

PSEGSPeRAIPEm Resource

From: Chowdhury, Prosanta
Sent: Monday, August 22, 2011 4:29 PM
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Subject: PSEG Site ESPA FINAL RAI 32 (eRAI 5791) SRP-02.01.03 (RSAC)
Attachments: PSEG Site ESPA Final RAI 32 (eRAI 5791).pdf

Please find attached RAI 32 for the PSEG Site ESP application. Following issuance of the draft of RAI 32 on August 2, 2011, a telecon was held on August 18, 2011, to provide clarification on Questions 02.01.03-3 (b) and (c), 02.01.03-4 (a) and (b), and 02.01.03-5 (c), as requested by PSEG. As a result of the discussion, the following were deleted: (i) two bullets with no text appearing under Question 02.01.03-4 (a), and (ii) the phrase "in either case," appearing in the text of the first bullet under Question 02.01.03-4 (a). No other changes were necessary, and therefore, we are issuing this RAI as final.

The schedule we have established for review of your application assumes technically correct and complete responses within 30 calendar days of receipt of RAIs; however, you requested via email on August 22, 2011, that the RAI response due date be 45 days from the issuance of the final RAI, instead of the normal 30 days; you stated that this request was based on your re-review of the full scope of the RAI and time required to ensure a complete response to the RAI. After reviewing your request, we concluded that a 45-day response period is acceptable for this RAI. As our standard practice, we will assess any impact the additional response time may have on the review schedule. If this RAI cannot be responded to within 45 calendar days, it is expected that a date for receipt of this information will be provided to the staff within the 30-calendar day period so that the staff can assess how this information will impact the published schedule.

If you have any questions, please contact me.

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8/22/2011

PSEG Site ESP
PSEG Power LLC, PSEG Nuclear LLC
Docket No. 52-043
SRP Section: 02.01.03 - Population Distribution
Application Section: 2.1.3

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

02.01.03-3

Regulatory Guide (RG) 1.206, Part III, Section C.I.2.1.3.4 (formerly Draft Guide DG-1145 as cited in SRP Section 2.1.3, Section II (Acceptance Criteria), Technical Rationale, Item 2, with respect to characterizing the low population zone (LPZ)) indicates that a scaled map of the LPZ should be provided to illustrate, among other things, “highways... waterways, and any other transportation routes that may be used for evacuation purposes”, so that appropriate protective measures could be taken on behalf of the enclosed population in the event of an emergency.

Figure 2.1-21 of the Site Safety Analysis Report (SSAR) in the Early Site Permit Application (ESPA) for the proposed PSEG ESP Site shows the extent of the LPZ (i.e., a 5-mile radius circle from the center of the proposed plant(s)) including:

- a grid of directional sectors at one-mile distance intervals and associated resident population counts in each segment;
- certain recreational areas; and
- certain nearby transportation routes (i.e., state highways).

Related SSAR Table 2.1-7 identifies facilities and institutions within the LPZ, the directional sectors and distances of these nearby facilities and institutions relative to the center of the proposed plant(s), and the associated peak daily transient population totals for the year 2008 for these locations. Consistent with RG 1.206, the Applicant should address the following issues:

- (a) Clarify SSAR Figure 2.1-21 by identifying the relative locations of the facilities and institutions listed in SSAR Table 2.1-7.
- (b) SSAR Figure 2.1-21 suggests that there are few roadways within and beyond the LPZ that may be used for evacuation purposes (especially on the Delaware side of the LPZ). Some smaller roads appear to connect to Delaware State Route 9 as it courses through the several identified recreational areas. Either explain why these smaller connecting roadways would not be appropriate for use in a situation calling for an evacuation, or update SSAR Figure 2.1-21 and related text in SSAR

Subsection 2.1.3.4 accordingly to show these additional routes. In any case, update Figure 2.1-21 (or provide an additional figure) to more clearly identify, graphically, the few available land-based transportation routes within the LPZ (or connecting to them).

- (c) SSAR Figure 2.1-21 shows what appears to be the plant access road to the existing Hope Creek and Salem Generating Plants. Confirm whether the proposed causeway alignment associated with the PSEG ESP Site, as depicted on SSAR Figure 1.2-3, would be available as an additional evacuation route for plant personnel and members of the public that may be in the immediate vicinity of the plant site as discussed in FSAR Section 2.1.2. If so, update SSAR Figure 2.1-21 (or provide an additional figure) to reflect the expected transportation routes during the operational phase of the proposed plant(s) and revise any associated text as necessary.

02.01.03-4

Pursuant to the regulations at 10 CFR 100.21(b) and the definition for “population center distance” in 10 CFR 100.3, the guidance in NUREG-0800, SRP Section 2.1.3, Subsection III (Review Procedures), Item 4 (Nearest Population Center Boundary) calls for, among other things, an evaluation of the bases used by an applicant to establish the boundary of the nearest identified population center. Population density is the controlling criterion, and the corporate boundary of the community is not limiting. The definition for “population center distance” refers to a densely populated center as containing more than “about 25,000 residents”.

Subsection 2.1.3.5 (Paragraph 1) of the Site Safety Analysis Report (SSAR) in the Early Site Permit Application (ESPA) for the proposed PSEG ESP Site states that the nearest population center is the city of Wilmington, DE, with its nearest boundary 14.8 miles north of the proposed plant center point. While the sources of the population estimates listed in SSAR Table 2.1-8, for population centers within 50 miles of the PSEG site, are referenced, the basis for identifying population center boundary locations relative to the proposed reactor(s) is neither explained nor illustrated under Subsection 2.1.3.5.

Furthermore, the city of Bridgeton, NJ, may represent an additional population center whose nearest boundary may be located closer to the proposed reactor(s) than the population center associated with the city of Wilmington, DE. As a result, given this uncertainty and based on the regulations and SRP guidance cited above, the Applicant should update the discussions in SSAR Subsection 2.1.3.5, including any associated current or new table(s) or figure(s), as appropriate, by addressing the following issues:

- (a) The 2010 U.S. Census Bureau (USCB) population count for the city of Bridgeton, NJ, is 25,349 people. Similarly, the 2009 USCB population estimate for Bridgeton, NJ, was 24,858 people, meeting the intent of 10 CFR 100.3 in regards to what constitutes a densely populated center. The city of Bridgeton, NJ, appears to be located about 15 miles to the east or east-southeast of the proposed PSEG ESP Site but areas just to the west through the north-northwest of the city limits may be slightly closer to the proposed PSEG ESP Site than the city of Wilmington, DE, otherwise designated in SSAR Subsection 2.1.3.5 as the nearest population center. In order to address this issue, the applicant should:

- Justify the exclusion of Bridgeton, NJ, from among the population centers identified in SSAR Table 2.1-8 as being within 50 miles of the proposed PSEG ESP Site and, explain the rationale for doing so.
- If added to the list of population centers within 50 miles of the proposed PSEG ESP Site in SSAR Table 2.1-8, confirm whether the nearest population center boundary for Bridgeton, NJ, (on the basis of population density as opposed to the corporate boundary limits as recommended in the referenced guidance) is closer than the distance specified for the population center associated with the city of Wilmington, DE.
- Clearly describe the basis for and illustrate the locations of the nearest population center boundaries for Bridgeton, NJ, (if added) and Wilmington, DE.

(b) The Staff notes that several other potential population centers appear to be located within 50 miles of the proposed PSEG ESP Site (based on the 50-mile radius illustrated in SSAR Figure 1.2-2) but have not been identified in SSAR Table 2.1-8 or addressed in SSAR Subsection 2.1.3.5. These include the Atlantic City, Cape May, and Wildwood areas of New Jersey along the Atlantic Coast.

USCB records indicate that the population of Atlantic City was more than 35,000 people in 2008, and that the Atlantic City-Hammonton, NJ, metropolitan statistical area exceeded 266,000 persons. The residential populations of Cape May and Wildwood, NJ, while generally well below the threshold of “about 25,000 residents” defined in 10 CFR 100.3 as a densely populated center, are seasonally well above that threshold due to transient recreational and other travel-related use (e.g., resorts) drawing more than 40,000 and 250,000 persons, respectively.

The Applicant should justify the need to include or exclude the Atlantic City, Cape May, and/or Wildwood areas of New Jersey from among the population centers identified in SSAR Table 2.1-8 as being within 50 miles of the proposed PSEG ESP Site and, in either case, explain the rationale for doing so. The Applicant should also explain whether and, if so, to what extent these transient populations have been accounted for in other discussions or data summaries presented under SSAR Section 2.1.3, or analyses addressed elsewhere in the SSAR.

02.01.03-5

Pursuant to 10 CFR 100.21(b), NUREG-0800, SRP Section 2.1.3, Subsection III (Review Procedures), Item 4 (Nearest Population Center Boundary) establishes the need, among other things, for the reviewer to evaluate communities that are closer to the plant than the design population center to determine the likelihood that their population will grow to greater than 25,000 people within the lifetime of the proposed power plant.

Subsection 2.1.3.5 of the Site Safety Analysis Report (SSAR) in the Early Site Permit Application (ESPA) for the proposed PSEG ESP Site:

- identifies the city of Wilmington, DE, as the closest population center to the proposed plant (Paragraph 1);

- states that one and one-third times the distance from the new plant center point to the proposed LPZ boundary is 6.7 miles (Paragraph 3);
- indicates that none of the distance / direction segments within 10 miles, as shown in SSAR Figure 2.1-11, have a projected resident and transient population in the year 2081 that exceeds 25,000 people, although the segment from 5 to 10 miles to the west of the PSEG Site approaches this 25,000-person criterion (Paragraph 4); and
- further indicates that Middletown, DE, is included in the 5- to 10-mile distance segment west of the PSEG Site with its nearest boundary being 7.0 miles from the site (Paragraph 4).

Given that the distance between the nearest boundary of Middletown, DE, and the new plant center point at the PSEG ESP Site, as stated by the Applicant, is so close to the separation requirement in 10 CFR 100.21(b) for population center distance (i.e., in this case, 7.0 versus 6.7 miles), the Staff evaluated the population estimates for the distance / direction segments around Middletown, DE. As a result, the Staff requests additional information which demonstrates that the population of and around Middletown, DE, will remain at a level below the threshold of “about 25,000 residents”, which 10 CFR 100.3 defines as a densely populated center, over the expected life of the proposed power plant(s).

The Applicant should update the discussions under SSAR Subsection 2.1.3.5, as indicated, by addressing the following technical issues with respect to the estimated population counts of and around Middletown, DE:

- (a) The Applicant based its comparison between the estimated population count for the year 2081 (expected end of the plant’s operating life) and the criterion in 10 CFR 100.3 that defines a densely populated center on the estimated count for the west direction sector between 5 and 10 miles from the PSEG ESP Site. However, examination of SSAR Figure 2.1-11 shows that several large portions of the Middletown community appear to extend into the west-southwest sector between 5 and 10 miles away and into both the west and west-southwest sectors beyond 10 miles. Consequently, it is not clear that the total population count associated with this potential population center has been established. Therefore, before a meaningful comparison can be made, the Applicant should update SSAR Subsection 2.1.3.5, including any associated current or new table(s) or figure(s), as necessary, by either:
 - justifying the exclusion of the resident and transient population in those portions of these adjacent sectors (areas) from being considered part of this potential population center; or
 - determining the estimated population counts for all of this potential population center by either including areas not only between 5 and 10 miles to the west of the proposed plant, but any adjacent distance / direction segments, or other alternative approach, and, in either case, explaining the method(s) used for making these estimates.
- (b) Table 2.5-4 of the Environmental Report (ER) in Part 3 of the ESPA contains annual population growth rates for the communities of Middletown, Odessa, and Townsend,

DE, among others within 10 miles of the PSEG ESP Site. The Applicant indicates that these growth rates are based on the decennial census for the year 2000 and on local population estimates for the year 2007 from the U.S. Census Bureau (USCB). The annual average growth rates over this 7-year period are 8.85, 2.24, and 1.27 percent; respectively; significantly higher than the county-wide annual average growth rate (i.e., 0.72 percent), and in the case of the Middletown community more than an order of magnitude greater. ER Subsection 2.5.1.1.1 (Paragraph 4) attributes the estimated increase in overall population within 10 miles of the proposed plant over the period from 2000 to 2010 as being “primarily due to the rapid growth in the Middletown-Odessa-Townsend, DE area”.

The Staff notes that for the west and west-southwest sectors between 5 and 10 miles from the PSEG ESP Site, SSAR Figures 2.1-3 through 2.1-11 appear to reflect this rapid growth between the years 2000 and 2010, increasing at a significantly lower estimated rate of growth of 6.34 percent over the 11-year period from 2010 to 2021 (or 0.57 percent per year), and at an even lower estimated growth rate of 4.10 percent over the 10-year period from 2021 to 2031 (or about 0.4 percent per year). This lower rate appears to be the basis for the remaining 10-year population estimates for the years 2041, 2051, 2061, 2071, and 2081 for distance / direction segments entirely within New Castle County, DE.

Finally, consistent with the guidance in SRP Section 2.1.3, Section III (Review Procedures), Item 1 (Population Data), the Staff notes that the total population for the community of Middletown, DE, based on the latest USCB data for 2010, is 18,871 persons. This total is more than 30 percent higher than the estimated population for the year 2010 as presented in ER Table 2.5-4 (i.e. 14,383 persons).

Given that the near-term increase in overall population within 10 miles of the proposed PSEG ESP Site has been attributed to rapid growth in the Middletown-Odessa-Townsend, DE, area, and that the population for the community of Middletown, as projected by the Applicant, appears to be underestimated by more than 30 percent compared to current actual USCB survey results for 2010, the updated population estimates for this potential population center, as called for in preceding comment (a), with appropriate updates to SSAR Subsection 2.1.3.5 and any associated current or new table(s) or figure(s), should also:

- either account for the actual population total reported by the USCB for the community of Middletown in the 2010 census results as a reference point, or justify continued reliance on a markedly underestimated total for making future population projections over the expected life of the proposed power plant(s);
- either determine and explain the rationale for the appropriate rates of growth to be applied to the time periods between 2010 and 2021, between 2021 and 2031, and any subsequent 10-year interval through 2081, for this specific potential population center as opposed to one or a group of distance / direction segments, considering that if the total population for the Middletown community has been underestimated by more than 30 percent then the segment-specific rate(s) of growth have been underestimated as well, or justify the retention and use of segment-specific growth rates for making future population projections over the expected life of the proposed power plant(s);

- identify and explain the technical bases for the length(s) of time (years) over which any revised rates of growth will be applied in relation to the specific time periods for which estimated population totals have are reported (i.e., the ten-year intervals between 2021 and 2081);
 - although a design has yet to be chosen, if a multiple unit configuration were to be selected, address to what extent population estimates beyond the year 2081 will need to be determined for both distance / direction segments out to 50 miles from the PSEG ESP Site and for this potential population center; and
 - determine the estimated population counts for this potential population center over the expected life of the proposed plant(s) so as to demonstrate whether or not the criterion of “about 25,000 residents” in 10 CFR 100.3 would be exceeded.
- (c) As indicated above, ER Subsection 2.5.1.1.1 (Paragraph 4) attributes the estimated increase in overall population within 10 miles of the proposed plant over the period from 2000 to 2010 as being “primarily due to the rapid growth in the Middletown-Odessa-Townsend, DE area”. At its closest point, the current political boundaries of Middletown and Odessa appear to be separated by only about one-quarter mile. Consistent with the guidance in SRP Section 2.1.3, Subsection III, Item 4, that population density is the controlling criterion and the corporate boundary of the community is not limiting:
- address the potential for such growth to continue into and around Odessa, DE, which is located just to the east of Middletown, over the expected life of the proposed plant(s) (i.e., during at least the next 70 years depending on the number of units to be built), such that the current and estimated population counts for both communities (rather than for Middletown alone) should be considered as representing the potential population center, and
 - in either case, update SSAR Subsection 2.1.3.5 and any associated current or new table(s) or figure(s), as necessary, to clearly explain the rationale for the determination made.

02.01.03-6

Pursuant to 10 CFR 100.21(b), NUREG-0800, SRP Section 2.1.3, Subsection III (Review Procedures), Item 4 (Nearest Population Center Boundary) establishes the need, among other things, for the reviewer to evaluate the basis used by an applicant to establish the boundary of the nearest identified population center. SRP Section 2.1.3, Subsection III, Item 4 goes on to state that “[t]he population center boundary should be established at that point nearest the plant where, in the reviewer’s judgment, the population density may grow to a value comparable to the density of the community itself”, and that the “[p]opulation density is the controlling criterion, and the corporate boundary of the community is not limiting”.

Subsection 2.1.3.5 of the Site Safety Analysis Report (SSAR) in the Early Site Permit Application (ESPA) for the proposed PSEG ESP Site states:

- that one and one-third times the distance from the new plant center point to the proposed LPZ boundary is 6.7 miles (Paragraph 3); and
- that the town of Middletown, DE, is included in the 5- to 10-mile distance segment west of the PSEG Site with its nearest boundary being 7.0 miles from the site (Paragraph 4).

The Applicant concludes the discussion in SSAR Subsection 2.1.3.5 by unequivocally stating that “there is no realistic possibility that a population center will exist closer than one and one-third times the distance to the LPZ within the projected life of the new plant”.

Given that the distance between the nearest boundary of Middletown, DE, and the new plant center point at the PSEG ESP Site, as stated by the Applicant, is so close to the separation requirement in 10 CFR 100.21(b) for population center distance (i.e., in this case, 7.0 versus 6.7 miles), the Staff evaluated both the population estimates for the distance / direction segments around Middletown, DE (see Question 02.01.03-5 in this RAI regarding the issues to be resolved with respect to the population projections under SSAR Subsection 2.1.3.5), and the possible nearest boundary location for this potential population center relative to the PSEG ESP Site.

As a result, the Staff requests additional information which demonstrates that the nearest boundary of a population center will not exist closer than one and one-third times the distance from the reactor(s) to the outer boundary of the low population zone (LPZ), as required by 10 CFR 100.21(b), within the projected life of the proposed power plant(s). As indicated above, SSAR Subsection 2.1.3.5 (Paragraph 4) points out that the nearest boundary of Middletown, DE, is 7.0 miles from the PSEG Site. In the west to west-southwest direction this occurs along the Korean War Veterans Memorial Highway (also referred to as Delaware State Route 1). In the same direction, the distance corresponding to 6.7 miles from the proposed reactor(s) occurs at the town of Odessa, DE, at about the U.S. Route 13 / Delaware State Route 299 interchange.

Therefore, in order to support the Staff’s evaluation of whether the population center distance will be acceptable over the projected life of the proposed power plant(s), the Applicant should resolve the following technical issues:

- (a) As indicated in Question 02.01.03-5 in this RAI, Paragraph 4 under Subsection 2.5.1.1.1 of the Environmental Report in Part 3 of the ESPA attributes the estimated increase in overall population within 10 miles of the proposed plant over the period from 2000 to 2010 as being “primarily due to the rapid growth in the Middletown-Odessa-Townsend, DE area”. At its closest point, the current political boundaries of Middletown and Odessa appear to be separated by only about one-quarter mile. Consistent with the guidance in SRP Section 2.1.3, Subsection III, Item 4, that population density is the controlling criterion and the corporate boundary of the community is not limiting:
 - address the potential for such growth to continue into and around Odessa, DE, which is located just to the east of Middletown, over the expected life of the proposed plant(s) (i.e., during at least the next 70 years depending on the number of units to be built), such that compliance with the population center distance

requirement in 10 CFR 100.21(b), regarding the location of the nearest boundary of this potential population center, is able to be demonstrated;

- identify and illustrate the areal extent of the growth of this potential population center over the expected life of the proposed plant(s) (e.g., on the basis of, but not limited to, available land use data and land use controls such as zoning, as indicated in SRP Section 2.1.3, Subsection III, Item 4), such that the nearest point to the plant from this potential population center over this time period is clearly indicated;
- in any case, update SSAR Subsection 2.1.3.5 and any associated current or new table(s) or figure(s), as necessary, to clearly explain the rationale for the determinations made.

(b) To the extent applicable, identify any changes to the current LPZ boundary distance and the implications of such changes on related analyses, discussions, tables, and/or figures in other sections of the ESPA.