



ND-2011-0039
June 7, 2011

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: **PSEG Early Site Permit Application**
Docket No. 52-043
Response to Request for Additional Information, RAI No. 21,
Population Distribution

- References:
- 1) PSEG Power, LLC letter to USNRC, Application for Early Site Permit for the PSEG Site, dated May 25, 2010
 - 2) RAI No. 21, SRP Section: 02.01.03 – Population Distribution, dated April 15, 2011 (eRAI 5638)
 - 3) PSEG Power, LLC letter to USNRC, Response to Request for Additional Information, RAI No. 21, Population Distribution, dated May 11, 2011

In Reference 3 above, PSEG informed the NRC that additional time was required to develop the response to RAI No. 21. RAI No. 21 addresses Population Distribution, as described in Section 2.1.3 of the Site Safety Analysis Report (SSAR), as submitted in Part 2 of the PSEG Site Early Site Permit Application, Revision 0. The purpose of this letter is to respond to the request for additional information (RAI) identified in Reference 2 above.

Enclosure 1 provides our response for RAI No. 21, Questions No. 02.01.03-1 and 02.01.03-2. Responses to Questions No. 02.01.03-1 and 02.01.03-2 will result in revisions to the SSAR. Enclosure 2 includes the proposed revisions to the SSAR. Enclosure 3 includes the new regulatory commitment established in this submittal.

If any additional information is needed, please contact David Robillard, PSEG Nuclear Development Licensing Engineer, at (856) 339-7914.

DD 79
NRD

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 7th day of June, 2011.

Sincerely,



James Mallon
Nuclear Development
Early Site Permit Manager
PSEG Power, LLC

Enclosure 1: Response to NRC Request for Additional Information, RAI No. 21,
Question Nos. 02.01.03-1 and 02.01.03-2, SRP Section: 02.01.03 –
Population Distribution

Enclosure 2: Proposed Revisions, Part 2 – Site Safety Analysis Report (SSAR)
Subsection 2.1.3

Enclosure 3: Summary of Regulatory Commitments

cc: USNRC Project Manager, Division of New Reactor Licensing, PSEG Site
(w/enclosures)
USNRC, Environmental Project Manager, Division of Site and Environmental
Reviews (w/enclosures)
USNRC Region I, Regional Administrator (w/enclosures)

PSEG Letter ND-2011-0039, dated June 7, 2011

ENCLOSURE 1

RESPONSE to RAI No. 21

QUESTIONS:

02.01.03-1

02.01.03-2

Response to RAI No. 21:

In Reference 2, the NRC staff asked PSEG for information regarding Population Distribution, as described in Section 2.1.3 of the Site Safety Analysis Report. The responses to the questions are presented following the same outline in which they were asked:

Response to RAI No. 21, Question 02.01.03-1:

In Reference 2, the specific requests for Question 02.01.03-1 were:

Pursuant to 10 CFR 52.17(a)(1)(viii) and based on the requirements in 10 CFR 100.21(h), NUREG-0800, SRP Section 2.1.3, Subsection III (Review Procedures), Item 5 (Population Density) establishes the need for an evaluation of the population density in the vicinity of the site to determine whether it exceeds the guidelines given in Regulatory Position C.4 of Regulatory Guide (RG) 4.7. This Regulatory Position specifies, among other things, a threshold population density criterion of 500 persons per square mile (per/sq-mi) averaged over any radial distance out to 20 miles.

Subsection 2.1.3.6 (Paragraph 2) of the Site Safety Analysis Report (SSAR) in the Early Site Permit Application for the PSEG Site includes a discussion of the plot in SSAR Figure 2.1-22 regarding estimated current (2010) and projected (2021) cumulative population totals as a function of distance from the proposed reactor(s) versus the population total equivalent to the 500 per/sq-mi threshold density. The Applicant considers data for the year 2021 to represent the period 5 years after the time of initial site approval. The Applicant states that the plot of population density for 2021 is well below 500 per/sq-mi out to 15 miles and approaches, but remains below, this threshold value between 15 and 20 miles reaching a population density of 497 per/sq-mi at 20 miles.

Given that the population density, as projected by the Applicant for 5 years after initial site approval, is within one percent of the 500 per/sq-mi threshold density, the Staff attempted to verify the Applicant's estimates based on the information available in SSAR Section 2.1.3. In the process, the Staff believes that the projected population densities within 20 miles of the site for 2021, and possibly for 2010, may be underestimated.

SSAR Subsection 2.1.3.6 is silent regarding whether and, if so, how any weighting was applied to the transient population component of the total population count as called for in Regulatory Position C.4 of RG 4.7. Therefore, presuming that no such weighting was taken into account, the Staff relied directly on the data available in SSAR Figures 2.1-4 and 2.1-5 which include distance- and direction-segment-specific combined resident and transient population counts between 0 and 10 miles from the proposed reactor(s) for the years 2010 and 2021, respectively. The Staff also relied on the data in SSAR Figures 2.1-13

and 2.1-14, recognizing that these values represent resident population counts only between 10 and 50 miles, again for 2010 and 2021, respectively, in order to account for at least that portion of the total population between 10 and 20 miles from the proposed reactor(s).

Based on its initial evaluation, the Staff has identified a number of technical issues which the Applicant should address by updating the discussions under SSAR Section 2.1.3, including any associated current or new tables and figures, as appropriate:

- (a) Confirm whether the transient population component of the total population counts to be considered in determining the population density out to 20 miles was weighted consistent with Regulatory Position C.4 of RG 4.7. If so, explain the methodology for doing so. In either case, explain the technical basis for the approach used.
- (b) Explain the apparent discrepancy between the population density estimated by the Staff for the year 2021 (i.e., 508 per/sq-mi), which includes no transient population component between 10 and 20 miles from the proposed reactor(s), and the value reported by the Applicant in SSAR Subsection 2.1.3.6 (Paragraph 2) (i.e., 497 per/sq-mi) as reflected in the data plot in SSAR Figure 2.1-22. The latter value presumably accounts for the cumulative resident and transient populations out to 20 miles from the proposed reactor(s). Note, however, that the value estimated by the Staff exceeds the 500 per/sq-mi threshold population density criterion in SRP Section 2.1.3, Subsection III (Review Procedures), Item (5) and Regulatory Position C.4 in RG 4.7 without accounting for the transient population component between 10 and 20 miles.
- (c) The Staff estimates that the Delaware River takes up approximately 145 sq-mi of the total area encompassed by a 20-mile radius circle centered on the proposed reactor(s). Excluding this over-water area increases the population densities within 20 miles to 574 per/sq-mi for the year 2021 and to 531 per/sq-mi for the year 2010, both in excess of the 500 per/sq-mi threshold population density criterion in SRP Section 2.1.3, Subsection III (Review Procedures), Item (5), and Regulatory Position C.4 in RG 4.7.

In order to resolve this issue, the Applicant should update SSAR Subsection 2.1.3.6 by confirming whether this over-water area was included in or excluded from the determination of the population densities averaged over any radial distance out to 20 miles, and:

- if included, explain the technical rationale for doing so considering that there would be no resident population on the over-water area and only a negligible transient population present; or

- *if excluded, specifying the actual over-water area taken up by the Delaware River at various distances from the proposed reactor(s) out to 20 miles, the available area at those radial distances, and the corresponding population densities.*
- (d) *Given the preceding issues and the potential for exceeding the threshold population density criterion, the Applicant should either:*
- *justify having estimated the population density averaged over any radial distance out to 20 miles for the year 2010 rather than at the time of initial site approval as called for in SRP Section 2.1.3, Subsection III (Review Procedures), Item (5), and Regulatory Position C.4 in RG 4.7; or*
 - *identify the expected time of initial site approval and update the estimated population density (and associated discussion, tables and/or figures) accordingly.*
- (e) *Resolution of one or more of the preceding issues may result in the need to revise the population density analyses discussed in SSAR Subsection 2.1.3.6. If the results of any revised analysis exceed the applicable threshold population density criterion of 500 per/sq-mi averaged over any radial distance out to 20 miles, the Applicant should update SSAR Subsection 2.1.3.6 to address the evaluation of alternative sites with lower population densities as called for by SRP Section 2.1.3, Subsection II (Acceptance Criteria), SRP Acceptance Criterion (5) and Regulatory Position C.4 in RG 4.7.*

PSEG Response to NRC RAI:

Regulatory Guide (RG) 1.70 specifies that the cumulative resident population density for the initial year of plant operation should be plotted out to 30 miles. The population density estimates originally presented in the SSAR included both resident and weighted transient populations within 10 miles of the PSEG Site, and resident populations only from 10 miles to 30 miles.

NUREG-0800 and RG 4.7 specify that population density estimates out to 20 miles should include resident and weighted transient populations and should be provided for the year of initial site approval and 5 years after approval. For the PSEG Site, the population density calculated for the first year of plant operation (2021) was considered conservative relative to the years of initial site approval and 5 years thereafter (2013 and 2018, respectively), because populations in the site area are projected to increase throughout the period under consideration.

Transient populations for the 10- to 20-mile radius were considered to be insignificant because it was expected that most of the visitors attracted to transient population centers within 20 miles would be drawn from the resident population within 20 miles,

and any temporary influx of visitors to the 20-mile radius would be offset by a similar out flux of people from the 20-mile radius. Therefore, the resident population density in 2021 was used as a conservative approximation of the resident plus weighted transient population in 2013 and 2018 for demonstrating compliance with the population density criteria specified in Regulatory Position C.4 of RG 4.7.

However, after considering the issues raised by the NRC Staff in RAI No. 21, PSEG has now calculated population densities for the years 2013 and 2018 including weighted transient populations within the 0- to 20-mile radius. Details of these new population density calculations are provided in the responses to specific questions below. The new calculations show that cumulative population densities, including weighted transient populations, are less than the RG 4.7 criteria (500 per/sq-mi) at all radial distances out to 20 miles from the PSEG Site in both 2013 and 2018. The new calculations also show that the 2013 and 2018 population densities (resident and transient) are less than the resident only population density in 2021, confirming the validity of the approach originally taken in the SSAR. Mark-ups are provided to add the new 2013 and 2018 population density estimates to the SSAR.

The 2013 and 2018 population densities, including weighted transient populations, are below the RG 4.7 criteria at all radial distances out to 20 mi.; the 2018 density at 20 mi. is 494 per/sq-mi. These projected population densities approach the RG 4.7 criteria. During preparation of the Early Site Permit application an Alternative Site Evaluation was performed. The PSEG Site was selected as the Proposed Site on the basis of this comprehensive site selection study. The study considered numerous safety, environmental and economic factors, including the population density in the area surrounding each Candidate Site. Based on the site selection study, the PSEG Site was found to have significant safety and environmental advantages compared with the other Candidate Sites. A detailed description of the Alternative Site Evaluation is provided in Part 3 of the PSEG ESP Application, Environmental Report, Section 9.3.

Responses to the specific questions included in RAI No. 21 are provided below. Unless otherwise indicated, these responses refer to the new population density estimates that are reflected in Enclosure 2 Proposed Revisions Part 2 – Site Safety Analysis Report (SSAR) Subsection 2.1.3.

(a) The transient component of the total population is weighted consistent with Regulatory Position C.4 of RG 4.7 in determining the population density out to 20 miles from the PSEG Site. The methodology used in this weighting considers the duration that transients in each category may be expected to be located within the 20-mile radius. For example, a weighting factor of 0.27 is applied to workers who enter the 20-mile area to reach their place of employment, based on the assumption that these workers are present in the area 9 hours per day, 5 days per week. A weighting factor of 0.17 is applied to people who enter the 20-mile area to shop at Christiana Mall, based on the assumption that these shoppers are present in the area 4 hours per visit. A weighting factor of 1.00 is applied to patients at major hospitals in the 20-mile area, based on the assumption that patients are present in

the area 24 hours per day, 7 days per week. Additional adjustments are made based on the percentage of the geographic service area for each category that is outside the 20-mile radius from the PSEG Site.

(b) The population density estimated by the Staff for the year 2021 (508 per/sq-mi) appears to include the transient population for the 10-mile radius without application of a weighting factor (i.e., assuming that all transient populations are present for a full 24 hours each day). The population density estimates calculated by PSEG include transient populations weighted as described in response to Question 02.01.03-1(a) above. These calculations include the following sources of transient population:

- Estimated transients associated with employers in the 0-20 mile radius (including those of the operating plants) using County-to-County Worker Flow Files (i.e., commuter data) from the 2000 Census
- Estimated contribution of transients to the overall 0-20 mile density associated with Bombay Hook National Wildlife Refuge
- Estimated contribution of transients to the overall 0-20 mile density associated with higher educational institutions such as University of Delaware
- Estimated contribution of transients to the overall 0-20 mile density associated with other major commercial/institutional facilities such as Christiana Mall, Christiana Hospital, Wilmington Hospital, and Delaware Park (a casino and racetrack).

The potential transient contribution from employees who enter the 20-mile radius for work is evaluated using commuter data from the 2000 Census. As part of this analysis the net influx is derived by evaluating employees' place of residence and their destination of employment to arrive at an estimate of total transient employees. Commuter data from the 2000 Census are advanced to each of the target years using the same growth rates used for the residential population estimates. Allocation of transients to/from counties within the 20-mile radius is accomplished using a geographic proportioning method. Employee density estimates are weighted using the above referenced weight. This analysis also considers employees of the existing operating plants at the PSEG Site.

Facilities within the 20-mile radius that are considered to be potential major contributors to transients within the area include the following:

- Christiana Mall
- Bombay Hook National Wildlife Refuge
- University of Delaware
- Christiana Hospital
- Wilmington Hospital
- Delaware Park (casino and racetrack)

Annual visitorship/use data for each of these facilities is obtained and adjusted to daily values. Additional adjustments are made for each facility, as appropriate, to account for daily duration of use and the geographic area outside of the 20-mile radius from which potential transients are likely to originate (typically 20 miles).

Using the above considerations, weighted transient populations are derived for the years 2013 and 2018 as presented in Table 1.

Table 1. Weighted Transient Populations within the 20-mile Radius of the PSEG Site

Source of Transients	Unweighted Annual Estimate	2013 Transient Estimate ¹	2013 Density ²	2018 Transient Estimate ¹	2018 Density ²
Census Commuter Workflow (projected from 2000)	3,269 ⁴	984	0.78	1,019	0.81
Christiana Mall ³	17,000,000	3,782	3.01	3,919	3.12
Bombay Hook National Wildlife Refuge (2008-2010 mean)	119,500	35	0.03	36	0.03
University of Delaware ³	21,177	3,363	2.68	3,484	2.77
Christiana and Wilmington Hospitals ³	1,154	609	0.48	631	0.50
Delaware Park ³	2,920,000	486	0.39	504	0.40
Total		9,259	7.37	9,594	7.63

¹Transient estimates represent time weighting and geographically adjusted daily values.

²Density is calculated by dividing the number of transients by the area of the 0-20 mile zone.

³Data obtained in 2011, presumably reflects 2010.

⁴Value from Year 2000, geographically adjusted.

In combination with the residential population estimates originally presented in the SSAR, these weighted transient populations result in the total population densities shown in Table 2.

Table 2. Summary of Supplemental Analysis of Population Density within the 20-mile Radius of the PSEG Site

2013 Resident + Transient Population	2013 Population Density	2018 Resident + Transient Population	2018 Population Density
599,617	477	621,303	494

The 2013 and 2018 population density estimates will be added to SSAR Subsection 2.1.3.6. The discussion on transient population in SSAR Subsection 2.1.3.3.2 will be revised to reflect the above information. In addition, SSAR Subsection 2.1.3.6 will

also be revised to identify that PSEG performed an Alternative Site Evaluation that considered population density when evaluating Candidate Sites.

- (c) The population density identified in SSAR Subsection 2.1.3.6 is calculated using a 20-mile circular area that includes the over-water portions of the Delaware River and estuary. The regulatory documents that describe the approach for determining population density do not prescribe that over-water areas be excluded in the calculation of population density. NUREG-0800 Section 2.1.3 Subsection I states that NRC assessment will review the specific area of population density to determine if the applicant's analysis is consistent with the guidance provided in RG 4.7. Regulatory Position C.4 of RG 4.7 states that the population density should be:

“...averaged over any radial distance out to 20 miles (cumulative population at a distance divided by the circular area at that distance) does not exceed 500 persons per square mile.”

Exclusion of an area because no one resides there does not reflect the regulatory guidance in the above referenced documents. This same logic would lead to the exclusion of other uninhabitable land surrounding the PSEG Site (e.g. Mad Horse Creek Wildlife Area) from the overall land area used in the population density determination and would lead to overly conservative estimates of population densities.

The PSEG Site is highly suitable given that there are no residents living within 2 miles of the plant. This low population density in the immediate region of the plant is supported by the presence of an uninhabitable water body. The PSEG Site is actually more protective from a long-term population density perspective given that no future residency can ever be established on this water body. This uninhabitable water body creates a buffer area between the site and higher population areas.

- (d) As explained in the response to Question 02.01.03-1(b), PSEG calculated population densities, including weighted transient populations within a 20-mile radius, for the year of initial site approval and 5 years thereafter (2013 and 2018), and these values are reflected in Enclosure 2, Proposed Revisions Part 2 – Site Safety Analysis Report (SSAR) Subsection 2.1.3.
- (e) As explained in the response to Question 02.01.03-1(b), PSEG calculated population densities, including weighted transient populations within a 20-mile radius, for the year of initial site approval and 5 years thereafter (2013 and 2018). The 2013 population density at 20 miles is 477 per/sq-mi. The 2018 population density at 20 miles is 494 per/sq-mi. This projection approaches the criteria provided in RG 4.7 (500 per/sq-mi).

An Alternative Site Evaluation was performed in support of the siting determination for the Early Site Permit effort. As reported in Part 3 of the PSEG ESP Application, Environmental Report, Section 9.3, the PSEG Site was selected as the Proposed

Site on the basis of a comprehensive site selection study. This study considered numerous safety, environmental and economic factors, including the population density in the area surrounding each Candidate Site. Based on the site selection study, the PSEG Site was found to have significant safety and environmental advantages compared with the other Candidate Sites.

This information will be added to SSAR Subsection 2.1.3.6.

Associated PSEG Site ESP Application Revisions:

SSAR Subsections 2.1.3.3.2 and 2.1.3.6 will be updated as specified in Enclosure 2 of this document.

Response to RAI No. 21, Question 02.01.03-2:

In Reference 2, the specific request for Question 02.01.03-2 was:

Pursuant to 10 CFR 52.17(a)(1)(viii) and based on the requirements in 10 CFR 100.21(h), NUREG-0800, SRP Section 2.1.3, Subsection III (Review Procedures), Item 5 (Population Density) establishes the need for an evaluation of the population density out to a distance of 20 miles from a proposed site to determine whether the density exceeds the 500 persons per square mile (per/sq-mi) guideline given in Regulatory Position C.4 of Regulatory Guide (RG) 4.7.

In determining the population density, Regulatory Position C.4 calls for, among other things, the inclusion of the weighted transient population for those sites where a significant number of people work, reside part-time, or engage in recreational activities. The data presented in Tables 2.1-5 and 2.1-6 of the Site Safety Analysis Report (SSAR) in the Early Site Permit Application for the PSEG Site suggest that a significant number of people work and utilize recreational areas and facilities beyond 10 miles from the proposed site.

Further, SSAR Figure 2.1-22 illustrates cumulative, combined resident and transient population totals as a function of distance from the proposed reactor(s) versus the population total equivalent to the 500 per/sq-mi threshold density. However, neither the discussion in SSAR Subsection 2.1.3.6 nor the population data presented in the tables and figures associated with SSAR Section 2.1.3 allow for a straightforward determination of the transient population counts beyond 10 miles from the reactor(s).

In RAI 02.01.03-1, the Staff raised several fundamental issues regarding the Applicant's determination of the population density averaged over any radial distance out to 20 miles. The Staff has identified additional technical issues pertaining to the transient population component of the total population count to be considered in determining the population density in accordance with the referenced regulatory guidance and, in particular, within the distance range of 10 to 20 miles from the proposed reactor(s). Therefore, the Applicant should:

- *provide additional information regarding the transient population in, at least, the 10- to 20-mile distance range where significant population variations are expected, consistent with Part III, Subsection C.I.2.1.3.3 of RG 1.206 (formerly Draft Guide-1145 as cited in SRP Section 2.1.3); and*
- *address the following technical issues by updating the population density analysis within 20 miles of the proposed reactor(s) and revising, as appropriate, the discussions under SSAR Section 2.1.3, including any associated current or new tables and figures.*

(a) *Employment statistics for several major economic centers between 10 and 50 miles from the proposed PSEG site are listed in SSAR Table 2.1-5. All or a portion of two of these centers lie within the 0- to 20-mile distance range to be considered in determining the population density for the site area. The Wilmington-Newark, DE economic center is located to the north-northwest within a distance range of 10 to 20 miles and is said to employ an estimated 350,700 persons. The Vineland- Millville-Bridgeton, NJ economic center is located to the east between 10 and 30 miles from the site and is said to employ an estimated 61,800 persons.*

However, the combined resident populations for the cities of Wilmington and Newark, in New Castle County, Delaware, are more than a factor three less, totaling only about 102,300 persons based on 2010 U.S. Census Bureau (USCB) counts. This suggests a significant influx for the work-related component of the transient population between 10 and 20 miles, for this direction sector at least. Conversely, the combined resident populations for the cities of Vineland, Millville, and Bridgeton, in Cumberland County, New Jersey, total approximately 114,500 persons, again based on 2010 USCB data. This population count is much higher than the associated 2008 employment statistic reported by the Applicant for this economic center, with no clear indication of potential influx or outflow of this work-related component of the transient population.

The Applicant should update the discussions under SSAR Section 2.1.3, including any associated current or new tables or figures, by addressing the following issues for the work-related component of the total transient population, specifically within the 10- to 20-mile distance range:

- Confirm whether and, if so, to what extent employment in the Wilmington-Newark, DE and/or the Vineland-Millville-Bridgeton, NJ economic centers have been accounted for in determining the population density averaged over any radial distance out to 20 miles from the proposed reactor location(s).*
- Reconcile the significant difference, as noted, between the combined resident population for Wilmington and Newark, DE versus the employment statistic for this economic center in terms of its relative contribution to the work-related component of the transient population between 10 and 20 miles.*
- Reconcile the difference between the employment statistic for the Vineland-Millville-Bridgeton, NJ economic center versus the combined resident population for these cities in terms of its relative contribution to the work-related component of the transient population, specifically between 10 and 20 miles.*

(b) There are three operating units currently adjacent to the proposed PSEG Site (i.e., two at the Salem Generating Station and one at the Hope Creek Generating Station). The proposed facility may incorporate two additional reactors depending on the design selected. The discussions under SSAR Section 2.1.3 do not appear to address work-related transient populations associated with plant outages and/or other construction activities for the existing or proposed unit(s) or whether such activities may overlap at some point in time such that a significant number of transient workers may be present at and in the immediate vicinity of the site.

Consequently, with regards to the determination of the population density averaged over any radial distance out to 20 miles from the proposed reactor location(s), the Applicant should either:

- explain the rationale for not including any of these activities as part of the work-related component of the transient population and update the discussions under SSAR Section 2.1.3 accordingly; or*
- update SSAR Section 2.1.3, including any associated current or new tables or figures, to account for this potential work-related component of the transient population.*

(c) Statistics on visitors to major public recreation areas located between 10 and 50 miles from the proposed PSEG site are listed in SSAR Table 2.1-6. The Bombay Hook National Wildlife Refuge, located to the south-southeast within a distance range of 10 to 20 miles away, reported 270,860 visitors during 2006. The Applicant should update the applicable discussions under SSAR Section 2.1.3, including any associated current or new tables or figures, by addressing the following issues for the recreation-related component of the total transient population within the 10- to 20-mile distance range:

- Clarify what constitutes a “major” public recreation area.*
- Confirm whether and explain how visitors to the Bombay Hook National Wildlife Refuge have been (will be) accounted for in determining the population density averaged over any radial distance out to 20 miles from the proposed reactor location(s). If not, justify the rationale for not doing so.*
- Identify any other non-major public or private recreation areas between 10 and 20 miles from the proposed PSEG site and, if any, either explain how visitors to such areas will be accounted for in determining the population density averaged over any radial distance out to 20 miles from the proposed reactor location(s), or justify the rationale for not doing so.*

(d) Several other possible contributors to the total transient population do not appear to have been accounted for in the determination of the population density averaged over any radial distance out to 20 miles from the proposed reactor location(s). Based on SSAR Table 2.1-3, these components may include: lodging (e.g., commercial, prisons, or other law enforcement facilities); schools and daycare centers; and medical care facilities.

Consequently, with regards to the determination of the population density, the Applicant should update the applicable discussions under SSAR Section 2.1.3, including any associated current or new tables or figures, to either account for the transient population components related to lodging, schools and daycare centers, and/or medical care facilities, specifically within the 10- to 20-mile distance range, or justify the rationale for not doing so.

(e) Resolution of one or more of the preceding issues may result in the exceedance of the applicable threshold population density criterion of 500 per/sq-mi averaged over any radial distance out to 20 miles. In such a case, the Applicant should update SSAR Subsection 2.1.3.6 to address the evaluation of alternative sites with lower population densities as called for by SRP Section 2.1.3, Subsection II (Acceptance Criteria), SRP Acceptance Criterion (5) and Regulatory Position C.4 in RG 4.7.

PSEG Response to NRC RAI:

(a) Employment in the Wilmington-Newark, DE and the Vineland-Millville-Bridgeton, NJ economic centers is included (through the use of employee commuter data) in the population density estimates shown in Table 1 presented in response to Question 02.01.03-1(b) above.

SSAR Table 2.1-5 lists 2008 employment data of 350,700 for the Wilmington-Newark economic center. This value was obtained from the Bureau of Labor Statistics (BLS) "Wilmington, Del.-Md.-N.J. Metropolitan Division." The BLS defines the Wilmington, Del.-Md.-N.J. Metropolitan Division as including New Castle County in Delaware, Cecil County in Maryland, and Salem County in New Jersey. Therefore, the 350,700 employees are for an area much larger than the area of the Wilmington and Newark municipalities. Year 2010 resident population projections are 539,587 for New Castle County, Delaware, 103,850 for Cecil County, Maryland, and 68,190 for Salem County, New Jersey, resulting in a total resident population of 711,627 for the Metropolitan Division.

SSAR Table 2.1-5 lists 2008 employment data of 61,800 for the Vineland-Millville-Bridgeton economic center. This value was obtained from the BLS "Vineland-Millville-Bridgeton Metropolitan Statistical Area." The BLS defines the Vineland-Millville-Bridgeton Metropolitan Statistical Area as being comprised of Cumberland County, New Jersey. Bridgeton is located within 20 miles of the PSEG Site. Vineland and Millville are beyond the 20 mile radius in Cumberland County.

SSAR Table 2.1-5 will be revised to clarify that the employment data represents geographic areas larger than the jurisdictions listed.

- (b) The existing workforce of the operating units includes employees representing nine states. Among these, 82.6 percent of the existing workforce resides within the four county "region of influence" represented by Salem, Cumberland and Gloucester counties in NJ and New Castle County in DE (Reference ER Table 2.5-1). As such, these workers are considered to be largely characterized by residents within the 20-mile radius and are not considered to be transients. This is consistent with PSEG's response to Question 02.01.03-1(b), where PSEG evaluated the potential transient workforce entering the 20-mile radius based on commuter census data. Based on 2000 Census data, all commuters entering or leaving the counties within the region of interest are tabulated and analyzed as to their residency and county in which they are employed. Table 1 presented in response to Question 02.01.03-1(b) above summarizes the estimated contribution of all commuting employees to the transient population within the 20-mile radius.

In consideration of the above analysis, PSEG also concludes that the potential contribution that outage workers would have to the transient population is minor. The outage workforce is expected to consist of up to 1000 workers who would travel to the PSEG Site for a total of approximately two months per year. Weighting of such a transient population would include the number of months during which they would be on site, the number of hours per day during those months, and their probable resident distribution. In consideration of these factors the potential contribution of outage workers to the population density within 20 miles of the PSEG Site is insignificant.

- (c) A "major" public recreation area is defined as a site with tracked usage patterns providing a total quantitative estimate of greater than 25,000 annual visitors.

Visitors to the Bombay Hook National Wildlife Refuge (NWR) are accounted for in the population density estimates as described below. It should be noted that the 270,860 visitors to Bombay Hook NWR reported in SSAR Table 2.1-6 appears to be misinterpreted data. Closer examination of the U.S. Fish and Wildlife Service publication *Banking on Nature 2006*, which was the source of the data (SSAR Reference 2.1-5), indicates that the 270,860 value represents visits (which counts multiple uses of the NWR facilities by the same person on the same day) rather than visitors. Visitor information was obtained from Bombay Hook NWR for the years 2010, 2009, and 2008. Bombay Hook NWR had 116,000 visitors in 2010, 119,000 in 2009, and 123,500 in 2008. Therefore, the average number of annual visitors for 2008 through 2010 (119,500) is used in the calculation of transient population, as described below.

The 2004 and 2006 *Banking on Nature* publications (SSAR Reference 2.1-5) note that roughly 20 percent of Bombay Hook NWR visitors are considered as residents.

People living within 30 miles of a refuge are considered residents for the purposes of the *Banking on Nature* publications.

Average annual visitorship from 2008 to 2010 is adjusted to a daily visitorship using the following:

- Consumptive use (hunting): 8 hrs per visit
- Non-consumptive use: 2.8 hrs per visit
- Resident vs. Non-Resident weighting (20 percent of visitors are considered to be residents who live within 30 miles of the refuge).

As a result, the contributing effect of these visitors to the overall density within the 20-mile radius is 0.03 per sq-mi in 2013 and 2018. This contribution is included in the population density values shown in Table 2 presented in response to Question 02.01.03-1(b) above.

The non-major public and private recreation areas within 20 miles of the PSEG Site are not included in the transient population calculation because they primarily serve permanent residents and are not significant centers of transient population. These non-major public and private recreation areas in the three states (New Jersey, Delaware, and Maryland) within the 0- to 20-mile radius are mainly state, county, city, and community parks and state wildlife management areas that provide open spaces, sports fields, picnic areas, boating areas, and hunting areas for predominantly resident communities. Examples of non-major public and private recreational sites within the 0- to 20-mile radius include parks, such as:

- Rogers Manor Park and Lums Pond State Park in Delaware;
- Toal Park and Fletchwood Community Park in Maryland;
- Bridgeton City Park and Riverview Beach Park in New Jersey;

and hunting/wildlife management areas, such as:

- Cedar Swamp Wildlife Management Area and Woodland Beach State Wildlife Management Area in Delaware;
- Bethel Managed Hunting Area and Courthouse Point Managed Hunting Area in Maryland; and
- Clarks Pond Wildlife Management Area, Madhorse Creek Wildlife Management Area, and Maskell Mill Wildlife Management Area in New Jersey.

Most of these facilities are relatively small and do not offer unusual recreation opportunities that are needed to attract a significant number of visitors from outside of the 20-mile radius. To the extent that transients are attracted into the 20-mile area by these facilities, PSEG would expect a comparable number of residents to be attracted out of the area for recreation, resulting in no significant net influx of transient population.

SSAR Table 2.1-6 will be updated with the revised value for Bombay Hook annual visitorship.

- (d) As part of the population density calculations described above, PSEG evaluated the potential contribution of other major sources of transients within the 20-mile radius. Facilities considered in this assessment include potential contributors to the transient population related to components such as lodging, schools, daycare centers, medical facilities, major commercial facilities and higher educational facilities. In the case of lodging facilities (hotels/motels) the net transient influx into the 20-mile radius is assumed to be insignificant, as persons originating from outside the area who may lodge inside the 20-mile radius (transients) are expected to be offset by residents from within the 20-mile area who leave the area for business and vacation.

Components such as grade schools, high schools, daycare centers, and outpatient medical centers, are expected to serve local residents. As such these institutions are not significant contributors to transient populations.

The potential contribution of transients from major commercial centers and higher educational institutions is quantitatively evaluated in the population density calculations. Facilities within the 20-mile radius that are considered to be potential major contributors to transients within the area included the following:

- Christiana Mall
- University of Delaware
- Christiana Hospital
- Wilmington Hospital
- Delaware Park (casino and racetrack)

As described in the response to Question 02.01.03-1(b), these facilities contribute a relatively minor number of transients to the overall density estimate for the 20-mile radius. However, they are included in the population density estimates presented in Table 2 above.

- (e) Please see the response to Question 02.01.03-1(e).

Associated PSEG Site ESP Application Revisions:

SSAR Table 2.1-6 will be updated as specified in Enclosure 2 of this document.

PSEG Letter ND-2011-0039, dated June 7, 2011

**ENCLOSURE 2
Proposed Revisions
Part 2 – Site Safety Analysis Report (SSAR)**

Subsection 2.1.3, Population Distribution

Marked Up Pages

2.1-6

2.1-8

2.1-15

2.1-16

**PSEG Site
ESP Application
Part 2, Site Safety Analysis Report**

limited land access to areas beyond the main access points. The daily usage data collected at these points reflect where most of the recreational transient population is located. Therefore, transient populations in the Cedar Swamp and Augustine Wildlife Management Areas are shown in the 3 to 4 mi. and 4 to 5 mi. bands in Tables 2.1-3 and 2.1-4. Transient populations for the Mad Horse Creek Wildlife Management Area are shown in the 5 to 10 mi. band.

2.1.3.3.2 Transient Population between 10 and 50 Miles

RAI No. 21, Question
02.01.03-2(a)

The major employment centers located between 10 and 50 mi. from the PSEG Site are shown in Table 2.1-5. These major employment centers include Philadelphia, which is the core of the Philadelphia Standard Metropolitan Statistical Area, as well as subregional centers such as Camden, Vineland, Millville, and Bridgeton, New Jersey; and Wilmington, Newark, and Dover, Delaware. The estimated total 2008 employment for these centers is 1,676,400, as shown in Table 2.1-5.

the metropolitan areas that include

Philadelphia generates the largest student population in the area due to a concentration of major colleges and universities. Students at colleges and universities are counted in the USCB census as year-round residents in their place of residence in February and March. Therefore, virtually all students are considered permanent, not transient, persons.

5,814,971

Major public recreation areas located between 10 and 50 mi. from the PSEG Site are shown in Table 2.1-6. Independence National Historical Park in Philadelphia generates the largest number of annual visitors, followed by Valley Forge National Historical Park in Pennsylvania. The total annual visitors for these recreation areas are 5,966,334 as shown in Table 2.1-6.

5,966,334

2.1.3.4 Low Population Zone

Insert 1

RAI No. 21, Question
02.01.03-2(c)

The proposed LPZ consists of a 5 mi. radius around the center point of the new plant as shown in Figure 2.1-21. This area is dominated by the open waters of Delaware Bay and low coastal wetlands to the east and west of the bay. Much of these coastal wetlands are under state ownership and managed as wildlife areas that are protected from future development. Additionally, most of the land on the New Jersey side within 2 mi. of the new plant center point is owned by PSEG, the USACE, or the New Jersey Department of Environmental Protection. Most of the privately owned land within the LPZ is managed for agricultural production and/or private access hunting/fishing.

RAI No. 21, Question
02.01.03-1(b)

Figure 2.1-21 shows the projected 2010 resident population in each distance band directional sector within the LPZ. The projected 2010 resident population within the LPZ is 2047 people.

Table 2.1-7 lists facilities and institutions identified within the LPZ. The directional sector, distance from the new plant center point, and associated 2008 peak transient populations are also shown in Table 2.1-7. It can be seen that the total 2008 peak transient population within the LPZ is estimated to be 260 people, almost all of whom are associated with recreation areas. One small day care facility, located 4.8 mi. from the plant center point, contributes seven students and two employees to the transient population. As discussed in Subsection 2.1.3.3.1, portions of Mad Horse Creek Wildlife Management Area are within the LPZ, but transient population use is concentrated beyond the LPZ.

**PSEG Site
ESP Application
Part 2, Site Safety Analysis Report**

RAI No. 21, Question 02.01.03-1
Insert 2

population projections are compared to hypothetical cumulative populations based on population densities of 500 and 1000 people per sq. mi.

NRC Regulatory Guide (RG) 4.7, *General Site Suitability Criteria for Nuclear Power Stations*, April 1998, and NUREG 0800 recommend that the population density within 20 mi. of a proposed plant site not exceed 500 people per sq. mi. at the time of initial site approval and 5 years thereafter. For the new plant, the projected first year of operation (2021) is considered to represent the period 5 years after initial site approval. As shown in Figure 2.1-22, the projected population density in 2021 is well below 500 people per sq. mi. out to 15 mi. from the PSEG Site. Between 15 and 20 mi. from the site, the projected population density is closer to 500 people per sq. mi. but continues to be below the recommended density. At 20 miles the projected 2021 population density is 497 people per sq. mi.

RG 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants, LWR Edition*, November 1978, states that the cumulative population density within 30 mi. of a proposed plant site should be compared to a density of 500 people per sq. mi. for the initial year of plant operation and 1000 people per sq. mi. for the last year of plant operation. As shown in Figure 2.1-22, the projected population density in 2021 is comparable to 500 people per sq. mi. for the distance out to 30 mi. from the PSEG Site. The projected population density in 2061 and 2081 is well below 1000 people per sq. mi. for the area out to 30 mi. from the PSEG Site. At 30 miles the projected 2081 population density is 782 people per sq. mi.

2.1.4 REFERENCES

- 2.1-1 The Delaware Population Consortium (DPC), Annual Population Projections Data Tables, Version 2008.0 (Excel), http://stateplanning.delaware.gov/information/dpc_projections.shtml, October 31, 2008, accessed May 18, 2009.
- 2.1-2 KLD Engineering, P.C., Salem and Hope Creek Nuclear Generating Stations, Development of Evacuation Time Estimates, Commack, New York, 2009.
- 2.1-3 Manta, profile based on data provided by Dun and Bradstreet accessed on June 11, 2009:
Air Liquide America LP <http://www.manta.com/company/mm77bp3>,
Autotype Holdings (USA), Inc. <http://www.manta.com/company/mm2s0m1>,
Delstar Technologies, Inc. <http://www.manta.com/company/mm29clk>,
Letica Corporation <http://www.manta.com/company/mm9wv0>
Memorial Hospital of Salem County, Inc.
http://www.manta.com/coms2/dnbcompany_dy11qv
- 2.1-4 Maryland State Data Center, 2009 Population Projections, Projections by Type for All Counties - Historic Census 1970 to 2000, Projected 2005 to 2030, Population Projections: XLS, http://www.mdp.state.md.us/msdc/dw_Popproj.htm, accessed May 18, 2009
- 2.1-5 National Park Service. Division of Economics U.S. Fish and Wildlife Service, "Banking on Nature 2004," September 2005. Division of Economics U.S. Fish and

2.1-8

Rev. 0

**PSEG Site
ESP Application
Part 2, Site Safety Analysis Report**

(d) **Table 2.1-5
Employment in Major Economic Centers between 10 and 50 Miles of the PSEG Site**

Economic Center	State	Directional Sector	Distance Band (miles)	2008 Employment
Camden	NJ	NE	30 to 40	536,000
Dover-Kent County ^(b)	DE	S	20 to 30	65,400
Philadelphia	PA	NNE	30 to 40	662,500
Vineland-Millville-Bridgeton ^(c)	NJ	E	10 to 30	61,800
Wilmington-Newark ^(a)	DE	NNW	10 to 20	350,700
Total	-	-	-	1,676,400

- a) Newark and Wilmington are not reported separately.
 b) Dover is not reported separately from Kent County.
 c) Vineland is not reported separately.

Reference 2.1-14

RAI No. 21,
Question 02.01.03-2(a)

(d) Values are reported from the Bureau of Labor Statistics and represent geographic areas larger than the jurisdictions listed.

**PSEG Site
ESP Application
Part 2, Site Safety Analysis Report**

**Table 2.1-6
Major Public Recreation Areas between 10 and 50 Miles of the PSEG Site**

Recreation Area	State	Directional Sector	Distance Band (miles)	Annual Visitors ^(a)
Independence National Historical Park	PA	NNE	30 to 40	4,076,638
RAI No. 21, Question 02.01.03-2(c) Historical Park	PA	N	40 to 50	1,275,871
Bombay Hook National Wildlife Refuge	DE	SSE	10 to 20	270,860
Prime Hook National Wildlife Refuge	DE	SSE	40 to 50	106,525
John Heinz National Wildlife Refuge	PA	NNE	30 to 40	106,491
Eastern Neck National Wildlife Refuge	MD	SW	40 to 50	103,946
Cape May National Wildlife Refuge	NJ	ESE	40 to 50	26,000
Wharton State Forest	NJ	ENE	40 to 50	NA(b)
Belleplain State Forest	NJ	ESE	40 to 50	NA(b)
Total	--	--	--	5,966,334

a) Visitor numbers are for the most recent year for which statistics are available.
b) "NA" indicates that statistics are not available.

Reference 2.1-5

Visitor number for Bombay Hook National Wildlife Refuge represents the average annual number of visitors from 2008 through 2010.

Rev. 0

RAI No. 21, Question 02.01.03-1(b), Insert 1

Other potentially significant sources of transient population between 10 and 50 mi. from the PSEG Site include Christiana Mall, a shopping mall located in Newark, Delaware, that reports approximately 17,000,000 annual visitors; and Delaware Park, a casino and racetrack located in Wilmington, Delaware, that reports approximately 2,900,000 annual visitors.

RAI No. 21, Question 02.01.03-1, Insert 2

USNRC Regulatory Guide (RG) 1.70 states that the residential population density within 30 mi. of a proposed plant site should be compared to a density of 500 people per sq. mi. for the initial year of plant operation and 1000 people per sq. mi. for the last year of plant operation. As shown in Figure 2.1-22, the projected population density in 2021 is comparable to 500 people per sq. mi. for the entire distance out to 30 mi. from the PSEG Site. At 20 mi. the projected 2021 residential population density is 497 people per sq. mi., and at 30 mi. the projected 2021 residential population density is 508 people per sq. mi. Figure 2.1-22 also shows that the projected population density in 2061 and 2081 is well below 1000 people per sq. mi. for the entire area out to 30 mi. from the PSEG Site. At 30 mi. the projected 2081 population density is 782 people per sq. mi.

RG 4.7 and NUREG-0800 recommend that the population density, including weighted transient populations, at all radial distances within 20 mi. of a proposed plant site not exceed 500 people per sq. mi. at the time of initial site approval and 5 years thereafter. For the PSEG Site, the expected year of initial site approval is expected to be 2013, and the year 5 years after initial site approval is expected to be 2018. Consistent with RG 4.7, transient populations identified within 20 mi. of the PSEG Site are weighted according to the percentage of each day the populations could reasonably be expected to be present in the area, and these weighted populations are added to the residential populations projected for 2013 and 2018. The resulting population density at 20 mi. from the PSEG Site is 477 people per sq. mi. in 2013 and 494 people per sq. mi. in 2018. As illustrated in Figure 2.1-22, the population density is lower at all distances closer to the site than at 20 mi.; therefore, it is clear that all radial distances within 20 mi. comply with the RG 4.7/NUREG-0800 guideline for the years 2013 and 2018.

Although the 2013 and 2018 population densities, including weighted transient populations, are below 500 people per sq. mi. at all radial distances out to 20 mi., the 2018 density at 20 mi. approaches the criteria provided in RG 4.7 and NUREG-0800. Given that the population density is close to the criteria, PSEG did consider population density in the Alternative Site Evaluation performed in support of the siting determination for the Early Site Permit effort. As reported in Part 3 of the PSEG ESP Application, Environmental Report, Section 9.3, the PSEG Site was selected as the Proposed Site on the basis of a comprehensive site selection study. This study considered numerous safety, environmental and economic factors, including the population density in the area surrounding each Candidate Site. Based on the site selection study, the PSEG Site was found to have significant safety and environmental advantages compared with the other Candidate Sites.

PSEG Letter ND-2011-0039, dated June 7, 2011

ENCLOSURE 3
Summary of Regulatory Commitments

ENCLOSURE 3

SUMMARY OF REGULATORY COMMITMENTS

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	Programmatic (Yes/No)
PSEG will revise SSAR Section 2.1.3, Table 2.1-5 and Table 2.1-6 to incorporate the changes in Enclosure 2 in response to NRC RAI No. 21.	This revision will be included in the next update of the PSEG Site ESP application SSAR.	Yes	No