PMHarrisCOL PEmails

From: Falk Kantor
Sent: Tuesday, June 03, 2008 8:12 AM
To: Donald Palmrose; Brian Anderson; Manny Comar
Subject: FW: Shearon Harris ETE review (Q4007, Task 18)
Attachments: Q4007 T18 Subt 3, TER Ltr.pdf; Harris ETE Review.doc

For your information.

From: Diediker, Nona H [mailto:nona.diediker@pnl.gov]
Sent: Monday, June 02, 2008 9:45 PM
To: Elinor Cunningham
Cc: Falk Kantor; Annette Stang; Serita Sanders; Hickey, Eva E; Keller, Tonya K
Subject: Shearon Harris ETE review (Q4007, Task 18)

Attached is a Word document containing the draft TER for the above-referenced task and a PDF of the associated cover letter. Hard copies of the attachments will follow. Please contact me if you have any problems with the attached files.

<<Q4007 T18 Subt 3, TER Ltr.pdf>> <<Harris ETE Review.doc>>

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Hearing Identifier: ShearonHarris_COL_Public
Email Number: 289

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Subject: FW: Shearon Harris ETE review (Q4007, Task 18)
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Pacific Northwest National Laboratory
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U.S. Department of Energy

June 2, 2008

Ms. Elinor M. Cunningham, Technical Assistance Project Manager
Mail Stop T-6 F-29
Division of New Reactor Licensing
Office of New Reactors
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Ms. Cunningham:

Subject: JCN Q-4007, Task 18 "Review of the Evacuation Time Estimate Analysis for Shearon Harris Unit 2 COLA"

Enclosed are the two components comprising the Draft Technical Evaluation Report for the Shearon Harris Units 2 and 3 Project evacuation time estimate review (Subtask 3). The first component is the preliminary draft text for incorporation into the Safety Evaluation Report (SER). The second part of the report includes a list of draft Requests for Additional Information (RAI) as input to the formal RAI which will be provided to the applicant by the NRC.

On May 30, 2008, PNNL was notified by Falk Kantor, NRC, that the NRC had requested the applicant, Progress Energy, perform a transportation impact analysis (TIA) to address increasing the level of the Harris Reservoir by 20 feet. There are many elements associated with the raising of the reservoir that could potentially affect the evacuation time estimate (ETE). If it is simply a matter of raising roadways while maintaining the same alignment and roadway characteristics, there may be no real affect on the ETE. However, 20 feet represents a significant change from existing conditions and may result in direct impacts to roadways and lake access thus requiring changes to the demand estimates, roadway capacities, and evacuation routes utilized in the existing ETE analysis.

The NRC has not yet received the TIA from the applicant, and therefore the attached report does not address the above-noted issues associated with raising the level of the reservoir. A more detailed assessment of impacts to the ETE analysis due to reservoir level changes will be warranted when the TIA becomes available.

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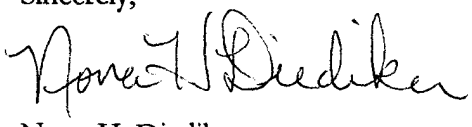
If you have any questions or comments, please contact Nona Diediker at 509-372-6538 or Eva Eckert Hickey at 509-375-2065.

Sincerely,



Nona H. Diediker
Project Team Lead
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Enclosures

Cc: Eva Hickey
Falk Kantor
Serita Sanders
Annette Stang

13.3.1B.R Evacuation Time Estimate (ETE) Analysis

13.3.1B.R.1 Regulatory Basis for the ETE Analysis

The staff considered the following regulatory requirements and guidance in the review of the evacuation time estimate analysis:

[**10 CFR 52.79(a)(21) refers to 10 CFR 50, Appendix E**] Section IV. "Content of Emergency Plans," of Appendix E to 10 CFR 50 requires that the nuclear power reactor operating license applicant provide an analysis of the time required to evacuate and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations.

The staff's primary focus was its evaluation of the ETE analysis against Appendix 4, "Evacuation Time Estimates within the Plume Exposure Pathway Emergency Planning Zone," to NUREG-0654/FEMA-REP-1. Appendix 4 includes detailed guidance that the staff should consider in determining whether the ETE analysis meets the applicable regulatory requirements in Appendix E to 10 CFR 50.

13.3.1B.R.2 Technical Information in the Evacuation Time Estimate Analysis

[10 CFR 50, Appendix E.IV.] The Shearon Harris Nuclear Power Plant Units 1, 2, and 3 Emergency Plan includes an analysis of the time required to evacuate the plume exposure emergency planning zone and for taking other protective actions for various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations. The ETE is summarized in Appendix 6 of the Plan and the full report is included as supplemental information to the Plan.

The ETE report provides an Executive Summary that describes the project activities, computation of the ETE, traffic management, and selected results. A total of 300 ETE were computed for the evacuation of the general public within the EPZ. An ETE was calculated for each of the 25 evacuation regions under one of each 12 evacuation-scenarios (25 x 12 = 300). Schoolchildren and other transit-dependent populations were calculated separately. A map of the EPZ showing sub-zones is provided.

Section 1 of the ETE provides an overview of the process used to estimate the ETE and presents a comparison to a 2002 ETE study conducted for the plant. This section also includes a vicinity map showing the site location, major population centers, and county lines. The analytical tools for estimating the ETE are presented, with a link-node map of the evacuation routes that was developed for the analyses.

The study estimates and assumptions of the ETE are provided in Section 2 of the report. Population estimates in the ETE were based on data from the 2000 US census projected to the year 2007. County-specific growth-rate projections were estimated by comparing 2000 census data and 2005 census estimates. County emergency management officials provided employment data that was used to estimate the population of employees who commute into the EPZ to work. County emergency management offices also provided information that was used to estimate special facilities populations.

Roadway capacity estimates were based on field surveys and application of the Highway Capacity Manual (2000). In order to determine population mobilization times and occupancy rates, the study used a statistical analysis of data acquired from a telephone survey created specifically for the ETE analysis. County buses were assumed to be used to transport those

without access to private vehicles. The analysis included elements such as voluntary evacuation of people within the EPZ but outside of regions for which evacuation is occurring, and “shadow” evacuations of people outside of the EPZ, when computing the ETE. These two evacuation elements are generally considered as a potential impediment to overall evacuation. The assumptions on evacuation were based on simultaneous evacuation of inner and outer sectors.

A total of 12 "Scenarios" representing different seasons, time of day, day of week and weather were considered in the analysis. The analysis included one special event scenario: the construction period of a new nuclear plant using peak workforce population projections for proposed units 2 and 3.

Section 3 of the ETE, Demand Estimation, provides an estimate of the number of people who could need to be evacuated in an event. The populations considered in this section include residents, employees, transients, and medical facilities. Appendix E provides separate tables for schools, day care facilities, medical and assisted living facilities, major employers, recreational areas, and lodging located within the EPZ. (A separate analysis for transit-dependent and special facility populations is contained in Section 8.) Employees who work within the EPZ but who live outside of the EPZ and commute to jobs within the EPZ are assumed to evacuate along with the permanent resident population. Other transient groups include visitors to local recreational areas, shopping centers, and parks, and those residing in non-permanent residential units (e.g., hotels, apartments, campgrounds). Vehicles traveling through the EPZ (external-external trips) at the time of an event are assumed to continue to enter the EPZ during the first 60 minutes. Subsequently, no “pass-through” vehicles will likely enter the EPZ and those remaining evacuate with the residents and other transients. Figures summarizing the various population groups are provided in the ETE in the format suggested by NUREG-0654 Appendix A.

Sections 4, 5, and 6 of the ETE Report describe the methods used to estimate the evacuation times. Section 4 describes estimation of highway capacity and the methods used are generally taken from the Highway Capacity Manual published by the Transportation Research Board of the National Research Council. Section 5 provides estimates of the distributions of elapsed times associated with mobilization activities undertaken by the public to prepare for the evacuation trip (the “trip generation times”). The elapsed time associated with each activity is represented as a statistical distribution reflecting differences between members of the public. The quantification of these activity-based distributions relies largely on the results of a telephone survey.

Section 6 defines the various evacuation cases (a combination of a scenario and a region) for which time estimates were made. A scenario is defined as a combination of circumstances, including time of day, day of week, season, and weather conditions. Scenarios define the number of people in each of the affected population groups and their respective mobilization time distributions. A region is defined as “a grouping of contiguous evacuation sub-zones, that forms either a "keyhole" sector-based area, or a circular area within the EPZ, that must be evacuated in response to a radiological emergency.” The HNP EPZ contains 14 separate sub-zones, with boundaries generally defined by major roads, county lines, or water bodies, and 25 evacuation regions. The sub-zone boundary definitions are provided in Appendix L.

Section 7 provides results of the General Population ETE that cover the 25 regions within the HNP EPZ and the 12 Evacuation Scenarios discussed in Section 6. Appendix J provides the ETE results for all regions and scenarios and provides plots of all evacuation scenarios for

evacuation Region 3. Results are presented for 50%, 90%, 95%, and 100% of the population within a region to evacuate from that region. Results are provided for good and adverse (rainy or icy) conditions. A variant of the NUREG-0654 format is used for the presentation of ETE results. The maximum times are presented, as well as, the times to achieve lower percentages. Times are reported separately for general population (Section 7 and Appendix J), schools (Section 8), and transit-dependent population (Section 8). The general population includes both permanent residents and transients. The ETE report uses figures to illustrate the patterns of traffic congestion that arise for the case when the entire EPZ is advised to evacuate during the summer, midweek, midday period under good weather conditions. These figures display congestion patterns after 1, 2, 3, and 3 ¼ hours after evacuation advisory. Appendix I presents a series of sensitivity tests that were performed to determine the sensitivity of the results to trip generation time. Individual tests included studies related to the shadow region, changes in the average number of evacuating vehicles per household, and traffic control tactics.

Section 8 of the ETE report includes separate calculations for special populations and transit-dependent individuals. Telephone survey results (reported in Appendix F) were used to estimate the portion of the population requiring transit service. The transit-dependent population considered included residents, employees, and transients that do not have a vehicle available, persons in households that do have vehicles that would not be available at the time the evacuation is ordered, and residents of special facilities such as schools, hospitals, and day cares. The study assumed that half of the transit-dependent people would ride-share with others, but that a residual 1,645 persons would require about 55 buses for evacuation. Results of the ETE for transit vehicles is provided for both good weather and adverse weather conditions, including an ETE for a "second wave" of buses needed along the more populous evacuation routes. This section further describes bus route operation and provides a map of proposed transit-dependent bus routes and school relocation facilities.

Section 9 presents a traffic control and management strategy that is designed to expedite the movement of evacuating traffic. The traffic management strategy is based on a field survey of critical locations, computer analysis of the evacuation traffic flow environment, consultation with emergency management and enforcement personnel, and prioritization of traffic control points. This section also proposes the use of Intelligent Transportation Systems (ITS) technologies to benefit the evacuation process (such as dynamic message signs, highway alert radio, automated traveler information systems, and GPS units).

Section 10 provides a discussion of the evacuation routes. Maps of the evacuation routes are provided by county. Reception centers are shown on one map of the entire EPZ, as well as, the individual evacuation route maps.

Section 11 briefly describes methods that could be utilized for traffic surveillance during an evacuation. These options include traffic control personnel located at Traffic and Access Control Points, ground patrols undertaken along well-defined paths to ensure coverage of highways that serve as major evacuation routes, aerial surveillance of evacuation operations using helicopter or fixed-wing aircraft, and cellular phone calls from motorists to provide direct reports of road blockages. The report also suggested that tow trucks with a supply of gas, be deployed at strategic locations within, or just outside, the EPZ.

Section 12 of the ETE provides a suggestion for a procedure to confirm that the evacuation process is effective in the sense that the public is complying with the Advisory to Evacuate. The procedure suggested employs a stratified random sample and a telephone survey to determine if a large percentage of households within the evacuation zone have actually been evacuated.

The telephone calls would be made by a group of people each dialing a different set of telephone numbers. It is suggested that labor effort could be reduced by the use of automated computer controlled auto-dialing equipment. If the results of the telephone survey were to exceed 20 percent, the survey would be repeated hourly until the confirmation process was completed.

13.3.1B.R.3 Technical Evaluation of the Evacuation Time Estimate Analysis

[10 CFR 52.79(a)(21) and 10 CFR 50, Appendix E.IV.] The Evacuation Time Estimate [**Report/Analysis**] was provided as a separate document in the COL application, but it is considered to be part of the Plan and subject to the requirements of 10 CFR 50.54(q).

The ETE Report was reviewed by NRC and by contractor staff at Pacific Northwest National Laboratory and Sandia National Laboratory. The reviewers checked the report for internal consistency, consistency with other parts of the Emergency Plan, and consistency with other parts of the COL Application, including the Environmental Report (ER) and Final Safety Analysis Report (FSAR). Citations in the report were verified by comparison to the cited document text. General descriptions of the HNP region, population, and highways were verified using internet searches and aerial photographs. The designated evacuation routes were driven by laboratory staff members.

In RAIs [13.3-1] through [13.3-56], the staff requested information regarding the ETE for the Shearon Harris Nuclear Power Plant Units 1, 2 and 3 as part of its review of physical characteristics unique to the site that could pose significant impediments to the development of emergency plans. The staff identified the need for this information as Open Item ----. In its submission to the NRC dated ------, the applicant responded to RAIs ---- through ----. The information related to the ETE for ----- provided by the applicant in response to RAIs ---- through ---- is consistent with the regulation in Appendix E to 10 CFR 50 and is, therefore, acceptable. The staff considers Open Item ---- to be resolved.

The Staff notes that the COL application site is adjacent to Harris Nuclear Plant Unit 1. Integrated onsite and offsite radiological emergency plans currently exist for HNP, which is an operating nuclear power plant. Because HNP is an operating nuclear power plant, with integrated onsite and offsite emergency plans, no significant impediments exist to the development of an emergency plan for the site.

The ETE Report analysis includes a map showing the proposed site and plume exposure pathway EPZ, as well as transportation networks, topographical features, and political boundaries. ***Additional mapping and information describing topography and the transportation network has been requested in RAIs [13.3-4 and 13.3-40 through 13.3-46]***. The boundaries of the EPZ, in addition to the evacuation subareas within the EPZ, are based on factors such as current and projected demography, topography, land characteristics, access routes, and jurisdictional boundaries. ***Additional information regarding demography has been requested in RAI [13.3-1, 13.3-21, 13.3-25, and 13.3-26].***

The ETE Report describes the method of analyzing the evacuation times. A general description of the IDYNEV modeling system was provided. The IDYNEV system consists of several submodels - a macroscopic traffic simulation model, an intersection capacity model, and a dynamic, node-centric routing model that adjusts the "base" routing in the event of an imbalance in the levels of congestion on the outbound links. Another model of the IDYNEV System is the

traffic assignment and distribution model, which model integrates an equilibrium assignment model with a trip distribution algorithm to compute origin-destination volumes and paths of travel designed to minimize travel time. ***Additional information regarding the modeling system has been requested in RAI [#13.3-9, a through e].***

The ETE Report submitted with the COL application includes an estimate of the number of people to be evacuated, using the latest population census numbers and the most recent local conditions. ***Additional information describing these assumptions has been requested in RAI [13.3-1]***. The population estimate also considers permanent residents, transients, and persons in special facilities, including those confined to institutions such as hospitals, nursing homes, and prisons. ***Additional information population estimates has been requested in RAI [13.3-1, 13.3-15, 13.3-21, 13.3-25, 13.3-26]***. Estimates for special populations considered the means of mobilization of equipment and manpower to aid in evacuation. ***Additional information describing these assumptions has been requested in RAI [13.3-11, 13.3-19, 13.3-20, 13.3-27, 13.3-31, 13.3-35, and 13.3-38].*** The applicant also evaluated the school population in the special facility segment of the analysis. ***Additional information regarding school populations has been requested in RAI [13.3-25, 13.3-26]***

The sub-areas [zones, which may be combined into Evacuation Regions], for which evacuation time estimates were determined, encompass the entire area within the plume exposure EPZ. Additionally, evacuation time estimates for simultaneous evacuation of the entire plume exposure pathway EPZ were determined.

The ETE Report also described the locations, types, and capacities of the facilities to be used in evacuation. ***Additional information regarding evacuation facilities has been requested in RAI [13.3-56].***

The ETE Report submitted with the COL application included a complete review and description of the road network in the proposed site area. ***Additional information has been requested in RAI [13.3-39 through 13.3-43].*** The applicant included the assumptions for determining the number of vehicles that should be provided, as well as the methodology for determining the transport-dependent population. ***Additional information describing these assumptions has been requested in RAI [13.3-23] and [13.3-27].*** The applicant also analyzed travel times and potential locations for serious congestion along the evacuation routes. ***Additional information has been requested in RAI [#13.3-40] and [#13.3-54].*** The ETE Report considered normal and adverse weather conditions, such as rain and icy conditions, as well.

The ETE Report describes the methods ***that could be used*** and estimates of the time to confirm evacuation. ***Additional information has been requested in RAI [#13.3-53].***

The ETE Report included specific recommendations for actions that could be taken to significantly improve evacuation times. These are primarily traffic control matters.

The review of the ETE Report by emergency planners from the State of North Carolina and the Counties of Chatham, Harnett, Lee, and Wake, who are involved in emergency response for the site was solicited. ***Comments resulting from the review have been requested in an RAI [#13.3-55)]***

13.3.1B.R.4 Conclusion for the Evacuation Time Estimate Analysis

As discussed above, the applicant needs to provide responses to Requests for Additional Information #13.3-1 through 13.3-56.

On the basis of its review of the onsite emergency plan as described above, the NRC staff ***may conclude*** that the information provided in the Shearon Harris Nuclear Power Plant Units 1, 2, and 3 Emergency Plan is consistent with those portions of Section 13.3 of NUREG-0800 related to the evacuation time estimate analysis. Therefore, the information ***may be*** acceptable and meets the applicable requirements of 10 CFR 50, Appendix E.IV.

Harris Combined License (COL) Application

Requests for Additional Information (RAIs)

RAIs 13.3-1 through 13.3-56 – *Evacuation Time Estimate (ETE)* – RAIs 13.3-1 through 13.3-56 address the August 23, 2007, Evacuation Time Estimate report prepared by KLD Associates, Inc for the Harris Nuclear Plant (KLD TR – 409v2). An executive summary of the ETE is included in Appendix 6 to Part 5 (Emergency Plan) of the COL application, with the full report included as supplemental information to the emergency plan. Please provide the following information regarding the ETE. (Regulatory Basis: 10 CFR 52.79(a)(21), 10 CFR 50.47(b)(10), Section IV of Appendix E to 10 CFR Part 50)

RAI 13.3-1

Population estimates in the ETE are based on data from the 2000 U. S. census projected to the year 2007. The impacts of population growth beyond the year 2007 are not considered. However, for the "special event" scenario 12, population data is projected to the year 2016 to also include the peak construction workforce for the two new reactor units.

The resident populations presented in the ETE for the year 2000 differ from those presented in the Harris ER and FSAR (which are consistent). The ETE presents a year 2000 population of 59,285 and the ER/FSAR a population of 55,219. Both numbers are reportedly based on the 2000 census data. There is a greater difference between the transient populations presented in the ETE and ER/FSAR (14,726 versus 24,365). A portion of this difference is likely because the ETE separates schools and employees from the transient count and the ER/FSAR do not. However, the ER and FSAR also include migrant workers in the transient population, but they were not mentioned in the ETE analysis. The peak workforce in the ETE is stated as 3500, but in the ER is stated as 3150.

a. Clarify the differences in population numbers, including workforce, between the three documents. Explain why there would be a difference in population count if each document used the 2000 census.

b. Describe how population growth beyond 2007 was considered and how increases in population throughout the life of the two new units will affect the ETE. (The FSAR provides population projections for 10-year increments up to 80 years beginning in the year 2010.)

c. Clarify if migrant workers were considered in the ETE transient population estimates. If not, explain why.

RAI 13.3-2

In the Executive Summary, Tables 7-1C, Time to Clear the Indicated Area of 95% of the Affected Population, and 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population, are described as the times needed to clear the indicated regions of 95 and 100 percent of the population. Clarify that these tables, which indicate times of around 4 hours, do not include schools, transit dependents, and special facilities - the latter of which are acknowledged to sometimes exceed the general population in Section 8.4.

RAI 13.3-3

Appendix E of the ETE provides tables of population information for special facilities within the EPZ. The lists include schools, children's day care facilities, medical and assisted living facilities, major employers, recreational areas, and commercial lodging. Each of these populations is discussed within the main text of the ETE with the exception of day cares. Discuss how the evacuation of day care children was addressed in the ETE analysis.

RAI 13.3-4

Appendix 4, section I.A. of NUREG 0654 calls for a vicinity map that identifies topographical features, which by definition should include elevations. No information on elevation or land formation, other than water body locations, is provided in the ETE. Provide a detailed map of the 10-mile plume exposure pathway EPZ, which identifies transportation networks, topographical features (including elevations), and political boundaries.

RAI 13.3-5

Section 2.3 Assumption 3.b. states that 26 percent of households will await the return of a commuter. However, Appendix F, Telephone Survey, page F-7 indicates that 57 percent of households will await the return of other family members. Discuss the basis for using 26 percent for households awaiting the return of a commuter.

RAI 13.3-6

The use of the "keyhole" is not clear:

a. Clarify Section 2.2 Assumption 5. Does the keyhole evacuation extend to 10 miles or stop at 5 miles as indicated in the referenced Figure 2-1, Voluntary Evacuation Methodology? Discuss if 100% of the population is considered when calculating the ETEs for the 10-mile EPZ or if 35% is used between the 5- and 10-mile rings as indicated in Figure 2-1.

b. Section 2.3 Assumption 2 states that it is assumed that everyone within the group of ERPA forming a Region will evacuate. ERPAs extend to 10 miles from the plant. However, Figure 2-1, Voluntary Evacuation Methodology, indicates that the area to be evacuated 100% extends to 5 miles from the plant. Clarify if 100% of the people out to 10 miles are included in the ETE calculation. If so, Figure 2-1, Voluntary Evacuation Methodology, may need to be modified to be representative of the evacuation assumptions.

RAI 13.3-7

Section 2.3 assumption 3.a. states "schools may be evacuated prior to notification of the general public." If notification is to take place in 10 minutes and mobilization of buses takes 90 minutes, it is not clear how this assumption can be valid.

a. Explain the use of this assumption.

b. Information on the "experience" used to establish the mobilization time of 90 minutes for buses is also not provided. For Section 8 (page 8-1), include a reference or more information on 'experience' used to establish the mobilization time of 90 minutes.

RAI 13.3-8

Section 2.3 Assumption 11 states that rain and ice are used for the adverse weather scenarios and the table indicates that "No Effect" is included for mobilization time. However, Section 8 frequently indicates that time is increased for activities during mobilization – such as, Section 8.4 Activity: Mobilize Drivers, "Mobilization time is slightly longer, 100 minutes, when raining". Discuss the meaning of the term 'No Effect' as used in the assumption.

RAI 13.3-9

While the algorithm for intersections and a description of variables is provided in Section 4, a description of how the values for each variable were derived is not provided. Address the following questions:

a. Only a few underlying algorithms of the system have been included. Provide a general description of other important algorithms used in the PC-DYNEV traffic simulation model, in particular, routines describing traffic control and vehicle routing.

b. For the Section 4 equation for capacity of an approach to intersections on page 4-1, provide the values of the parameters in the equations, where applicable, including Mean Duration of Green Time and Mean Queue Discharge. Were these values estimated or field verified? Discuss if this equation is applicable for manned intersections.

c. Explain how the Capacity Estimate on Approaches to Intersections equation on page 4-1 is affected by traffic control at intersections. Discuss if the modeling addresses traffic through intersections considering traffic control or the equation presented.

d. Discuss the assumptions and inputs for the nodes and segments with respect to the field survey.

e. The definition of "F" on page 4-2 is defined as various known factors influencing "hm". Identify the important "F"-factors for the turn movement "hm".

f. Section 1.1, Item 7 states the traffic management strategy is represented in the modeling. Discuss the level of detail to which the traffic management strategy is represented in the modeling.

RAI 13.3-10

Table 6.4 presents the number of vehicles modeled for each scenario; however, it is not clear what this table actually represents. Is this the total number of vehicles for a full EPZ evacuation?

RAI 13.3-11

The routes for individuals requiring public transit are identified in Section 8.

a. Discuss if the ETE developed for school in session includes consideration that the same buses will be used to evacuate transit dependent individuals.

b. If the same buses are used, explain the effect on the ETE for the transit dependent residents under this scenario.

c. Unloading the bus in 5 minutes as shown in Tables 8-7A and 8-7B and discussed in Section 8.4 seems optimistic for individuals who are likely carrying belongings.

d. Page 7-4 says summer implies school is not in session, but tables 6-3 and 6-4 show 10% of school buses evacuating in Scenarios 1 and 2. Discuss why 10% of the school buses are planned for use in Scenarios 1 and 2.

e. Discuss the basis for the 75% value used for "Residents with Commuters in Household" as shown in Table 6-3.

RAI 13.3-12

In Table 8-7A Transit Dependent Evacuation Time Estimates – Good Weather, the initial route time of 45 minutes would occur during the period when Figure 7-4, Congestion Patterns at 2 Hours after the Evacuation Advisory, indicates many of these roadways would have Level of Service F, which is very congested. This is also described as the peak congestion period in Section 7.2. Buses would be traveling through traffic control points, such as TCP E11A, that would be established to discourage thru traffic.

a. Explain how the route times were derived considering distance and speed.

b. Discuss if passing through TCPs was considered in the travel speed. Discuss the basis for using 45 minutes for route 1 and 30-minute route times for the remaining routes.

c. Provide a basis for using 10 minutes for pick up time in Table 8-7A. How many stops does this include along each route? These same questions are applicable to Table 8-7B (Transit Dependent Evacuation time Estimates – Rain). The 10 minutes conflicts with Section 8.4 [Activity: Board Passengers (C→D)] that indicates 15 minutes for normal weather and 20 minutes for adverse weather.

RAI 13.3-13

In Figure 3-2 Permanent Residents by Sector and Figure 3-3 Permanent Resident Vehicles by Sector, explain the note: "3 Miles to EPZ Boundary". It is not evident to what the note applies. This note also appears on Figures 3-4, 3-5, 3-6, and 3-7.

RAI 13.3-14

Discuss why the employee values are reduced for the summer scenarios considering the large number of campsites and recreational areas identified in Section 3. Table 6-3 Percent of Population Groups for Various Scenarios, indicates 96% of employees are considered in the ETE calculation for summer midweek scenarios and as few as 10% of employees are considered for summer weekend evening scenarios. The table identifies 100% of employees considered for winter midweek scenarios.

RAI 13.3-15

In Table 8-1 Transit Dependent Population Estimates, the transit dependent population definition does not include any individuals with special needs. The State of North Carolina Radiological Emergency Response Plan, IV, (H)(4)(i), states that mobility impaired persons will be identified and provided specialized information. According to the plan, these individuals will be identified primarily through the registration cards described in the Harris Nuclear Power Plant annual public brochure. Discuss if data from registration cards was used in the ETE calculation for transit dependent persons.

RAI 13.3-16

Explain why the term (0.74×0.42) is squared in the formula in Section 8.1 (page 8-3) used to calculate the number of persons.

a. Section 8.1 uses the value of 74% of households have commuters, 42% of which would not return home. Discuss the basis for these values when used in the equation to determine the number of buses required for transit dependent persons. These values are not consistent with Table 6-3 Percent of Population Groups for Various Scenarios.

RAI 13.3-17

The routes for individuals requiring public transit are identified in Figure 8-2 Proposed Transit Dependent Bus Routes. It appears from Figure 8-2, that much of the EPZ is not serviced by bus routes (there are no bus routes serving sub-zones A, B, C, D, J, L, and M), but there is no mention of how transit-dependent individuals get from their residences to these bus routes.

a. Discuss the means by which individuals are assumed to travel to the transit route stops. Discuss how the time required for this activity is included in the ETE.

b. Discuss how the large distances between transit-dependent residents and the bus routes was considered in the ETE calculation.

RAI 13.3-18

Discuss why Table 8-7B Transit Dependent Evacuation Time Estimates – Rain, was developed for the transit-dependent adverse weather condition when ice was identified in Section 2.3 Assumption 11, as the more limiting adverse weather condition. Discuss if using ice for the adverse weather would increase the ETEs provided in Table 8-7B.

RAI 13.3-19

Section 8-1, Transit Dependent People-Demand Estimates (p. 8-3), identifies the need for 55 bus runs for the transit-dependent population. There are many assumptions with regard to this population group that can insert uncertainty in the actual number of persons requiring bus service.

a. In Section 8-1, explain how an increase in 50% demand for buses could still be accommodated if buses are assumed to be at 68% capacity.
b. With a time difference of 5 minutes between bus runs, as indicated on Tables 8-7A and 8-7B, and 10 minutes for pick up time, this would indicate a queue of passengers must be waiting to board the next bus. Discuss the assumptions used in developing such a precise plan for the transit dependent population.
c. Explain why a second wave is not needed for routes 1, 2 and 3.
d. Explain why a second wave is needed for routes 4, 5, and 6.

RAI 13.3-20

On page 8-7, Analysis of Bus Route Operations, discuss the basis for using five buses for routes 1 and 5, six buses for routes 2, 3 and 6, and eight buses for route 4. Discuss the basis used to determine the number of buses required for each route.

RAI 13.3-21

Clarify Section 2.2 Assumption 6 that indicates that there are no peak tourist events that should be considered. Peak Fest, which is held every May in Apex, North Carolina, has an annual attendance of as many as 25,000 people.

a. Discuss why there are no special events listed and why peak tourist populations are not included in the transient population estimates in Section 3.
b. Explain what resources were used to determine the special events.
c. Identify the effect on the ETE of the peak tourist volume listed here, or other events that might be identified through research that may have greater peak tourist volumes.
d. Clarify Section 2.2 Assumption 6. Discuss why there are no special events listed and why peak tourist populations are not included.

RAI 13.3-22

Discuss the basis for such a small number of employees within the EPZ. Table 3-4, Summary of Non-EPZ Employees by Sub-Zone indicates a total of 3,811 non-EPZ employees. Non-EPZ employees are discussed on 3-13 as making up 60 percent of the employee population within the EPZ. This percentage has been confirmed, however, the total number of employees appears to be significantly low. The total employees within the EPZ would need to be 6,352 if 3,811 represents 60 percent. For an EPZ of over 74,000 residents, the employee population value does not appear realistic. These values would indicate that of 74,000 residents, only 2,541 work within the EPZ. Discuss the resources used to identify the employee population of the EPZ. If the values were accurate, such a distribution would indicate that the majority of residents work outside of the EPZ. Discuss how this affects the time required to leave work, travel home, then prepare to evacuate.

RAI 13.3-23

Section 8, page 8-1 states that transit service may be needed for residents, employees, and transients. It appears that in Table 8-1 Transit Dependent Population Estimates, only residents have been factored into those needing transit. Discuss if employees and transients are expected to need transit service.

RAI 13.3-24

In Section 5, Figure 5-1, Events and Activities Preceding the Evacuation Trip, discuss the reasoning behind transients not returning to their “residence” prior to evacuation. For those in hotels, they may return to gather their belongings. Discuss how this would affect the time for the transient population to evacuate.

RAI 13.3-25

The EPZ for the Harris plant extends beyond 10 miles as indicated on Figure 3-1, HNP EPZ Showing Sub-Zones. Based on staff’s brief online research, it appears there may be schools within the EPZ that were not included in Appendix E Special Facility Data or in Table 8-2 School Population Demand Estimate. The schools missing from the ETE lists include:

- Montessori Center for Children, 4817 Johnson Pond Road, Apex, NC
- West Lake Elementary, 4500 West Lake Road, ~10.97 miles from HNP, 1018 students

- Middle Creek Elementary, 110 Middle Creek Park, Apex NC, ~10.92 miles from HNP, 890 students
- Middle Creek High School, 123 Middle Creek Park, Apex NC, ~10.92 miles from HNP, 1762 students
- Community Partners, 116 Quantum Street, Holly Springs, NC
- Fuquay-Varina Elementary, 6600 Johnson Pond Road Fuquay-Varina, ~11.16 miles from HNP, 933 students
- Montessori World, 25 Buttonwood Court
- Ballentine Elementary, 1651 McLaurin Lane, 733 students.

Discuss if these schools are within the EPZ. If so, discuss the evacuation resources and any affect these schools have on the ETE.

RAI 13.3-26

The student population in Table 8-2 School Population Demand Estimate differs from published values. Specifically, Salem Middle School is listed in the ETE as having 656 students, however, Greatschools.net lists 1094 students; Holly Grove Elementary School is listed in the ETE as having 462 students, but Greatschools.net lists 781 students; Holly Grove High School is listed in the ETE as having 805 students, but Greatschools.net lists 1274 students.

a. Discuss the resources used to identify school populations presented in Table 8-2.
b. Explain if these larger student populations should be included in the Special Facility transit demand analysis.
c. If necessary, provide information to support the evacuation time for these additional students and discuss the effect these may have on the ETEs provided.

RAI 13.3-27

Table 8-2, School Population Demand Estimates, indicates approximately 302 buses are needed to support the school evacuation. The ETE provided in Table 8-5A School Evacuation Time Estimates Good Weather and Table 8-5B, School Evacuation Time Estimates Rain indicates one bus run. No information is provided to support that there are enough buses and drivers available to evacuate all schools simultaneously. Section 8.4, page 8-4 states that if the impacted region is other than R3, there will likely be ample transit resources. It appears that R15 would affect all of the schools in Apex, Holly Springs, and Fuquay-Varina and R14 would possibly affect many of these schools as well.

a. Provide information to support that there are enough buses available to evacuate all schools simultaneously and begin the bus routes for transit-dependent residents.

b. Provide information to support that there are enough drivers available to evacuate all schools simultaneously and begin the bus routes for transit dependent residents.

c. If there are not enough buses or drivers to complete these activities concurrently, explain any effect on the ETE if multiple bus trips must be made.

RAI 13.3-28

In Table 8-2, School Population Demand Estimates, approximately 302 buses are needed to support the school evacuation. The number of buses for each school appears to have been rounded down in many cases. For instance, Apex High School has 2215 students, divided by

50 students per bus would require 44.3 buses whereas the Bus Runs Required indicate 44 buses. This also does not account for any adults on the buses.

Discuss if any teachers are expected to be present on elementary, middle, or high school buses. Discuss the effect on bus capacity. Discuss if rounding down the number of bus runs will be adequate to accommodate all of the students.

RAI 13.3-29

In Table 8-5A, School Evacuation Time Estimates – Good Weather, provide the assumptions for loading the students in 5 minutes. For Apex High School, population 2215 students, this would require 44 buses. Seventy-passenger school buses are usually around 35-40 feet long. Assuming 10 feet between buses, this would require almost one-half mile of buses lined up for students to then board and evacuate. The logistics of such a movement indicate a 5-minute loading time would be challenging. Discuss any further assumptions on the boarding time for school buses.

RAI 13.3-30

In Table 8-5A, School Evacuation Time Estimates Good Weather, the speed of the outbound school buses is approximately 20 mph. The speed is discussed in Section 8.3 (page 8-5) and use of the model output is an excellent approach for establishing speeds. However, Figures 7-3 thru 7-5 (Areas of Traffic Congestion after Advisory to Evacuate) would indicate a level of service of F for many roadways during this timeframe. It may not be appropriate to use average speeds. Explain why the average speed for the evacuation was used rather than the speeds that would exist during this timeframe for the evacuation.

RAI 13.3-31

Table 8-4 Special Facility Transit Demand indicates that 23 ambulance runs are required. However, six facilities do not identify the current census of the facilities. In addition, the number of ambulance runs is based on census rather than capacity as required.

a. Explain if the number of ambulance runs will increase if the capacity values are used for all facilities.

b. Identify the assumptions on mobilization time, number of available ambulances, loading time, etc., to support a determination of number of waves needed. Discuss any impact on the ETE.

c. Discuss the resources used to determine that there are enough ambulances to accomplish the evacuation in one wave as indicated.

RAI 13.3-32

Special facilities are identified in Table 8-4 and discussed in Section 8.3 and in Appendix E on an individual basis. Tables with names, address, direction from Harris, distance in miles, and populations are also provided. However, no maps for schools, day cares, or medical facilities were provided . Include a map of special facilities within the EPZ.

RAI 13.3-33

In Section 8.4, page 8-8, Evacuation of Ambulatory Persons from Special Facilities, explain the basis for mobilizing buses in 90 minutes. Page 8-9 states that the average speed output by the model at 90 minutes is 22.9 mph. Use of the model is a good approach for establishing the

speeds; however, mobilization time for the buses is 90 minutes, and loading of the buses is at least 30 minutes as indicated on page 8-9, totaling 2 hours.

a. Discuss why the 2-hour speed, which is the peak congestion period as stated in Section 7, was not used.
b. Discuss why the average EPZ speed was used rather than speeds specific to the selected routes or areas.
c. Discuss the effects of adverse weather when evacuating special needs facilities.

RAI 13.3-34

In the ETE calculation for buses assigned to pick up ambulatory persons located on page 8-9, there is no time included for travel between facilities although 5 minutes is mentioned in the text above the equation. Include the time to travel between facilities in the ETE calculation.

RAI 13.3-35

For wheelchair bus runs, the ETE states that "wheelchair buses and vans are often scarce" and regular buses can be used to transport these patients. Wheelchairs would be stacked in the back and evacuees would sit in the front of the bus. Discuss the assumptions on bus capacity when using this approach.

RAI 13.3-36

Discuss how the traffic management plan discussed in Section 9 Traffic Management Strategy and detailed in Appendix G Traffic Management, was integrated into the ETE modeling. Discuss if intersections were modeled as indicated in Appendix G or if intersections were modeled as having signalization control. Was the ETE provided in Table 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population, calculated based upon these traffic controls being in place?

RAI 13.3-37

Section 2.3 Assumption 8 states that traffic control points outside of the EPZ should be established to facilitate evacuation flow to the reception centers. Discuss if the ETE includes such traffic control in the modeling. Discuss if local authorities have agreed to implement the traffic control outside of the EPZ as suggested.

RAI 13.3-38

Section 9, page 9-2, explains the importance of establishing traffic control in a prioritized manner. Page 9-2 also states that the traffic control plans were developed in conjunction with county emergency management and law enforcement and that concern was expressed over the manpower and equipment shortages. Discuss if these concerns were provided as comments to the traffic control plan and if these were resolved. Clarify if the law enforcement who reviewed the ETE report have agreed and understand the priority of traffic control placement. Appendix I includes an evaluation of the effect on the ETE if traffic control is not placed. If State and local police have not confirmed the ability to place the traffic control as described, discuss why the longer ETE values from Appendix I are not more appropriate for Tables 7-1 A thru D.

RAI 13.3-39

The roadway network is identified on multiple figures including Figure 1-2 Harris Link-Node Analysis Network. According to the North Carolina Department of Transportation and the North Carolina Turnpike Authority, a new Interstate (I-540) is under construction and planned to

traverse immediately west of Apex. I-540, which is planned to be open to traffic in the fall of 2011, will link Apex, Holly Springs, and Fuquay-Varina. Discuss why this new Interstate was not considered in the modeling of the roadway network. Identify the affects this roadway may have on the ETE.

RAI 13.3-40

Appendix K that provides road characteristics, lists lane widths as 1 or 2 inferring two lane and highways. The actual width of the lane is not provided. It is not mentioned whether lane widths were measured, most likely during the field survey, and if they were one consistent width. Section 1.3, page 1-5, states that unusual roadway characteristics were identified in the field survey including: narrow bridges, sharp curves, poor pavement, flood warning signs, inadequate delineations, etc. This information is not discussed in other areas within the document. Identify the narrowest section or other areas that are not uniform. Discuss how this information was used in the ETE calculations. For Appendix K, Evacuation Roadway Network Characteristics, provide the value that was used for the "Full Lane" lane width. Identify where the narrowest roadway sections exist within the roadway network and discuss how this was factored into the calculation.

RAI 13.3-41

Provide a legible map that includes the nodes identified on Figure 1-2 Harris Link-Node Analysis Network and in Appendix K Evacuation Roadway Network Characteristics. The nodes must be annotated (numbered in some manner) to support the review. A larger scale is necessary. Provide a roadway map that includes the sector and quadrant boundaries.

RAI 13.3-42

Section 2.1, Data Estimate 3, states that roadway capacity was estimated for each segment based on the field surveys and on the HCM. Section 4, page 4-5, states the two-lane roadway capacity is 1700 pc/hr as identified in Chapter 20 of the HCM. The HCM identifies these capacities for 'ideal conditions which include physical and operational conditions. Chapter 20 of the HCM does identify 1700 pc/hr as the capacity of a 2-lane roadway when the roadway meets the Base Conditions of Chapter 12 such as 12-foot lane widths and 6-foot shoulders. Operational conditions would include such items as time spent following other vehicles. Clarify if the field survey confirmed that lane widths meet the conditions for 'ideal'. Discuss the operational considerations applied to the roadway capacity estimate. If necessary, explain the affect on the ETE if the capacity is determined to be lower than the value used.

RAI 13.3-43

Section 4, page 4-4, states "based on empirical data collected on freeways, we have employed a value of R=0.85." Provide additional information, such as a reference, for the basis of this empirical data. Was the R factor applied only to freeways or was it also applied to the rural roads of the EPZ. Explain the basis for applying this factor to other than freeways, if applicable.

RAI 13.3-44

Section 3, page 3-17, states that approximately 8,100 vehicles enter the EPZ during the first hour after the siren. Provide the basis for the 8,100 vehicles. Discuss how this relates to the background traffic assumed on the roadway network when the evacuation begins.

RAI 13.3-45

Shadow Evacuation:

a. For the shadow evacuation values used in Table 6-4 Vehicle Estimates by Scenario, provide the assumptions with regard to trip generation times and loading of the transportation network.

b. In Table I-2 (Appendix I), Evacuation Time Estimates for Shadow Sensitivity Study, explain how the 30% increase of vehicles was distributed throughout the EPZ. Was the distribution uniform or based on the current population densities?

RAI 13.3-46

Section 4 describes the modeling of intersections and states on page 4-1 that critical intersections will often be provided by traffic control personnel. How are intersections that are controlled by traffic personnel modeled? Explain any assumptions on traffic speed, service flow, capacity, and queue discharge through a manned intersection.

RAI 13.3-47

Discuss where voluntary evacuation population within EPZ as shown on Figure 2-1 Voluntary Evacuation Methodology, (not the shadow evacuation as defined in Section 2.2) is allocated within Table 6-3, Percent of Population Groups for Various Scenarios and Table 6-4, Vehicle Estimates by Scenario.

RAI 13.3-48

It appears the analysis may include truncated distributions. The longest evacuation time for 100% of the ETE is 4 hours 40 minutes in Table 7-1D, (Time to Clear the Indicated Area of 100% of the Affected Population). This is based on the distributions in Section 5.

a. Figure 5-3, Evacuation Trip Generation for Various Population Groups, identifies a tail that may extend to 300 minutes, or 5 hours. Explain how the total evacuation time for 100% of the population as identified in Figure 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population can have a maximum ETE of 4 hours 40 minutes if the trip generation time may take as long as 5 hours.

b. Distribution No. 4 Prepare to Leave Home on page 5-8 does not agree with Figure F-12 Time to Prepare Home for Evacuation. Figure F-12 indicates that it takes 250 minutes for approximately 100% of people to prepare to leave home; however, it appears this tail could be as long as 360 minutes in the Figure. Distribution No. 4 indicates that 100% of the people are prepared to leave home in 195 minutes. Discuss the differences in the data between Appendix F and Section 5.

c. If necessary, reconcile Figure 5-2 Evacuation Mobilization Activities and Figure 5-3 Evacuation Trip Generation for Various Population Groups with the comments on the distribution of data for time to prepare to leave home.

RAI 13.3-49

Section 2.3 Assumption 2 states that it is assumed that everyone within the group of ERPA forming a Region will evacuate. However, Section 7.3 states that these ETE estimates do not and should not be distorted to account for stragglers. Discuss whether reference to 100%

evacuation, throughout the ETE does indeed represent 100% evacuation or if values have been truncated to eliminate those that may take longer to evacuate.

RAI 13.3-50

For the trip generation time events and activities in Figure 5-1, Events and Activities Preceding the Evacuation Trip, it appears that for scenarios (b) and (c), the assumption is 100% of the public is at home when the sirens sound. Explain the basis for not having a 'prepare to leave activity' and 'travel home' sequence for these scenarios.

RAI 13.3-51

For the distribution of data tables in Section 5, there is a note that states the survey data was normalized to the "Don't Know" response. Provide additional information to explain the normalization process.

RAI 13.3-52

In Table 7-1C, Time to Clear the Indicated Area of 95% of the Affected Population for R03, there is a difference in evacuation time between normal and adverse weather. In Table 7-1D, Time to Clear the Indicated Area of 100% of the Affected Population, there is no such difference for R03 although there are minor differences in time for some of the other regions. Discuss why adverse weather does not affect the total evacuation time for the 100% evacuation of R03.

RAI 13.3-53

Section 12, "Confirmation Time," addresses the time needed to confirm that the evacuation process is effective, i.e., the public is complying with the advisory to evacuate. Please address the following questions:

a. On page 12-1 it states, "[a]lthough Chatham County, Harnett County, Lee County and Wake County may use their own procedures for confirmation, we suggest an alternative or complementary approach." This statement suggests that the confirmation process and times discussed in Section 12 are an alternative for other that may be specific to the counties. It is unclear whether the counties have agreed with the (ETE) plan – or even if other county plans exist for confirmation of evacuation. Discuss whether the counties have agreed with the ETE plans for confirmation of evacuation, including the existence of other county plans. If other county plans exist, discuss how they would work with the ETE plan.

b. On page 12-1, it states that "[s]hould the number of telephone responses (i.e., people still at home) exceed 20 percent, then the telephone survey should be repeated after an hour's interval until the confirmation process is completed." Explain what is required if the telephone survey response is less than 20%, but still significant, such as 15%.

c. Discuss if the time required to mobilize the personnel needed to confirm the evacuation has been included in the time estimate. This would include the time and resources needed to obtain telephone numbers for the EPZ that are necessary prior to beginning the telephone survey. Discuss whether the time and resources needed to obtain telephone numbers for the EPZ, which are necessary prior to beginning the telephone survey, is included. Provide an estimate of the time needed to confirm that the evacuation is complete

RAI 13.3-54

The report discusses intelligent transportation systems (ITS), dynamic message signs, and highway advisory radio in Section 9. It is not clear if the use of such systems was considered in the ETE or if the results are dependent upon their use. Appendix G provides traffic control tactics for traffic control points, which have been developed in conjunction with the county emergency management representatives and law enforcement personnel. Section 1.3 Analytical Tools, page 1-8, states that the analyst can identify bottlenecks and develop countermeasures that are designed to expedite the movement of vehicles. Were any such adjustments integrated into the traffic management plan? Identify any adjustments that were made to expedite the movement of vehicles and improve evacuation times.

RAI 13.3-55

The Executive Summary indicates that state and county personnel reviewed and modified the telephone survey prior to its use. It further states that the traffic management plan was reviewed by state and local law enforcement officials, and modified based on their comments, although the modified version may still have caused concern. The cover letter states that the contractor has addressed comments provided by the counties. Section 9, Traffic Management Strategy, states that concern over the manpower and equipment was expressed by law enforcement personnel. The report states modifications to the plans were made.

a. Include the comments received.
b. Identify changes that were made to address comments. Clarify whether State and local police reviewed the changes and now agree with the traffic management plan.
c. Clarify if the priority assigned to each traffic control point in Appendix G has been agreed to by local response agencies.

RAI 13.3-56

Maps were provided to indicate the locations of reception centers. Provide textual information regarding the location, types, and capacities of facilities to be used in an evacuation.