July 11, 2008

Mr. Ashok S. Bhatnagar
Senior Vice President
Nuclear Generation Development
and Construction
Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING THE ENVIRONMENTAL REVIEW OF THE COMBINED LICENSE APPLICATION FOR BELLEFONTE NUCLEAR PLANT, UNITS 3 AND 4

Dear Mr. Bhatnagar:

Attached are Requests for Additional Information (RAI's) generated by the U.S. Nuclear Regulatory Commission (NRC) staff during its review of the Tennessee Valley Authority (TVA) Bellefonte Nuclear Power Plant, Units 3 and 4 Environmental Report (ER) and the site audit conducted in March 2008. Upon completion of site audit, NRC received additional information that might satisfy the need for the information requested in some of the RAI's. The staff has not yet had the time to fully review the additional information provided by TVA. Once the staff identifies which RAI's, if any, no longer need to be address by your staff, I will contact the representatives of your staff. The NRC requests that TVA provide responses to

these RAIs within 30 calendar days of this letter in order to support the Combined License (COL) application review schedule. If you have any questions, please contact me at (301) 415-0673.

Sincerely,

/RA/

Mallecia Hood, Project Manager
Environmental Projects Branch 1
Division of Site and Environmental Reviews
Office of New Reactors

Docket Nos: 52-014 and 52-015

Enclosure: As stated

cc: See next page

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ADAMS ACCESSION NO.: ML081840493

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Hydrology

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.3-1	Edit the caption for ER Figure 2.3-23 to address concerns over W29 data.	
2.3-2	Reconcile the statements describing the pores, joints, bedding planes, and the description of the model (i.e., "equivalent porous media" versus "karst") in the ER and those in FSAR Section 2.5.	Section 2.3.1.5.4, page 2.3-24. Groundwater Occurrence and Usage. There is considerable discussion of the enlarged joints and fractures, e.g., "…most water producing fractures, both in the epikarst and bedrock aquifers are solutionally enlarged joints and bedding plane fractures." Later in Section 2.3.1.5.6, page 2.3-28, the applicant states that the karst system includes "poorly integrated pores, joints, and tubes, most with soil or clay fill." However, in FSAR Section 2.5.4.1.3 the following statements are made, • "A karst model was developed by TVA for the BLN site …" • "In the TVA model groundwater flow at the BLN site occurs within three different stratigraphic horizons… • "Water moves through rock via an integrated system of conduits following solutionally enlarge joints and bedding plane features." How do these two descriptions (i.e., ER and FSAR 2.5) of the system compare to the conceptual model of the system adopted for analysis and the mathematical representation of travel times reported later in the application.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.3-3	Comment on the alternative conceptual model and pathway suggested by the groundwater depression observed between Unit 3 and Town Creek. Explain why it was excluded from the plausible alternative conceptual models and pathways evaluated in the ER.	Section 2.3.1.5.5 Site Hydrology, page 2.3-27. "…a groundwater depression was observed adjacent to Town Creek to the northwest of Unit 3. This represents a depletion of the epikarst aquifer and slow drainage into the lower bedrock zone." The applicant goes on to state that following precipitation events in the fall and winter, "the epikarst aquifer refills and groundwater reestablishes its normal drainage pattern to Town Creek." The occurrence of downward drainage during relative dry periods of the year does not necessarily suggest that less downward drainage would occur during wet periods of the year. Moreover, the groundwater depression suggests an alternative pathway for groundwater flow from the proposed Unit 3 and Town Creek. Discuss the significance of this alternative conceptual model and pathway.
2.3-4	Provide the reference source and the laboratory or field data for the hydraulic properties used to represent the backfill material.	
2.3-5	Provide consistent and complete data on water use (diversion) and water return. Provide a justification for using a cumulative demand of 16 MGD while acknowledging 1600 MGD withdrawn from Guntersville Reservoir, or present and defend a revised cumulative demand value.	Section 2.3.2.2.3 Guntersville Surface Water Withdrawal. Average monthly **return** rates for each diversion by use category do not appear in the supporting table (i.e., Section 2.3.2.2, Table 2.3-28), and the water use information in Table 2.3-31 is not for the same water users. Provide information on return or use data consistent with the water users listed in Table 2.3-28. The TVA record of water use on Guntersville Reservoir shows 1600 MGD withdrawn, and does not show any water return volumes – even for TVA's own Widows Creek Fossil Plant. The applicant then states a preference for a USGS cumulative demand value of only 16 MGD, but does not cite a reference for this value. Provide this reference. Justify the application's use of a withdrawal rate that is 1% of TVA's known withdrawal rate.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
3.3-1	With respect to Table 3.6-1, describe the seasonal variation in chemical usage. Table 3.6.1 refers to an algaecide in the CWS. It does not refer to a molluskicide. Is a separate molluskicide used? If so, what is the amount used per year, the frequency of use, and the concentration in the waste stream for both the CWS and the SWS?	Section 5.2.2.2.1 lists both an Algaecide (quaternary amine) and a Molluskicide (quaternary amine). Table 3.6-1 shows only an Algaecide.
3.6-1	Explain how the various descriptions of portable toilet use at the site are consistent. Provide an estimate of water use and waste disposal volumes. Describe the use of vendors and the ultimate disposal of the waste.	Section 3.6.2. Sanitary System Effluents. The application contains conflicting information on the use of portable toilets. Section 3.6.2 states that sanitary systems needed during pre-construction and construction <u>include</u> portable toilets. Section 4.2.1.3 states that portable toilet facilities <u>are</u> utilized during construction. Section 10.4.2.2.3 states "…water use may be reduced <u>if</u> portable toilets are used…". Clarify in these sections whether portable toilets will be used or not, and, if used, what their use implies for environmental impact including water use and waste disposal volumes. Are licensed vendors of portable toilets to be used, and are they required to dispose of waste in licensed landfills or other facilities?
3.6-2	Provide estimates of non-radioactive wastes, and describe the proposed use or disposal of PCB-containing items / equipment / articles.	Section 3.6.3, page 3.6-6 and 3.6-7. Other Effluents. Section 3.6.3.3 provides no estimates of quantities of non-radioactive wastes. For the proposed plant construction and operation, what quantities and quality of non-radioactive waste may be generated? Will the existing PCB-containing items/equipment/articles on-site be brought into service for the proposed units? If not brought into service, describe the future disposal of the existing on-site PCB-containing items/equipment/articles as well as the timing of the disposal.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.2-1	Using a figure, identify the on-site area or areas that may be used for dredged material deposition.	Section 5.2.2 Water-Use Impacts. [also relevant to Section 5.2.1.6 Operational Activities, Section 5.5.1 Nonradioactive Waste Systems Impacts, and Section 6.3 Hydrological Monitoring] Assuming a figure is used to identify the on-site disposal area, also show the 500-yr flood elevation.
5.2-2	Discuss and provide references for any studies reviewed in development of the ER associated with the impacts of climate change on water supply.	Section 5.2.2 Water-Use Impacts. Discuss any studies reviewed in development of the ER associated with the impacts of climate change on water supply.
5.2-3	The applicant states "…the appropriate USACE permit is expected to be acquired…"; however, Table 1.2-1 notes for the USACE that "pre-construction permit not required". Explain how these statements are consistent.	Section 5.2.1.6 page 5.2-3. Operational Activities Causing Other Hydrologic Alterations. The applicant states "…the appropriate USACE permit is expected to be acquired…"; however, Table 1.2-1 notes for the USACE that "pre-construction permit not required". Explain how these statements are consistent.
5.2-4	Describe the origin, measurement methods, instrumentation, etc., for the temperature data collected from 1974 to 1990. Provide the data. Are there data from the Widows Creek facility, upriver of Bellefonte, on temperature of Guntersville Reservoir in the vicinity? If available, provide these data.	Section 5.2.2.2.2 Thermal Impacts. Given the recent and ongoing drought in the region, explain whether river temperature data collected from 1974 to 1990 at Guntersville Reservoir are representative. Discuss how data collected during the year of pre-application monitoring compare to this older but longer record. Provide a reference on or describe how the long-term temperature data set from Widows Creek Fossil Plant was collected, (e.g., frequency, depth).
5.2-5	Provide a description of all nine CORMIX cases analyzed to understand the potential impact of discharge on the Tennessee River.	Section 5.2.2.8 The text lists and describes six cases; however, nine are described elsewhere. Provide plots showing all nine cases.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.3-1	Explain how the description of the water velocity through the screens is consistent in the three sections (Sections 3.4.2.1, 5.3.1.1.1, and 5.3.1.1.1) in which it is presented. Provide the background information sufficient to check this calculated velocity (e.g., water withdrawal rate, base elevation of screen, minimum pool elevation {top of screen}, width of screen, number of screens, area of screen).	Section 5.3.1.1.1, page 5.3-2. Intake-Hydrodynamic Description. In Section 3.4.2.1, page 3.4-5, Intake System, the application states "The maximum velocities through clean screens are estimated to be **about 0.5 fps** at maximum normal pool elevation of 595 ft." In Section 5.3.1.1.1, page 5.3-2, the application states "This intake screen velocity is **less than 0.5 fps**, as required by 40 CFR 125.84, to limit organism mortality from impingement and entrainment." In Section 5.3.1.2.1, page 5.3-3, Fish Impingement and Entrainment, the application states "Section 3.4.2.1 indicates water velocity through the screens during operational mode, which is **well under 0.5 fps** flow requirements of Section 316(b) of the Clean Water Act." Provide the calculation packages for all calculations, or an opportunity to review them in detail. Explain why the maximum normal pool elevation would be used to produce this velocity estimate.
5.3-2	Provide a description and data associated with definition of "reversing river flow", and "maximum reverse river flow" (e.g., the river discharge values employed in the analyses).	Section 5.3.2.1 Thermal Description and Physical Impacts. Provide the calculation package for all CORMIX runs reported in the application. Include all input files. Provide a discussion of how the river flow rates defined by "reversing river flow" and "maximum reverse river flow" were developed and the values adopted. Assuming data are used in the development, identify where and when it was collected. Include any more recent calculations and results supporting the "reversing river flow" and "maximum reverse river flow" values. Also provide input files for new CORMIX runs if new CORMIX runs are made. Existing CORMIX run input – provided at ER Site Audit Discussion of river flow rates and their derivation

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.3-3	(1) Provide data or an analysis of flow reversal at the Bellefonte site that better characterizes the flow reversal phenomena. Use the existing reservoir operation rules and any future anticipated changes to peaking strategy to evaluate these phenomena. (2) If results of the flow reversal warrant them, provide revised descriptions of the CORMIX runs that characterize the operation of the diffusers. (3) If additional CORMIX simulations are conducted, provide their input and output files. (4) Provide an analysis of the potential for discharge from the diffuser to re-enter the intake canal and be drawn back into the proposed facility. Also analyze the potential for discharge to be drawn into Town Creek.	Section 5.3.2.1 Thermal Description and Physical Impacts. Describe the process used to select the suite of conceptual models and associated CORMIX simulations presented in the application. Key to this discussion is gaining an understanding of the zero flow phenomena and its influence on the environmental response in Guntersville Reservoir. As Guntersville Reservoir goes through a flow reversal, discuss the frequency of the reversal event and the duration of what is essentially zero flow. Provide data on the frequency and duration of flow reversal at the Bellefonte site. What is the relationship among data on discharge from Nickajack Dam (Figure 2.3-6), discharge from Guntersville Dam, and flow reversal at Guntersville Dam? During the ER Site Audit, TVA stated it was able to simulate the Guntersville Reservoir flow to better quantify the flow reversal phenomena at the Bellefonte site.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.3-4	Provide further discussion of diffuser length (i.e., 45', 75', and 120') versus discharge rate. The application states that the normal plant release will be in the 25-50 cfs range. Explain whether this implies use of the 45' diffuser to achieve the desired port velocity. Describe the various operational modes of the diffuser. Relate these to the parameterization of the CORMIX simulations used to characterize diffuser operation.	Section 5.3.2.1 Thermal Description and Physical Impacts. Provide further discussion of diffuser length (i.e., 45', 75', and 120') versus discharge rate, (i.e., 25-50 cfs, 51-100 cfs), {see page 3.4-6 for discussion}. The application states that the normal plant release will be in the 25-50 cfs range. Explain whether this implies use of the 45' diffuser. To achieve the desired nozzle velocities for mixing, will this be the standard operational mode? Justify the use of the full 120 ft diffuser pipe in each of the CORMIX analyses.
5.3-5	(1) Review and revise Figures 5.3-3 through 5.3-11; for clarity, draw them all to scale or none to scale. (2) For these figures, use a consistent unit convention (English or Metric).	Review and revise Figures 5.3-3 through 5.3-11; for clarity, draw them all to scale or none to scale. For figure consistency, use one unit convention (English or Metric).
5.3-6	Regarding CORMIX simulations, explain how ambient river water temperatures were selected. Identify the data set used to develop the values and indicate the date and location of the data.	Regarding CORMIX simulations, explain how ambient river water temperatures were selected. Identify the data set used to develop the values and indicate the date and location of the data. This question is with regard to the use of high, medium, and low temperatures of 90ºF, 68.5ºF, and 39.2ºF.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.3-7	(1) Using the Guntersville Dam discharge record, calculate the 7Q10. (2) Using the Nickajack Dam discharge record, calculate the 7Q10. (3) Describe how these values compare to the 7Q10 derived from the South Pittsburg gage.	Provide a calculated 7Q10 based on recent data on discharges from Guntersville Dam and Nickajack Dam and compare it to the 7Q10 presented and employed in the ER, Rev.0.
5.3-8	Provide a referenceable, consistent, and complete discussion of the analysis and assumptions leading to the single pipe simulation (including the results of such simulation(s) appearing in the ER) for diffuser operation.	Provide a referenceable, consistent, and complete discussion of the analysis and assumptions leading to the single pipe simulation (including the results of such simulation(s) appearing in the ER) for diffuser operation.
6.6-1	Describe, list, or provide a diagram showing the likely internal monitoring points used to track water quality within the plant (i.e., prior to discharge through regulatory defined control points).	

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.4.1-1	Provide the document *TVA Draft Environmental Statement, Bellefonte Nuclear Plant. Volume 1 and 2 Docket Nos. 50-438 and 50-439, 6 March 1973*	Reference 1, the *TVA FES Related to Construction of Bellefonte Nuclear Plant Units 1 and 2, June 1974* refers to the DES for "details of the site terrestrial ecology..." and also mentions that Appendices contain species level data from an onsite survey in 1972.
2.4.1-2	Discuss what wildlife species are likely to be found in native grass, mixed hardwood forested wetland, and emergent wetland cover types.	Explain how the ER identifies faunal communities for these cover types.
2.4.1-3	Have Rafinesque's big-eared bats been observed near the BLN site? Describe where/when the nearest surveys were conducted by a qualified bat biologist.	Rafinesque's big-eared bats occur in many forest types, including forest types on the BLN site, are listed as occurring in Jackson County, AL, and also are found in abandoned buildings. Discuss potential impacts to this species from the proposed action.
2.4.1-4	What keystone species are present within BLN cover types?	
2.4.1-5	What species may function as indicators of ecological health on the BLN Site?	
2.4.1-6	Provide document cited as TVA (1998e) on page 4-74 of the DOE FEIS for the Production of Tritium in a Commercial Light Water Reactor (see ER Section 2.4.3, Ref. 3)	This reference is described in the cited DOE FEIS containing information about threatened and endangered species from "extensive field surveys".

RAI Number	Question Summary (RAI)	Full Text (supporting information)
4.3.1-1	Identify how much acreage of each cover type will be permanently lost due to the construction and operation. Identify how much will be temporarily lost and what cover type the reclaimed community will resemble.	Explain how the estimate of 188 acres affected in 2nd paragraph of Section 4.3 is consistent with the sum of acres within first paragraph of Section 4.3.1.1 (55+13+11+147 = 226 acres).

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.3.1-1	Describe the "significant" impact the Nickajack, Guntersville and Wheeler reservoirs can have on the BLN plant operations and the impact BLN plant operations can have on the reservoirs.	Page 2.3-14 states that "Three, large manmade impoundments are located within 100 river mi. of the BLN site. These impoundments can significantly affect or be affected by BLN plant operations". These impoundments include • Nickajack Reservoir • Guntersville Reservoir • Wheeler Reservoir. Elaborate on the "significant" impact that BLN could have on these reservoirs as well as the "significant" effect these reservoirs could have on the BLN plant operations. Address the impacts on water quality and on the aquatic organisms.
2.4.2-1	Provide information on current methods of aquatic macrophyte control in Guntersville Reservoir and how successful they are.	During site audit, we understood that there was a coalition to manage macrophytes on Guntersville Reservoir and that this coalition makes the decision of when to treat and how to treat the macrophytes in the reservoir. ESRP 2.4.2 refers to the characterization of the aquatic environment, including the presence of nuisance species.
4.3.2-1	Confirm whether restoration plans on the barge slip/dock could involve removal of existing banks and whether refurbishment includes dredging in the vicinity of the barge slip. If disturbance of the current habitat is anticipated, identify the area of disturbance.	The Response to Environmental Report Sufficiency Review, May 2, 2008, states in Comment ID ER 04, 11, 43, 44, 45 that "plans are to restore the barge dock to its "original" size (i.e., maintenance/refurbishment), rather than to modify it." It also states that revisions will be made to ER Chapter 4, Subsection 4.3.2.1 as follows: "Upon assessing the material condition of the docking facilities refurbishment (maintenance) as needed will be performed to return the facilities to original condition. Any disturbance of the aquatic environment is considered to be similar but of smaller effect than that experienced during the Bellefonte Unit 1 and 2 construction of the docking facility. "
Table 2.4-7	Provide an explanation, if available, of the observed decline in fish species between the 1949 – 1984 samples and the 2002-2006 samples.	Fish species that were not identified in the recent samples include paddle fish, American eel, walleye, redline darter, bluntnose darter, fantail darter, creek chub, suckermouth minnow, blacktail shiner, whitetail shiner and bigeye chub.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.3.1.2-1	Provide a current characterization of ichthyoplankton in the vicinity of the BLN site, or provide the basis for assuming the 1977-1983 data is still valid.	The description of the ichthyoplankton in the vicinity of the BLN site is based on 1977-1983 data. Discuss why more recent information on ichthyoplankton characteristics, including temporal and spatial distributions, is not provided.
5.3.1.2-2	Provide an estimate of the level of entrainment at the BLN site.	The ER provides a description of the intake system and a discussion of the entrainment of ichthyoplankton. It also characterizes the mortality rate from entrainment. Please quantify the amount of ichthyoplankton entrained as a fraction of the amount of ichthyoplankton occurring in the Guntersville reservoir.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.5.2-1	Provide information (demographic, housing, transportation) describing the neighborhood(s) across Town Creek from the plant site in ER Section 2.5.1.2 or 2.5.2.6. Include a map/graphic of this area at a scale that illustrates the relationship of residences to the plant and transportation routes.	These neighborhoods will incur the greatest exposure to plant-related transportation and aesthetic impacts given their proximity to the plant site and their separation from the plant site by open water. These neighborhoods include Creek's Edge subdivision, as well as the older residential neighborhoods and would include Jackson County roads 33 and 113 and Bellefonte Road.
2.5.2-2	Explain why the data for 2007 in Table 2.5-1 (Current Residential and Transient Population) and Table 2.5-2 (Projected Permanent Population) are identical, and provide corrections, if necessary.	The numbers are identical for Residential and Transient populations and permanent population in the two listed tables. Is that possible? If not, please provide corrections.
2.5.2-3	Provide information about the labor market/ labor-shed for the project site that includes information about commuting patterns of workers into and out of neighboring counties and discuss how this area and these patterns relate to the 50-mile radius "region." (ER Section 2.5.2.1)	This information affects assumptions about in-migration of the construction and operations workforce (ER Sections 4.4 and 4.5) and the area included in the RIMS II analysis of multipliers.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.5.2-4	Provide additional detail to characterize the transportation network linking the population centers in the project region to the project site in ER Sections 2.5.2.2.2 and 2.5.2.2.3. Include level of service designations in this characterization and description of Jackson County roads 33 and 113 and Bellefonte Road.	Characterize the key transportation routes according to the Alabama Department of Transportation functional classification system (freeways, arterials, collectors and local streets) and level of service (LOS) data to support the analysis of impacts to the transportation system and nearby community residents.
2.5.2-5	Provide information about pertinent tax rates, particularly in the proximate communities and Jackson County, and additional detail about how TVA's in lieu of taxes payments are calculated and distributed. Include in this discussion how TVA's in lieu of tax payments to Jackson County will be affected by the changing status of Bellefonte Units 1 and 2. Provide information about how Scottsboro and Jackson County schools are funded.	Provide information about tax rates and distribution equations for the purpose of determining the fiscal and economic consequences of the proposed project and assessing the ability of proximate communities to respond to project-related demands for expanded services in ER Section 2.5.2.3, as well as for conducting the Benefit-Cost analysis. Discuss tax receipts to local jurisdictions with responsibility for providing the services likely to be impacted by project-related population effects.
2.5.2-6	Clarify whether and how emergency planning and resources in the study area will be affected by the Watts Bar and Sequoya nuclear power plants. (see discussion in ER Section 2.5.2.3.1)	

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.5.2-7	Discuss the status of the housing stock in the vicinity of the project since the 2000 Census, including other substantial development projects and expansions.	Discuss whether recent changes in the housing stock in the project vicinity could affect the distribution and impact of the construction and operations workforce (see the discussion in ER Section 2.5.2.6, page 2.5-14).
2.5.2-8	Provide either service ratios or other measures of adequacy (e.g., comparison to national or state standards or averages) or an assessment of adequacy by local officials for key facilities and services in the proximate communities (police, fire, medical, education).	
2.5.4-1	Provide information about changes in the minority/poverty populations since the 2000 Census to reflect consultation with local residents with knowledge of these populations, even if this information is qualitative in nature.	Interviews with local officials and service providers indicate that the Hispanic population in Jackson County and the proximate communities may have increased substantially since the 2000 Census and that a larger number of Cherokee people may live in the area than self-identified and were counted in the 2000 Census. Because of its qualitative nature, it is not expected that this information would be incorporated into the statistical analysis of minority or low-income populations and their distribution within the region. However, discuss how this qualitative information supports analysis of potential environmental justice impacts.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
4.4.1-1	Provide a basis for the assumptions used concerning peak construction traffic in ER Section 4.4.1.3 and the frequency of carpooling. Describe the temporal distribution of traffic in more detail and explain whether the analysis reflects that workers will travel both to and from the site each day and that each delivery will involve trucks entering and exiting the site. Provide more detail to support the conclusion concerning U.S. Highway 72 and county roads 33 and 113 and Bellefonte Road, given baseline traffic patterns. Include information about the number and timing of barge traffic to the site and its implications for recreational use of the waterway.	ER Section 4.4.1.3 states" During the peak construction period, two staggered shifts of 10 hrs each are scheduled, with a combined workforce of 3000. The number of workers per shift is not known at this time. A conservative estimate of 100 daily truck deliveries is assumed for this analysis….It is also assumed that there is one worker per vehicle and no carpooling is taking place. The total number of vehicles, including deliveries, on the road during the peak construction period is projected at 3100 during the workday."
4.4.2-1	Throughout the discussion of construction phase impacts, please indicate the temporal progression building toward peak construction workforce and transitioning to the lower operations workforce.	Impacts on community facilities and services as well as transportation are influenced by how fast the workforce and construction activities ramp up and ramp down, as well as how long they remain at peak levels. Please include this information in the assessment discussion.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
4.4.2-2	Clarify what jurisdictional area(s) are included in the calculations of indirect jobs and income and how the employment and income multipliers were determined. Also clarify the relationship between the multiplier effect from construction worker expenditures and from TVA non-workforce purchases. Explain why the indirect jobs and income are being calculated based on the estimate of in-migrating workers rather than the total number of new construction jobs created in Jackson County by the project.	ER Section 4.4.2.2 states: "The resulting multipliers were used to estimate the number of indirect jobs and expenditure of money in Jackson County, Alabama." However, the next paragraph states: "For every construction worker, an estimated additional 0.423 jobs is created in the region." Previously, the region has been defined as the 50-mile radius. Please clarify the geographic area upon which the multiplier is based is needed as well as the resulting geographic distribution of the indirect jobs and those filling them. This clarification has implications for the Benefit-Cost analysis in ER Section 10.4. Analyses that estimate impacts to Jackson County and to the entire project region separately might provide this clarity.
4.4.2-3	Please specify the geographic basis of the estimated multiplier of expenditures for materials and services by the project, and clarify the relationship between the multiplier and the total expenditures for materials and services by the plant. (Section 4.4.2.2)	ER Section 4.4.2.2 states: "At this time annual expenditures within the region for materials and services during construction of the BLN site are not known." In the TVA letter dated May 2, 2008, pages 45 and 46, an estimate of $41 million in regional expenditures for the construction period was provided but no estimate of the multiplier effect of these expenditures was developed. Lacking annual expenditure data, the regional economic effects of plant expenditures could be averaged over the entire construction period (i.e., total expenditures divided by duration of construction in years). Please clarify whether the expenditure estimate is in current or constant dollars.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
4.4.2-4	Please provide an analysis of estimated taxes and payments in lieu of taxes, including discussion of the time lag associated with tax collection. This includes the variety of taxes identified in ER Section 2.5.2.3. (Section 4.4.2.2.1). This analysis informs the assessment of impacts on local governmental jurisdictions. Include information on how site activities and change in Bellefonte Units 1 and 2 status will affect historical in–lieu-of-tax payments.	Section 4.4.2.2.1 states: "Several types of taxes are generated by construction activities and purchases, and by workforce expenditures at the BLN site. These would include income taxes on wages and salaries; sales and use taxes on corporate and employee purchases; and personal property tax associated with employees." Please provide estimates of these taxes to the region and to the proximate communities. In the TVA letter dated May 2, 2008, page 46, the focus is on state rather than regional or local tax receipts.
4.4.2-5	Clarify how the housing deficit analysis was conducted and provide greater quantification of the expected deficit. ER Section 4.4.2.4. Table 4.4-2 is labeled "Trends in Jackson County Housing Growth" but does not provide housing growth data.	Please provide a more detailed specification of the projected housing deficit.
4.4.2-6	Describe the consequences of a deficit in housing, and describe appropriate associated mitigation measures. (ER Section 4.4.2.4)	Discuss the consequences of the rapid increase in housing demand in a deficit market. In addition, the mitigation measures suggested are more appropriate to address transportation/traffic impacts than housing impacts.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
4.4.2-7	Provide a more detailed analysis of the impact on public schools in the project vicinity, including identifying the schools in the geographic area expecting to receive the greatest population impact from the project. Information about the demographics of construction workers and their families would enhance the analysis. Please combine more specific information about the expected school-age population and its geographic distribution with more specific information about the schools in the vicinity and their capacity to respond to the temporary increases. (ER Section 4.4.2.5)	Please explain why analysis of percentage increases is based on current population levels rather than on the projected population at the time of the impact. Explain how the discussion of growth addresses not only growth caused by the project, but growth caused by the project on top of projected baseline growth.
4.4.2-8	Discuss in greater detail the consequences of education impacts, and identify more appropriate mitigation measures. (ER Section 4.4.2.4)	Describe any TVA plans to collaborate with the Earnest Pruett Center of Technology (EPCOT) to provide enhanced vocational training and increase the ability of local residents to obtain jobs at the plant site.
4.4.2-9	Discuss the impacts of competition for transient housing and traffic congestion on recreation in ER Section 4.4.2.6.	Describe and assess the following consequences of the project: additional population to participate in recreational activities, pressure on transient housing, and traffic congestion.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
4.4.3-1	Clarify the basis for excluding the minority population across Town Creek from the site from further consideration for impacts, including those caused by housing demand and traffic as well as noise and air quality impacts. (ER Section 4.4.3)	
5.8.1-1	Provide more detail about the traffic patterns during the periods of construction and operation overlap, normal operation (clarify shift vehicle counts), and outages, and correct the analysis as necessary. Provide estimates of the number of outage workers and shift patterns. Clarify why assumptions about carpooling for operations workers differ from those for construction workers. (ER Section 5.8.1.2).	
5.8.1-2	Include a more detailed description of the plumes and their aesthetic impacts. (ER Section 5.8.1.3).	

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.8.2-1	Please clarify the analysis of indirect and induced jobs and income (i.e., the multiplier analysis) and confirm that the approach is consistent with the approach in ER Section 4.4.2.2. Include outage worker employment and income in the multiplier estimates. Include the multiplier effect of operations nonlabor expenditures, and clarify the geographic areas of analysis and the basis for their selection. (ER Section 5.8.2.2)	In the TVA letter dated May 2, 2008, pages 45 and 46, an estimate of $550K in regional expenditures for the construction period was provided but no estimate of the multiplier effect of these expenditures was developed. Clarify whether these expenditures are expected to occur in Jackson County (i.e. “local”) or in the larger region (including Huntsville and Chattanooga). Clarify whether this estimate includes outage expenditures and whether the expenditure estimate is in current or constant dollars.
5.8.2-2	Provide a more quantified and detailed discussion of expected payments in lieu of taxes; include information about timing and distribution to local jurisdictions. As in ER Section 4.4.2.2, please address other tax revenues as well.	Provide more analysis to assess the impacts on local jurisdictions and communities, as well as for purposes of the Benefit-Cost analysis. Clarify whether the estimate is in current or constant dollars.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.5.3-1	Provide results of efforts made to identify relevant stakeholders that may have an interest in understanding impacts from the BLN site on newly identified above-ground resources.	The results of an above-ground historic resources inventory were provided describing the APE as being within one mile of the cooling towers and any resources identified. Provide copies of consultation letters with the AHC and indicate any stakeholder input on assessment of effects.
2.5.3-2	Provide copies of cultural resources survey reports conducted within five miles of the BLN APE up until 2008.	It appears that one report that originally documents 1JA111, and 1JA113 authored by Dejartte and Dodd (1937) was not cited in the ER nor provided to NRC. It is not clear whether additional (more recent) surveys have been completed within close proximity of the BLN site since the March 2007 report completed at the BLN site. Are there other recent cultural resources surveys that have been completed within 5 miles of the site?
2.5.3-3	Provide site form for Bellefonte town, if there is one.	
5.1.3-1 and 2.2.2-1	Describe the applicant's process for concluding that impacts to cultural resources from ongoing maintenance of transmission lines are small.	Information provided on May 2, 2008 to NRC under BLN comment ID ER00-ER03, ER05 clarifies that an assumption was made by the applicant regarding the lack of ground disturbance and that the SAR review process would be used. However, please clarify why the transmission lines are not included in the archaeological or above-ground APE and whether the SHPO has had the opportunity to concur that the transmission lines not be considered as part of the APE. Will the SAR process define an APE?
9.3-1	Describe process for weighing cultural resources in the alternative site analysis.	This process is briefly described in the ER; please identify the thresholds and weighing criteria (i.e. assumptions made).

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.7.4.2-1	(a) Provide a completed version of ER Table 2.7-119. (b) Provide revisions of the normal atmospheric dispersion (χ/Q) calculations and incorporate the results into Table 2.7-119 so that it can be reconciled with FSAR Figure 2.1-206.	Please substantiate the GASPAR input data in Table 2.7-119 in accordance with NUREG-1555, or make upper bound assumptions. Clarify the description of residences and gardens in Table 2.7-119 (e.g., no residences in 13 sectors and yet gardens in most sectors) for consistency with FSAR Figure 2.1-206.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.4.1-1	(a) Provide reanalysis of the maximum individual exposure based on the revised χ/Q values. (b) Provide the input and output decks for the XOQDOQ code. (c) Specify whether XOQDOQ used ground-level or elevated release assumptions, and whether building wake effects were turned on. (d) Provide well-documented data of the locations of every kind of data in Section 5.4.1 (Exposure Pathways) under "Data and Information Needs" that are used in GASPAR, to enable the reviewer to verify that the maximally-exposed vegetable garden, milk cow/goat, house, animal for meat, and school is identified by compass sector and distance. Revise Table 5.4-6 to list all necessary GASPAR input data and reference the sources or specify the assumptions behind those data. (e) Update all affected tables in which these data are found or from which these data derive. (f) Provide a copy of the input and output data decks for the PAVAN and GASPAR codes.	Please substantiate the GASPAR input data in Table 5.4-6 in accordance with NUREG-1555, or make upper bound assumptions. Table 5.4-6 omits some of the information regarding grazing seasons and fraction of daily intake of cows, meat animals, and milk goats derived from pasture or fresh forage during the grazing season. Please explain how Table 5.4-6 is consistent with Table 2.7-119 regarding the distance to nearest residence/house; Table 5.4-6 claims to define "Nearest" as "the location at which the highest radiation dose to an individual from the applicable pathways has been estimated. Locations by all compass directions and distances are not provided because the highest dose location is identified." Provide the source(s) for the data in Table 5.4-6.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.4.3-1	Provide occupational doses from normal operations.	Pursuant to ESRP Section 5.4.3.III.(3) ("(3) Include an estimate of the collective occupational dose using the format of Table 5.4.3-2"), please provide occupational collective doses, or justify their exclusion.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
2.7-1	Provide X/Q computation for routine operations based on the AP-1000 DCD, revision 16.	The detailed materials provided by the applicant note that the X/Q computation for routine operations given in the ER is based on the AP1000 DCD, revision 15, rather the AP1000 DCD, revision 16, used in other similar computations. Provide the results of an X/Q computation using the PAVAN code for routine operations from the proposed Bellefonte Units 3 and 4 based on the AP1000 DCD, revision 16.
7.2-1	Discuss whether there are surface water pathways that need to be addressed for severe accidents in addition to the ingestion pathways considered by MACCS2.	In the severe accident analysis, discuss any potential for impacts from non-ingestion surface water pathways in addition to the results of direct water ingestion considered by MACCS2. Because the local region has a very active sport fishing industry, address the potential for impacts from fish ingestion. The requested discussion should apply to such surface water pathways within 50 miles of the site.
7.2-2	Identify groundwater pathways that exist for severe accidents.	In the severe accident analysis, please discuss the potential for impacts from the groundwater pathway.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
8.0-1	Provide a brief description of the process by which TVA develops and updates its IRP and by which it reviews the forecasts for power and energy requirements, factors affecting growth of demand, power supply, and its assessment of need for power that are included in the ER.	
8.2.2-1	Provide the updated Need for Power assessment incorporating Watts Bar II.	Describe how the recent decision to proceed with Watts Bar II as a TVA resource in the region is reflected in TVA's Need for Power analysis.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
10.4.1-1	Verify that the benefit and cost estimates in ER chapter 10 are consistent with the data and analysis in previous subsections, particularly those being revised or updated. As a specific example, verify that the benefit estimates are consistent with those developed in ER Sections 4.4 and 5.8, that the geographic areas in which the benefits occur are clearly identified, that multipliers are appropriately applied and interpreted, and that the estimate indicates whether it is in current or constant dollars. Also, verify that the assessed impact level is consistent between ER Section 10.4 and the ER sections upon which the statements are based.	An example of a discussion to be verified is in ER Section 10.4.1.1.2, which states that "At the average per capita income of $23,200 for Jackson County (Subsection 2.5.2.1), indirect jobs created during peak construction would generate approximately another $15 million annually for the regional economy. In addition to these benefits, every construction dollar spent is multiplied by 0.443 dollars in the regional economy (Subsection 4.4.2.2)."
10.4.1-2	In the discussion of fuel diversity (ER Section 10.4.1.2.2), provide data to indicate TVA's and the region's current and projected fuel mix in the electrical power supply system.	

RAI Number	Question Summary (RAI)	Full Text (supporting information)
10.4.2-1	If necessary, update the costs of construction estimates and provide references to support the revised cost estimates. Confirm that the cost of the rework of existing structures, including the cooling towers, intakes, and potentially the discharge structure as well as the cost of managing sediment, e.g., dredging and/or sediment removal from the raw water, is included, or explain its omission. Also, clarify whether spent fuel storage and disposal costs are included. (ER Section 10.4.2.1.1).	

RAI Number	Question Summary (RAI)	Full Text (supporting information)
9.2-1	Provide references for ER Section 9.2.3.3.	In Section 9.2.3.3 of the ER, provide references for the economic comparison numbers that are listed for electric generation. (If cost references are listed in separate sections, please refer to the specific section). Please specify whether these cost estimates are for new generation or for the existing fleet of generation (and, specifically for the nuclear generation estimate, please indicate why the operations kWh estimate differs from the estimates presented in Chapter 10 (Benefit-Cost Balance). Provide references for dollars per kWh estimates in the combination of alternatives section and in Section 9.2.3.3.3
9.3-1	Describe the systematic screening process to select alternative sites and optimization model that supported this process (Section 9.3.2.2).	Describe the “systematic screening process” to eliminate unsuitable alternatives, referred to in Section 9.3.2.2, as well as the “optimization model” that was originally used to support this process. As this process and model were developed during the original screening (i.e., pre-construction of Bellefonte Units 1 and 2 -- 1960s and 1970s), explain how the methodology and results of this process are still valid. For example, explain why it is reasonable to assume that a site that was eliminated 30 years ago (using this process and tool) would likely still be eliminated today.
9.3-2	Provide a description and documentation of the “high-level screening assessments of numerous sites” referred to in paragraph 2 of Section 9.3.2.2.	As part of the description of the overall screening process, provide a description of the “high-level screening assessments of numerous sites,” referred to in paragraph 2 of Section 9.3.2.2.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
9.3-3	Describe the rating and weighting system that the applicant used to further screen sites and resulted in Table 9.3-1 in the ER.	Several different criteria are used to rate different aspects of the alternative sites from various perspectives (e.g., safety, environmental, socioeconomics). Although some of these criteria are discussed in the text, these criteria are not defined in a comprehensive manner. Briefly define the criteria and discuss the weighting system and any assumptions that are necessary to complete these types of rankings. For example, how much is actually known regarding the cultural resources at alternative sites (i.e., are there assumptions that must be made to complete these rankings)?

RAI Number	Question Summary (RAI)	Full Text (supporting information)
9.3-4	Provide a description of the activities that went into assessing the 4 alternative sites (i.e., "re-evaluat[ion] of continued viability for the purpose of operating nuclear power generation facilities." Page 9.3-3 of ER).	The ER states that, ". . .over time, as TVA has had to make decisions in response to the growing need for power generation, the suitability of the most attractive sites has been re-evaluated (including addition to, restart, or completion of existing or partially-completed nuclear assets) as to their continued viability for the purpose of operating nuclear power generation facilities." Clarify at what time and in what manner these "re-evaluations" have taken place. Provide descriptions of these updated studies and evaluations to ensure that data is current and valid. Specifically, please provide descriptions of activities and/or references of the following: ▪ Section 9.3.3.1 – "Cooling System Suitability" – Reference to average flow numbers (dates should be included). ▪ Section 9.3.3.1 – "Plant Safety Evaluation – Flooding Potential" – Reference to flood rating numbers. Include minimum flow levels. ▪ Section 9.3.3.2 – "Construction-Related Effects on Terrestrial Ecology" – Description and dates of survey activities and/or references on which terrestrial characteristics are based. ▪ Section 9.3.3.2 – "Construction-Related Effects on Wetlands" – Dates of "current aerial photogrammetry at each site." ▪ Section 9.3.3.2 – "Entrainment and Impingement Effects" – Dates when sites "were evaluated with respect to their relative potential for entrainment and impingement effects from closed-cycle cooling water systems." ▪ Section 9.3.3.2 -- References and dates for cultural resource surveys conducted. ▪ Section 9.3.3.3 – "Socioeconomics Criteria" – Descriptions of the "previous studies" and "recent updates" used to predict that brownfield sites were capable of adequately handling an increase in population due to the construction worker influx. Description should include the data (demographic, housing, etc) on which conclusions are based.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
9.3-5	Provide description of current land-use zoning, urban and industrial development controls and policies at all 4 alternative sites.	Section 9.3 of the ER states that the 4 alternative sites conformed with land use urban and industrial development controls and policies when the original construction planning was taking place (1970s and 1980s); provide an updated description of these local government controls and policies (if any).
9.3-6	Verify the transmission distance requirements for Hartsville, Phipps Bend, and the Yellow Creek alternative sites.	In Section 9.3.3.4, it is stated that the Hartsville site would require 397 miles of 500-kV transmission line to be constructed. For the Phipps Bend site, the requirement is 139 miles, and for the Yellow Creek site, the requirement is 329 miles. Please explain the basis for these transmission distance requirements.
9.3-7	Describe the type of land coverage (e.g., industrial/developed, wetlands, forested, flood plain) and the approximate acreage of each land category for the Hartsville, Phipps Bend, and Yellow Creek alternative sites.	The Hartsville, Phipps Bend, and Yellow Creek alternative sites are currently in use as industrial and commercial parks. The remainder of the land in these sites is some combination of vegetated and forested land, wetlands and water bodies, partially developed (from previous nuclear construction) land and flood plains. For purposes of identifying the absolute acreage currently available for nuclear plant construction, approximate the acreage of these land-use coverage categories.
9.3-8	Are there any land-use or development restrictions that would take effect on the Hartsville site once the planned prison construction is complete?	During the May 14, 2008 visit to the Hartsville site, the NRC staff obtained information about the current prison construction (on land owned by Powercon) adjacent to the TVA-owned portion of the Hartsville site. Does the presence of this prison restrict (by state law, county code, or other relevant oversight authority) future development and/or activities taking place in the surrounding TVA portion of the site?

RAI Number	Question Summary (RAI)	Full Text (supporting information)
5.3.4.1-1	What protection will be provided to workers during activities within the cooling towers to minimize exposure to thermophilic microorganisms?	Section 5.3.4.1 does not mention protection of workers from occupational exposure to thermophilic microorganisms. Are there/will there be procedures in place for occupational activities associated with the cooling towers to protect workers from thermophilic microorganisms, e.g. *Legionella*? The response may involve reference to a procedure at a similar operational TVA facility.

RAI Number	Question Summary (RAI)	Full Text (supporting information)
10 CFR 51.45(c)	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/doc-collections/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.