP THAT REMAINS AT <300 PPI
56	056 Attachment 2.4-1P.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, BUT DRAWINGS REMAIN AT <300 PPI
57	057 Attachment 2.4-1Q.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, MAPS REMAIN AT <300 PPI
58	058 Attachment 2.4-1R.pdf	Y	Y	Y	PASS	N/A	N/A
59	059 Attachment 2.4-1S.pdf	Y	Y	Y	PASS	N/A	N/A
60	060 Attachment 2.4-1U.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, LOGOS REMAIN AT <300 PPI
61	061 Attachment 2.4-1V.pdf	Y	Y	Y	FAIL	<300 PPI	PHOTOS IN DOCUMENT, SCANNING AT 300 PPI NOT SUCCESSFUL TO INCREASE TO 300 PPI; RETAIN ORIGINAL DOCUMENT FOR CLARITY
62	062 Attachment 2.4-1W.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, UNEMBEDDED FONTS
63	063 Attachment 2.4-1X.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, STILL SOME LOGOS AND FOOTERS THAT REMAINS AT <300 PPI
64	064 Attachment 2.4-1Y.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	EVEN THOUGH SCANNED AT 300 PPI, THIS DOCUMENT IS BEING FLAGGED AT <300 PPI.
65	065 Attachment 2.4-1Z.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, LOGOS, HEADERS SIGNATURES AND SOME TEXT REMAIN AT <300 PPI

		Acceptance Review			Preflight Review		
Item #	File Name	Word Searchable? (Y/N)	Fast Web View? (Y/N)	Fonts Embedded? (Y/N)	Preflight (Pass/Fail)	Failure Reason (<300 ppi or unembedded fonts)	Comments
66	066 Attachment 2.4-1AA.pdf	Y	Y	Y	N/A	N/A	N/A
67	067 Attachment 2.4-1AB.pdf	Y	Y	Y	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AND REPLACED PAGE AT 300 PPI, SOME EMBEDDED DRAWINGS AND LOGOS ARE <300 PPI
68	068 Attachment 2.4-1AC.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, STILL SOME LOGOS, SIGNATURES, AND TEXT THAT REMAINS AT <300 PPI
69	069 Attachment 2.4-1AD.pdf	Y	Y	Y	FAIL	<300 PPI	WEB DOCUMENT, LOGOS AND COLORED HEADINGS REMAIN AT <300 PPI AFTER SCANNING, RETAINED ORIGINAL
70	070 Attachment 2.4-1AE.pdf	Y	Y	Y	FAIL	<300 PPI	WEB DOCUMENT, LOGOS AND COLORED HEADINGS REMAIN AT <300 PPI AFTER SCANNING, RETAINED ORIGINAL
71	071 Attachment 2.4-1AF.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SIGNATURES AND GRAYED BOXES (NON TEXT) IN TABLES STILL <300 PPI
72	072 Attachment 2.4-1AG.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, STILL SOME LOGOS, SIGNATURES, AND TEXT THAT REMAIN AT <300 PPI
73	073 Attachment 1.2-1A.pdf	Y	Y	N	FAIL	<300 PPI UNEMBEDDED FONTS	SCANNED AT 300 PPI, SIGNATURES AND PARTS OF MAPS REMAIN AT <300 PPI

Report Prepared by: Jen Schaefer/CH2M HILL (425) 785-1325